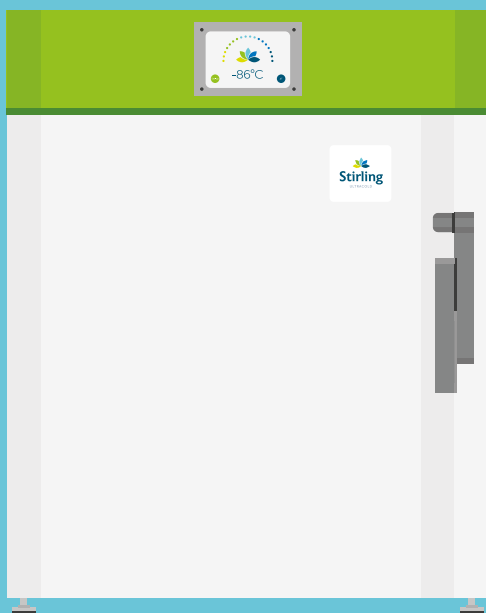




# SU105UE OPERATING MANUAL



**Compact Ultra-Low**  
Temperature Freezer

STIRLING POWER



# SU105UE QUICK GUIDE

## INITIAL SETUP

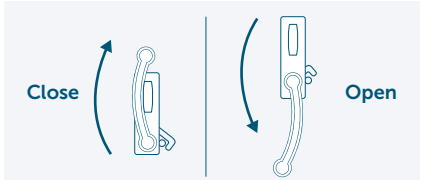
1	Unpack freezer unit and included components, ensure all packaging material has been removed from around the fan inlet and outlet hole.
2	Remove orange Transport Stop and replace with the white Protective Cap before powering on the freezer.
3	Plug AC power cord into the main power socket at the back of the unit and then into an electrical outlet. Maintain a minimum of 2-3 inches (50-77mm) clearance from the back of the unit.
4	Turn the AC Power Switch to the "On" position.
5	<b>Notice:</b> Ensure the Access Port stopper or sealant is in place. Remove factory tape at the port stopper prior to initial use.
6	Turn on battery power. The Battery Power Switch is located within the Recessed Electrical Panel on the rear of the freezer.
7	Ensure setpoint is within desired range (default is -80°C) or change setpoint to user-preferred temperature according to the control functions outlined below.

## GUIDE TO BASIC GRAPHICAL USER INTERFACE (GUI) FUNCTIONS

ON / OFF	Switch the main power on, located at the back of the unit above the AC cord.
Battery Power	Switch on the battery power, located within the Recessed Electrical Panel on the rear of the freezer. This is essential if monitoring is required in the event of a power failure.
Change Setpoint	Tap Home > Setup > Setup > Enter PIN > Enter > Change > Setpoint > +/- > Save
Silence Alarm	Tap Home > Setup > Silence
Event Log	Tap Home > Event Log > Prev. Page, Next Page
Chart History	Tap Home > Setup > Chart History

## GUIDE TO ADVANCED GUI FUNCTIONS

Alarm Set-up	Tap Home > Setup > Setup > Enter PIN > Enter > Alarms > xxx Delay > +/- > Save
Date and Time	Tap Home > Setup > PIN > Date & Time > +/- > Save
Change PIN	Tap Home > Setup > Setup > Enter PIN > Enter > PIN > Enter New PIN > Enter > Re-enter New PIN > Enter
Calibrate RTDs	Tap Home > Setup > About > Service > RTD Calibr. > RTD Select > +/- > Calib.



### NOTICE:

Before engaging door latch, ensure handle is fully rotated down to the stop point in order to reset latching mechanism. To engage door latch when closing, push outer door IN before rotating door handle to UP position.

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# SU105UE

## -86°C ULTRA-LOW STORAGE

The model SU105UE incorporates next generation free-piston Stirling engine technology. Free-piston Stirling engine technology differs from conventional compressor-based refrigeration by providing high efficiency, deep-temperature cooling in a lightweight package.

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## 1 INTRODUCTION

### 1.1 DESCRIPTION

The Stirling Ultracold SU105UE free-piston Stirling engine Ultra-Low Temperature (-86°C) Freezer uses proven M150A free-piston Stirling engine technology to provide high efficiency, deep-temperature cooling.

### 1.2 INTENDED USES

The SU105UE freezer provides ultra-low temperature storage for general (non-flammable) research laboratory materials requiring a stable, computer-controlled, deeply-frozen environment. The storage of blood or blood products intended for medical purposes is prohibited.

The SU105UE freezer is classified for use in a PollutionDegree 2 and Overvoltage Category II environment. The unit is designed to operate under the following environmental conditions:

- Indoor use
- Altitude up to 2000 m
- Maximum relative humidity 80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 40°C.

### 1.3 DOCUMENTATION

#### 1.3.1 Operating Manual

- This operating manual describes all aspects of receiving, installing, use, moving and storage of the Stirling Ultracold SU105UE Freezer. More detail on specific aspects of operation of the freezer is available via online supplementary documentation.
- Performance of the freezer is controlled by electronic logic that is programmed through a touch screen Graphical User Interface (GUI). This operating manual describes use of the GUI in section 5.

#### USER ADVISORY:

Deep temperatures are dangerous, use proper precautions when operating ultra-low temperature freezers. This ultra-low temperature freezer is intended for storage of frozen sample product or vials at deep temperatures. Stirling Ultracold, Division of Global Cooling, Inc. cannot be held responsible for damages or loss of stored product attributed to unintended use. In no case will Stirling Ultracold, Division of Global Cooling, Inc. be held liable for loss of stored product resulting from electrical, mechanical or structural failure. As with any ultra-low temperature freezer, appropriate back-up and redundancy considerations are the responsibility of the user.

## 1 INTRODUCTION (Continued)

### 1.4 ORGANIZATION OF THIS OPERATING MANUAL

This manual is organized as follows:

- Unpacking and installation
- Set-up
- Operation
- Transporting and moving.

**Please note** that precautions and safety instructions are part of each section of the manual, and must be observed to avoid damage to the freezer or harm to its users.

#### Flammable Refrigerant Use:

SU105UE uses 30-33 grams of R-170 (Ethane) in hermetically sealed thermosiphon tubing. It requires caution in use/repair.

- A Danger** – Risk of Fire or Explosion. Flammable Refrigerant Used. **Do Not Drill or Puncture Inner Liner.**
- B Danger** – Risk of Fire or Explosion. Flammable Refrigerant Used. **To be Repaired Only by Trained Service Personnel.** Component Parts Shall Be Replaced With Like Components. Do Not Puncture Refrigerant Tubing.
- C Caution** – Risk of Fire or Explosion. **Flammable Refrigerant Used. Consult Repair Manual/Owner's Guide Before Attempting to Service this Product.** All Safety Precautions Must be Followed.
- D Caution** – Risk of Fire or Explosion. **Dispose of Properly in Accordance with Federal or Local Regulations.** Flammable Refrigerant Used.
- E Caution** – Risk of Fire or Explosion Due to Puncture of Refrigerant Tubing; **Follow Handling Instructions Carefully.** Flammable Refrigerant Used.

## 2 FEATURES OF THE SU105UE FREEZER

### 2.1 FREE-PISTON STIRLING ENGINE

The SU105UE Ultra-Low Temperature Freezer uses the state of the art Stirling Ultracold Model M150A free-piston Stirling engine to provide high efficiency, deep-temperature cooling. No HCFC or CFC refrigerants are used in the M150A and SU105UE. The M150A Stirling cycle engine uses approximately 2 grams of helium gas as a working fluid. 30-33 grams of R-170 are used in the thermosiphon which removes energy from the freezer.

### 2.2 CABINET DESIGN FEATURES

The cabinet is VIP insulated with polyurethane foam support providing an internal volume of cabinet approximately 105 liters. The environmentally friendly, SNAP-compliant blowing agent is Ecomate®. A locking cam door latch ensures Door Gasket compression when closed. Door sealing consists of three gaskets and is factory replaceable. A door defrost minimizes water or ice deposition on the gasket interface.

### 2.3 TEMPERATURE MONITORING FEATURES

Two resistance temperature detectors (RTDs) measure the internal cabinet temperature of the SU105UE. One provides input to the free-piston Stirling engine controller and the other provides input for the Graphical User Interface (GUI) display and for reporting and logging. The display RTD may be user calibrated through the GUI. The GUI provides a door open timeout alarm and monitors the temperature reporting RTD for excursions beyond high and low limits that are set automatically or manually. Alarms are reported through an audible alarm in the freezer enclosure and through a contact closure that may be connected to an external alarm. The GUI provides options to temporarily suppress alarms and set a delay time before the alarm is reported via the contact closure. A one-time temperature alarm suppression provided by the software allows for the initial cooling of the freezer after start-up.

## 2 FEATURES OF THE SU105UE (Continued)

### 2.4 GRAPHICAL USER INTERFACE (GUI)

The GUI is implemented on a touch screen Control Panel on the front of the cabinet. Its capabilities are described in detail later. General features of the Control Panel are:

- Set freezer control, alarm and communications parameters
- Provide password protected access to parameter changes
- Display freezer status
- Display temperature graph and event log
- Display diagnostic and service information
- Display freezer identification information

Values for the following SU105UE parameters are viewed and modified through the touch screen.

Accessible Values	Modifiable Values
> Current freezer temperature	> Temperature setpoint
> Temperature history chart	> Under temperature limit
> Interior vs. free-piston Stirling engine temperatures	> Over temperature limit
> Alarm status	> Over temperature delay after door opening
> GUI firmware event log	> Audible alarm silence duration
> "About" screen (general information)	> External contact delay upon alarm
> Service contact information	> Door open alarm delay
> Diagnostics screen	> Door defroster status
	> Door auto-defrost status
	> Manual defrost time
	> Password Identification Number
	> (PIN) status
	> Current date
	> Current time
	> RTD calibration adjustments

## 2.5 PICTORIAL TOUR

- 1 Control Panel
- 2 Locking Latch
- 3 Door Gasket
- 4 Fixed Stainless Steel Shelf
- 5 Air Inlet
- 6 Access Port
  - > For thermocouple wires, purge gas, etc.
  - > 0.5" (12.7 mm) with plug
- 7 Air Outlet
- 8 Recessed Electrical Panel
  - A AC Power Connector
  - B AC Power Switch
  - C External Alarm Terminal Strip, Dry Contacts (NC, NO, C)
  - D Battery Power Switch

## 2.6 INCLUDED ITEMS

- Ice Scraper
- Port Sealant
- 1 Port Plug
- 2 Keys
- 1 Wrench

## 2.7 POWER CORDS

- **Power Cords** — A simple line cord change can allow for multiple power and receptacle types.
- **Power Cord Change** — To change the line cord, unplug the old line cord from the AC Power Connector found on the rear of the unit and plug the new line cord in its place. ***Make sure to use the cord and plug appropriate for your location.***

The options below are available:

- 1 **Line Cords for North America.** 120V, AC, 60Hz. NEMA 5-15P plug. Requires standard NEMA 5-15R receptacle.
- 2 **Line Cords for Europe/International.** 240V, AC, 50Hz. Standard two-pin plug requires two-pin receptacle and ground pin receptacle.



### 3 SAFETY PRECAUTIONS

Potential hazards associated with use of the SU105UE freezer may impact the safety of persons in the workplace in which the freezer is installed. This includes persons who operate the freezer, and other personnel in its vicinity. The freezer itself may also be damaged or its warranty voided by improper operation or usage. It is very important that all personnel that install, operate, transport or place the freezer into storage read this entire manual to understand those hazards. Likewise, it is imperative to place this manual for ready reference adjacent to the freezer at all times.

Specific appropriate precautions are included in each section of this operating manual. However, several important general precautions must be observed and are described below.

- **Do not** disassemble, modify or repair.\* There are no user serviceable parts inside the freezer unit.\*
- Use two or more people to lift the freezer or use mechanical means such as a dolly or fork lift. Sliding the freezer is acceptable.
- **Do not** operate freezer with the top cover removed as this will affect freezer performance. To avoid risk of electrical shock and injury disconnect power before removing top cover.
- **Do not** immerse in water, pour water on the unit, or operate where water may drip or fall on the unit. Operation under extreme environmental conditions, e.g., in very high humidity environments (RH 85% or more) also may lead to condensation or water intrusion.\*
- **Warning:** Unauthorized modification to the cabinet, controls or free-piston Stirling engine will void all warranty provisions.
- **Do not** cut, change or modify the power cable.\*
- **Do not** store flammable items such as gasoline, thinner or solvents in the freezer.
- The freezer is NOT rated as an explosion-proof freezer.
- **Do not** use hard and/or sharp objects, such as knives, screwdrivers, etc. to remove any frost or ice that has accumulated on the inside of the freezer. The inside panels are heat exchangers and can be damaged. Defrosting the cabinet is described later in this operating manual.

\*Doing so will void the warranty.

### 3 SAFETY PRECAUTIONS (Continued)

- **Do not** use solvents to clean the panel or the outside or inside of the freezer.
- When removing the power cable, hold onto the plug and not the cable.
- **Do not** block the air intake or air discharge vents used by the free-piston Stirling engine (See pictorial on Page 11 for locations.)
- Ultra-low temperature freezers are different from home freezers in that at -86°C frostbite can occur instantly.
- **For the personal safety of freezer users, safe operating procedures are essential.**
  - > Never handle samples or freezer accessories with bare hands. Be especially careful not to spill ultra-low temperature materials onto skin or clothing.
  - > **Do not** use gloves that become brittle at ultra-low temperatures.
  - > Nitrile and latex gloves are inadequate.
- **Permeable gloves are dangerous because frozen materials can contact skin and cause damage:**
  - > Be especially careful that materials at low temperatures are not spilled onto skin or clothing.
- **Ultra-low temperatures may adversely impact freezer contents:**
  - > **Do not** put ice or liquid water directly in the freezer box; always use suitable containers.
  - > Use only sample containers that have been approved or tested for ultra-low temperature use.
  - > **Do not** use glass containers when the contents might freeze and expand.
  - > Some plastics shatter at ultra-low temperatures. Avoid splinter hazards.
  - > Biological and chemical hazards are still hazardous at ultra-low temperatures.
  - > Always wear proper protective equipment and follow appropriate isolation protocols.
  - > Many types of labels will fall off and/or break at ultra-low temperatures. Some types of ink which stick to glass and/or plastic at room temperature lose adhesion at ultra-low temperature.
- **In addition to the ULT hazards above, there are also physical hazards to consider:**
  - > Be cautious when closing the door to avoid a pinching hazard.
  - > Be careful when loading the cabinet with heavy items.

## 4 UNPACKING AND INSTALLATION

Verify the SU105UE freezer shipment by uncrating the freezer and included items, inspecting them for damage during shipping, and compare the items to the packing list for completeness.

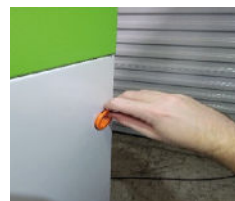
### 4.1 QUALIFY THE INSTALLATION SITE FOR THE FREEZER BEFORE PLACING IT INTO SERVICE

- 1 Note the shipping packaging dimensions (H x D x W) of 1079.5 x 838.2 x 838.2 mm | (42.5 x 33 x 33 in) and shipping weight of 121 kg | (266 lbs.), crated ocean weight of 180 kg | (396 lbs.).
- 2 When moving the shipment from the point of receipt to the place where it will be uncrated. The installation site must accommodate the freezer exterior dimensions of (H x D x W) 864 x 711 x 686 mm | (34 x 28 x 27 in) and weight of 100 kg | (220 lbs.).
- 3 There are no specific required clearances for the top and sides of the freezer; however, a minimum of 2-3 inches (50-77 mm) must be made for the electrical connection to the panel and air flow at the back of the unit.
- 4 The freezer should be positioned for easy power cord access.
- 5 Ingress to the Access Port (see Page 11) is required during normal operation.
- 6 The freezer must be installed on a nominally level surface and leveling feet will accommodate small variations from level.
- 7 The aisle way into which the freezer door opens must be wide enough to allow access to the contents of the freezer and not present a hazard to those using the aisle way.
- 8 The facility/room lighting must not obscure the readability of the touch screen display and must provide good visibility for working with the contents of the freezer.
- 9 After the freezer is placed into its installation location, any blockages to the Air Inlet and Air Outlet must be removed. (See Page 11 for locations.)
- 10 Care must be taken while unpacking and installing the freezer not to injure personnel or damage the freezer by loss of control of its motion during the processes. Be mindful of its size and weight. Dropping the freezer is likely to damage it.

## 4 UNPACKING AND INSTALLATION (continued)

### 4.2 SETUP

- 1 Remove orange Transport Stop and replace with the white Protective Cap before powering on the freezer.



**Step A**

Remove the orange Transport Stop Plug from the freezer.



**Step B**

Locate the Protective Cap in the accessory packet of the freezer.



**Step C**

Fit the Protective Cap over the hole where the Transport Stop Plug was removed. Hand-press the cap until flush.

- 2 Before switching on the AC electrical power to the freezer, make all desired external connections:
  - A AC Power Connection
  - B External Alarm
- 3 Turn on the AC Power Switch.
- 4 **Notice:** Ensure the access port stopper or sealant is in place. Remove factory tape at the port stopper prior to initial use.
- 5 After the freezer reaches its operating temperature and its door is opened and closed, the partial vacuum created when warm air is admitted, then cooled, will prevent reopening of the door until the pressure is equalized. A vacuum relief port is provided to accelerate this process.
- 6 Be mindful of any electrical shock hazards associated with making electrical connections to the freezer, especially the external alarm connection.
- 7 **Notice:** To activate the battery for the alarm system, please place the Battery Power Switch to the "on" position. The Battery Power Switch is located within the Recessed Electrical Panel on the rear of the freezer.



## 5 OPERATION

### 5.1 OPERATION OF THE SU105UE FREEZER COMPRISES FOUR STAGES:

- 1 Monitoring temperature performance using the Graphical User Interface (GUI) touch screen Control Panel.
- 2 Managing the freezer contents.
- 3 Cleaning and defrosting the freezer.
- 4 Calibrating the freezer's display RTD.

Specification of responsibilities for each of the above components of freezer operation should be part of the procedures and policy documents and guidelines for the clinical, laboratory, or other activity for which the freezer is used. Safety requirements are integral to these responsibilities.

## 5 OPERATION (Continued)

### 5.1.1 Graphical User Interface (GUI) & PIN

A Password Identification Number (PIN) may be set, but is not displayed. The default PIN is 1234 and may be changed by the user to any four-digit numeric. Use the PIN to control access to parameter change screens.

The GUI is preprogrammed with generic default values for most parameters listed on page nine, so entering the date, time and temperature setpoint are the most essential actions. Unless temperature limits are set manually, the software calculates default values appropriate for the temperature setpoint.

The GUI uses a menu system to display and modify system values. Generally, each screen displays certain values and contains "soft" buttons that are pressed to access other screens (according to the menu structure), and each screen has a soft button to return to the "Home" screen and a "Back" soft button to return to the next higher level of the menu (from which it was called).



## 5.1.2 GUI Menu

The GUI menu tree below starts with the Home screen. (How to get there is described later.) Soft buttons provide navigation to the screens on the next level of the menu tree.

- **Home** – display current freezer temperature.
- **Setup** – display Password Identification Number (PIN) status, door defrost status, temperature setpoint, system date and time and alarm status.
- **Setup** – display temperature setpoint.
  - > **Change Setpoint** – display and change the temperature setpoint and high and low temperature limits.
  - > **Alarm Setup** – display and change the Temp. Delay (to delay an over temperature alarm after a door opening), Audible Delay (time interval to silence the audible alarm upon request), Ext. Delay (to delay remote alarm contact closure after alarm condition is detected) and Door Delay (period that the door may remain open without alarm).
  - > **Date & Time Setup** – display and change system date and time.
  - > **Door Defrost** – enable/disable automatic door defrosting and/or set a manual defrost time and initiate manual defrost.
  - > **PIN Setup** – disable/enable the system PIN and change the PIN.
- **Silence Alarm** – temporarily silence audible alarm.
- **Event Log** – tracks the last approximately 200 alarm conditions such as door openings, temperature setpoint changes, over temperature condition, and power outages.
- **Chart History** – display the cabinet interior air temperature over the last 24 or 48 hours, or 7 days.
- **About** – display freezer model number, serial number, firmware version, engine number, run hours, temperature setpoint, and install date.
  - > **Service** – display cabinet, control and cold-head RTD temperatures, warm-head thermistor temperature and engine voltage, current and power.
  - > **Diagnostics** – display temperature setpoint, engine running power as a percentage of maximum running power, and freezer condition status.
  - > **Service Contact** – provides phone, email, and web address for manufacturer.
  - > **RTD Calibration** – display RTD readings and calibration offsets to apply to reading (used to compensate for discrepancies between Display RTD and user-supplied temperature standards).
- **Firmware Upgrade** – display screen for firmware check and upgrade options.
- **Alarm Test** – Tests alarm.

## 5.1.3 Basic GUI Controls

- Generally, to change a value on a screen, Tap the appropriate soft button to highlight the parameter.
- Use the +/- buttons to enter the desired value and then use the “Save” soft button to complete the change.
- PINs are entered through a numeric keypad screen with an “Enter” soft button to complete the entry and an “Exit” soft button to terminate it.
- PINs may be disabled on the PIN Setup screen by leaving the new PIN value blank. When the PIN is disabled, any person can perform all actions available via the GUI, including silencing alarms and calibrating the RTDs.
- The following examples of GUI usage describe sequential button taps, e.g., 1 > 2 means: tap button labeled “1” then tap button labeled “2”. GUI display screens are named and those names are shown in bold. Access to certain screens requires entry of the system PIN via a numeric keypad screen; this entry is shown as the PIN button tap.

### Guide to Basic GUI Functions

<b>ON / OFF</b>	Switch the main power on, located at the back of the unit in the Recessed Electrical Panel, above the AC cord.
<b>Battery Power</b>	Switch on the battery power, located within the Recessed Electrical Panel. This is essential if monitoring is required in the event of a power failure.
<b>Change</b>	Tap <b>Home</b> > <b>Setup</b> > <b>Setup</b> > Enter PIN > <b>Enter</b> > <b>Change</b> > Setpoint > Setpoint +/- > <b>Save</b>
<b>Silence Alarm</b>	Tap <b>Home</b> > <b>Setup</b> > <b>Silence</b>
<b>Event Log</b>	Tap <b>Home</b> > <b>Setup</b> > <b>Event Log</b> > Prev. Page, Next Page
<b>Chart History</b>	Tap <b>Home</b> > <b>Setup</b> > <b>Chart History</b>

### Guide to Advanced GUI Functions

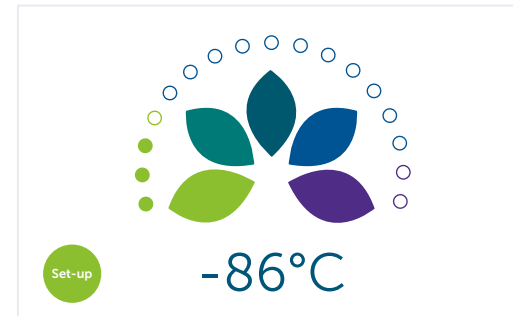
<b>Alarm Setup</b>	Tap <b>Home</b> > <b>Setup</b> > <b>Setup</b> > Enter PIN > <b>Enter</b> > <b>Alarms</b> > xxx Delay > +/- > <b>Save</b>
<b>Date and Time</b>	Tap <b>Home</b> > <b>Setup</b> > PIN > <b>Date &amp; Time</b> > +/- > <b>Save</b>
<b>Change PIN</b>	Tap <b>Home</b> > <b>Setup</b> > <b>Setup</b> > Enter PIN > <b>Enter</b> > <b>PIN</b> > Enter New PIN > <b>Enter</b> > Re-enter New PIN > <b>Enter</b>
<b>Calibrate</b>	Tap <b>Home</b> > <b>Setup</b> > <b>About</b> > <b>Service</b> > <b>RTD Calibr.</b> > RTD Select > RTDs +/- > <b>Calib.</b>

### 5.14 GRAPHICAL USER INTERFACE (GUI) INSTRUCTIONS



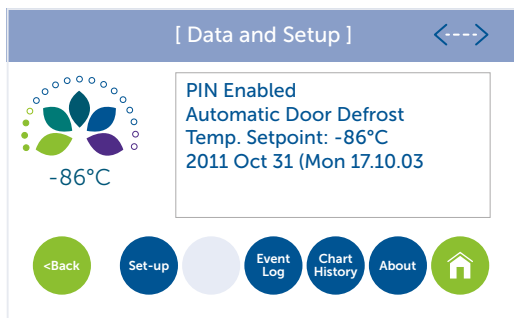
#### 1 Start Screen:

- Turn On Freezer and Battery Power
- Stirling Ultracold splash screen will appear for 3 seconds



#### 2 Home Screen:

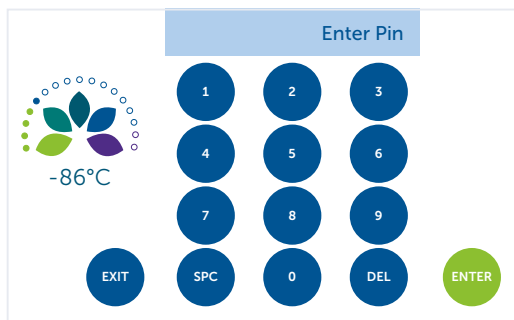
- The Home screen will be displayed next
- Tap the **Set-up** button to proceed to system settings



### 3 Data Setup:

From the Setup Screen.

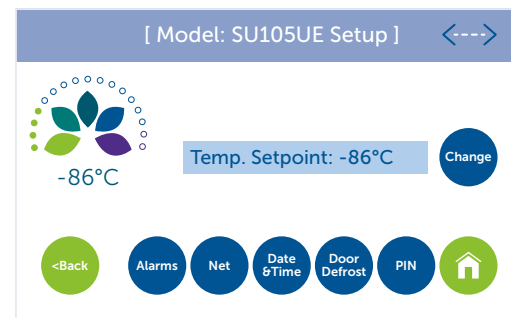
- Tap the **Set-up** button to change alarm settings, date & time, door defrost heater, and PIN
- Tap the **Silence** button to temporarily silence the audible alarm
- Tap the **Event Log** button to track the last approximately 200 events
- Tap the **Chart History** button to track the box air temperature over the last 12 hours, 24 hours or 7 days
- Tap the **About** button for freezer information including build and service and calibration
- Tap the **Back** button to return to the Setup Screen
- Tap the **Home** button to take you back to the Home Screen



### 4 PIN Number:

By default, Silence and Calibration require PIN.

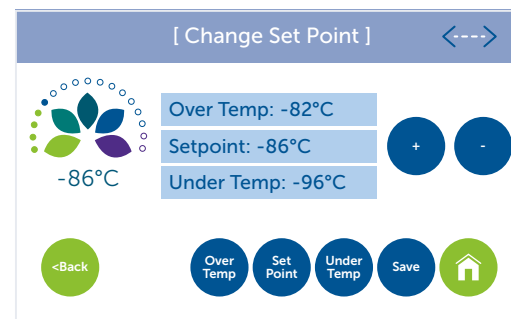
- Tap 1 2 3 4
- Tap Enter



### 5 Secure Temperature Setpoint:

To observe the current temperature setpoint.

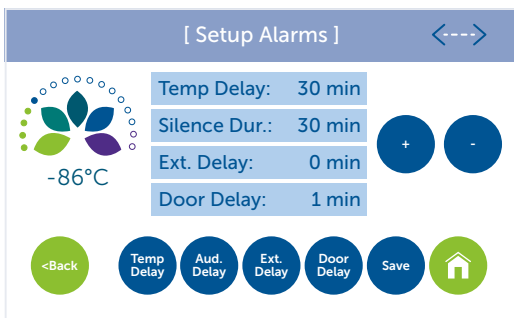
- Tap **Change** to change the temperature setpoint and over / under temperature thresholds
- Tap the **Alarms** button to change the alarm delays
- Tap the **Date & Time** button to change system date and time
- Tap the **Door Defrost** button to setup auto defrost or to start a manual defrost
- Tap **PIN** to change or disable PIN
- Tap the **Back** button to return to the Setup Screen
- Tap the **Home** button to take you back to the Home Screen



### 6 Alarm Setpoint:

To change the setpoint or over/under temperature thresholds.

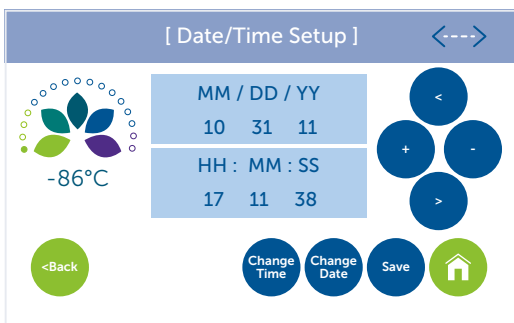
- Select the appropriate parameter then use the + and - buttons to adjust then tap **Save** (Note: If Save is not tapped new values will not be used)
- Tap the **Back** button to return to the Setup Screen
- Tap the **Home** button to take you back to the Home Screen



### 7 Alarm Delay:

From the Setup Alarms Screen.

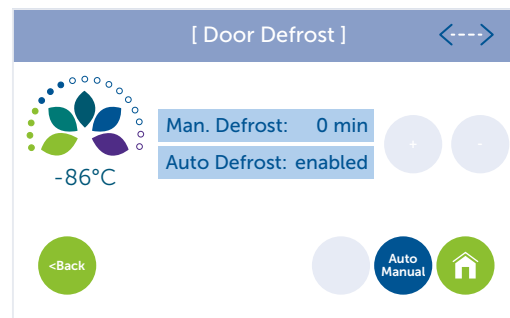
- Select the appropriate parameter then use the + and - buttons to adjust then tap **Save** (Note: If Save is not tapped new values will not be used)
- **Temp. Delay** delays an over temp alarm after a door opening
- **Audible Delay** delays beeper for a period of time when silence is tapped
- **Ext. Delay** delay between audible alarm and remote alarm
- **Door Delay** period of time that the door can be open before sounding an alarm
- Tap the **Save** button to save configurations
- Tap the **Back** button to return to the Setup Screen
- Tap the **Home** button to take you back to the Home Screen



### 8 Date and Time:

To setup the date and time select.

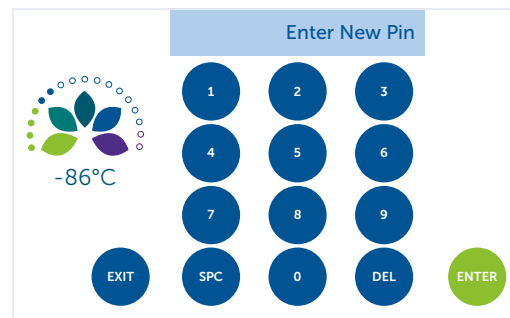
- **Change Time** – use the <, >, +, - buttons to set the time then tap **Save**
- **Change Date** – use the <, >, +, - buttons to set the date then tap **Save**
- Tap the **Back** button to return to the Setup Screen
- Tap the **Home** button to take you back to the Home Screen



### 9 Door Defrost Heater:

When set to Auto Defrost, the door defrost heater will cycle 15 minutes ON and 20 minutes OFF unless otherwise programmed.

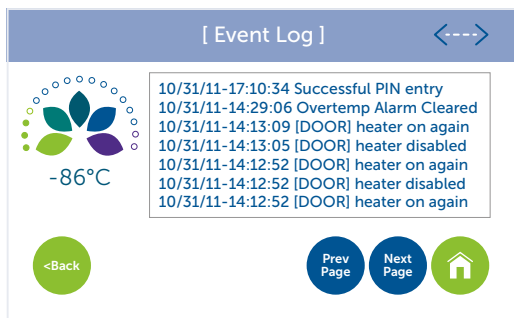
- Auto Defrost parameters are not adjustable
- To enable Manual Defrost tap the **Auto Manual** button to activate Manual mode
- Set Manual Defrost for any value up to 30 minutes
- Tap **Enter**
- When the desired cycle is completed the system will revert to the Auto Defrost Mode



### 10 Change PIN:

By default the PIN is enabled. Use the PIN setup to change or disable the PIN.

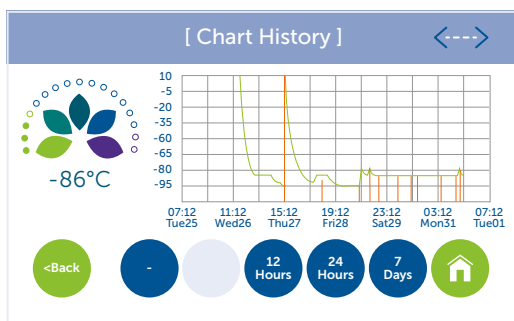
- To change the PIN use the keypad to enter a new 4 digit PIN then tap **Enter**. You will then be prompted to reenter the new PIN then tap **Enter**
- To disable PIN leave the Enter New PIN field blank and tap **Enter**



### 11 Event Log:

The Event Log will display the last approximately 200\* events in about 30 pages, listing 7 events per page. The last 7 events are shown by default.

- Events beyond 30 pages will not be saved
- Tap **Prev Page** and **Next Page** to scroll through the pages
- Tap the **Back** button to return to the Setup Screen
- Tap the **Home** button to take you back to the Home Screen

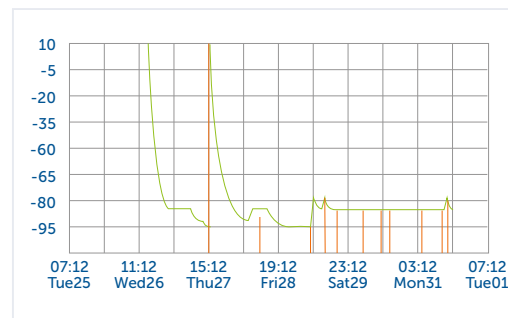


### 12 Chart History:

Chart History will display the internal box air temperature for the last 12 or 24 hours, or 7 days.

- Tap the **Back** button to return to the Setup Screen
- Tap the **Home** button to take you back to the Home Screen

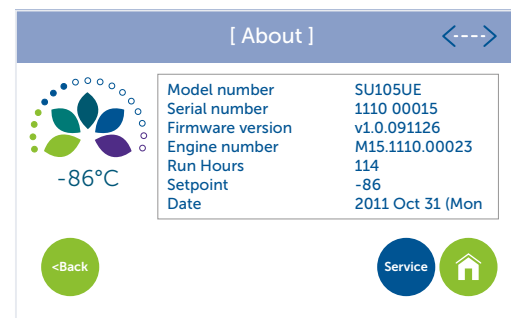
\*Approximate because the length of the stored parameter changes depending on the event. Once the registers are full, the oldest data is rejected to make place for the newest data.



### 13 Chart History, Zoom:

The Chart History can be enlarged to use the entire display.

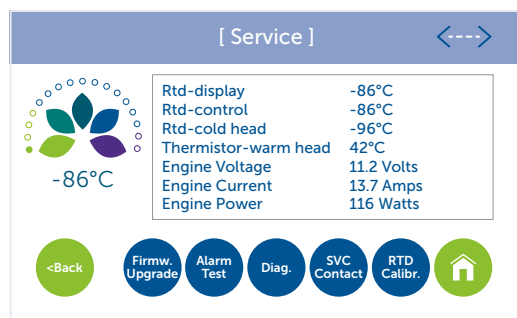
- Tap the screen to enlarge or reduce the Chart History Screen



### 14 About Freezer:

To observe specific freezer information including Model and Serial Number, Firmware Version, Engine Number, Run Hours, Setpoint, and Date.

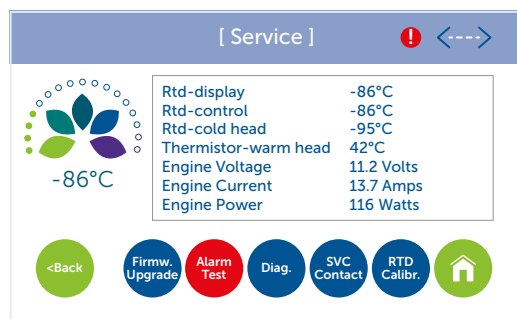
- Tap the **Service** button to look at freezer parameters such as temperatures and engine voltage, current, and power
- Tap the **Back** button to return to the Setup Screen
- Tap the **Home** button to take you back to the Home Screen



### 15 Performance Snapshot:

The Service Screen gives you access to system information and calibration, as well as Firmware Upgrade options, Alarm Tests, Diagnostics, Service Contact, and RTD Calibration.

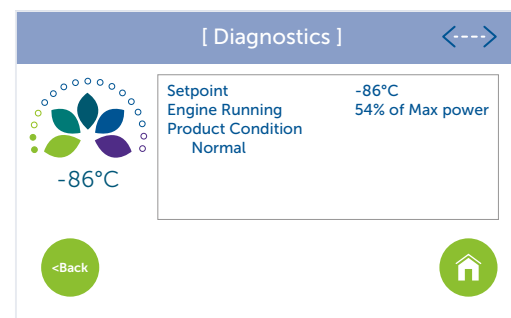
- Tap the **Firmw. Upgrade** button to for system firmware upgrades
- Tap the **Alarm Test** button to test temperature alarms
- Tap the **Diag.** button to get to the system diagnostics screen
- Tap the **SVC Contact** button to find dealer information
- Tap the **RTD Calibr.** button to calibrate the RTD (Note: PIN required to calibrate the RTD)
- Tap the **Back** button to return to the Setup Screen
- Tap the **Home** button to take you back to the Home Screen



### 16 Alarm Test:

Alarm Test Screen provides alarm testing.

- Tap the **Firmw. Upgrade** button to for system firmware upgrades
- Tap the **Alarm Test** button to test temperature alarms
- Tap the **Alarm Test** button again to stop beeping



### 17 Diagnostics:

Diagnostic Screen provides system health information.

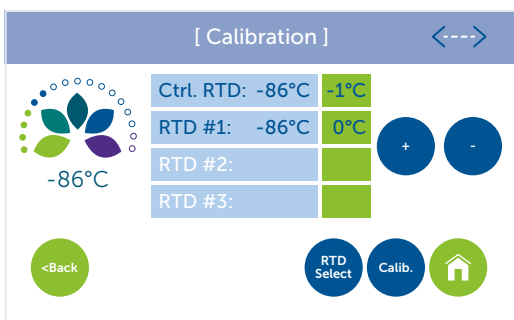
- Tap the **Back** button to return to the Setup Screen
- Tap the **Home** button to take you back to the Home Screen



### 18 Service Contact:

Service Contact Screen provides phone, email, and web address for manufacturer.

- Tap the **Back** button to return to the Setup Screen
- Tap the **Home** button to take you back to the Home Screen



### 19 Calibration:

RTD Calibration Screen is used to compensate for discrepancies between the Display RTD and a user provided standard.

- Tap **RTD Select** until the desired RTD is selected then use the **+** and **-** buttons to adjust the offset. Tap the **Calib.** button to save changes
- Tap the **Back** button to return to the Setup Screen
- Tap the **Home** button to take you back to the Home Screen

### 5.2 MANAGING FREEZER CONTENTS

The SU105UE freezer is designed for long-term storage of sample materials with ultra-low, well-regulated temperature storage requirements. Many times these materials are collected in cassettes or other carriers for ease of inventory and transportation. Such carriers have respective safety requirements and best practices for usage that become part of the requirements for managing freezer contents.

- The temperature setpoint for the freezer should be changed as appropriate for the materials being stored using the GUI as described above, as may the high and low temperature limits, as necessary.
- The current freezer temperature is displayed on the Home Control Panel screen, and a temperature history chart is available on the Control Panel screen.
- Materials may be placed in the freezer in any convenient arrangement that does not block the access port, interfere with the Door Gasket, or prevent the door from closing completely.
- The Safety Precautions section of this Operating Manual is especially pertinent to this component of SU105UE freezer operation, as ultra-low temperatures are encountered directly. The user is directed to review those Safety Precautions.



### 5.3 CLEANING

#### Cleaning the Freezer Surfaces

- Clean the exterior surfaces of the SU105UE cabinet as needed by using a soft cloth and mild detergent. Do not use solvent (such as bleach) or harsh abrasive cleansers or pads.
- When appropriate, remove ice that accumulates inside the freezer by defrosting it.
  - > Transfer the contents of the freezer to alternate storage, switch off the power to the freezer and wait for the ice to melt.
  - > Wipe up moisture with a clean cloth. If the freezer door can be left ajar safely, defrosting will be more rapid.
  - > After defrosting the freezer, switch the power back on. When the temperature reaches the setpoint, return the contents to the freezer.
- Note the Safety Precautions section of this Operating Manual while defrosting the freezer.

### 5.4 CALIBRATION OF THE RESISTANCE TEMPERATURE DETECTOR (RTD)

The SU105UE Display RTD and Control RTD may be calibrated by inserting a temperature sensor through the Access Port of the cabinet wall and securing it next to the RTDs located in the right rear corner of the interior just above the shelf.

- To provide access to the RTDs, it may be necessary to transfer the contents of the freezer to alternate storage. Note the Safety Precautions section of this Operating Manual while making such transfers.
- Navigate to the RTD Calibration screen using the GUI.
- **To calibrate:**
  - > Use the **"RTD Select"** soft button to highlight the RTD reading on the screen.
  - > Use the **"+"** and **"-"** soft buttons to adjust the offset to the desired value.
  - > Tap the **"Calib"** soft button to save changes.

## 6 TRANSPORTING, MOVING AND STORAGE

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To move the freezer to another location or temporarily place it into storage, perform the following steps:

- Transfer the contents of the freezer to alternate storage. Note the Safety Precautions section of this Operating Manual while making such transfers.
- Shut down the freezer by turning off the power and allowing it to come to room temperature.
- Dry the inside of the freezer compartment and clean any spills.
- Disconnect wires and cable connected to the freezer. See Section 4.2 for precautions associated with this task.
- Disinfect with suitable sterilizing agent if the freezer has been used for biohazards. Do not use bleach.
- Close and secure the door to the freezer.
- Move the freezer. Use two or more people to lift the freezer or use mechanical means such as a dolly or fork lift. Sliding the freezer is acceptable. See Section 4.1 for precautions associated with this task.

## 7 PREVENTATIVE MAINTENANCE AND SERVICE

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The SU105UE freezer is designed for years of trouble-free operation. To prevent costly and inconvenient repairs and maintain your freezer to an optimum level of performance, follow the recommended preventative maintenance schedule and contact an authorized service provider as needed.

### 7.1 MONTHLY MAINTENANCE

#### 7.1.1 DE-ICE GASKETS AND BREAKER

Remove any frost buildup from around door, door gaskets, and breaker using the included scraper or a soft cloth.

#### 7.1.2 INSPECT VACUUM RELIEF PORT

Ensure vacuum relief port is free of frost or ice at the vacuum breaker. Clear any ice using the included scraper.

### 7.2 YEARLY MAINTENANCE

To be performed only by an authorized service provider.

#### 7.2.1 CHECK AND CLEAN HEAT REJECT FINS

**CAUTION:** Stored voltage hazard – performed by authorized service provider only.

**CAUTION:** Cover is in one piece and weighs approximately 15 lbs.

#### 7.2.1 CHECK DOOR ALIGNMENT

Check that door alignment is correct and allows the door latch to be easily engaged.

### 7.3 BIENNIAL MAINTENANCE

To be performed only by an authorized service provider.

#### 7.3.1 REPLACE BATTERY

**CAUTION:** Stored voltage hazard – performed by authorized service provider only.

**CAUTION:** Cover is in one piece and weighs approximately 15 lbs.

**CAUTION:** Only use a sealed lead acid rechargeable battery (6V, 7Ah) as specified. Power-Sonic (PS-670) replacement batteries can be purchased from Stirling Ultracold (Part# SU105U-A000).

**WARNING:** Using a non-rechargeable battery may cause the battery to leak or explode and in extreme cases the battery may burst into flames. Non-rechargeable batteries contain dangerous chemicals which may escape if used, causing serious health hazards.

### 7.4 POWER CORD REPLACEMENT

**CAUTION:** Contact an authorized service provider before replacing mains/power cord. Cord must be rated at a minimum of 250V and 12A. Cord must be approved by the following agencies: UL and CSA. If the freezer's voltage rating does not match your mains/electrical supply, or if the plug on the mains/power cord does not fit the outlet, do not plug in the freezer.

**WARNING:** Using a non-rechargeable battery may cause the battery to leak or explode and in extreme cases the battery may burst into flames. Non-rechargeable batteries contain dangerous chemicals which may escape if used, causing serious health hazards.

Problem	Possible Cause	Solution
Freezer does not power on	Power is not getting to the freezer from the Power Supply	Check the connections to the power supply Assure that the wall plug is firmly seated
	Inadequate air circulation	Remove airflow obstructions
	Inadequate power	Ensure that the AC power Switch is in the 'ON' (up) position (see Section 2.5 Pictorial Tour for reference). <b>NOTE:</b> The Control Panel may be lit if the AC Power Switch is turned 'OFF' and the Battery Power Switch is 'ON'
Freezer does not achieve desired temperature		Remove freezer from direct sunlight, hot room, etc.
	Improper environment	Check that freezer is level. Tilts of more than 12 degrees in some directions will degrade performance
Freezer recovers/ returns to set point slowly	Door is not completely closed	Check for ice buildup, remove if necessary, and properly close door
	Door is open and closed too often	Minimize opening and closing of door
	Inadequate air circulation	Unblock air vents

#### Note

This freezer is designed for storage of frozen product. **For best results:**

- Always operate your freezer at full capacity with real or simulated product to increase the thermal mass, displace air and maintain optimal stability.
- Always minimize the frequency and duration of door openings.

## 9 SPECIFICATIONS

### 9.1 FREEZER SPECIFICATIONS

Electric Power	100V - 240V ( $\pm 10\%$ ) at 50 or 60Hz
Maximum Power (Current)	300 watts (3 amps @120V, 1.5 amps @240V)
Electric Supply Rating	15 amp or greater grounded circuit
Cooling System/Device	Direct cooling by a free-piston Stirling engine and thermosiphon heat transfer
Refrigerant, Engine	Helium
Refrigerant, Thermosiphon	R-170 (Ethane) 30-33 grams <i>To be repaired only by trained service personnel.</i> <i>Component parts shall be replaced with like components.</i> <i>Consult Repair Manual/Owner's Guide before attempting to service this product. All safety precautions must be followed.</i> <i>Dispose of properly in accordance with federal or local regulations.</i> <i>Follow handling instructions carefully.</i>
Risk of fire or explosion. Flammable refrigerant used. Do not drill or puncture inner liner.	
Temperature Range	-86°C to -20°C, adjustable in 1°C increments
Ambient Operating Temperature	5°C to 35°C (41°F to 95°F)
Warehouse Storage Temperature	-5°C to +60°C (at RH 65%)
Operational Environment	This ultra-low temperature freezer is designed for use in a normal laboratory environment. Avoid unusual dust or particles circulated through the rejection heat exchanger.
Volume	105 liters   (3.7 cu.ft.)

## 9 SPECIFICATIONS (Continued)

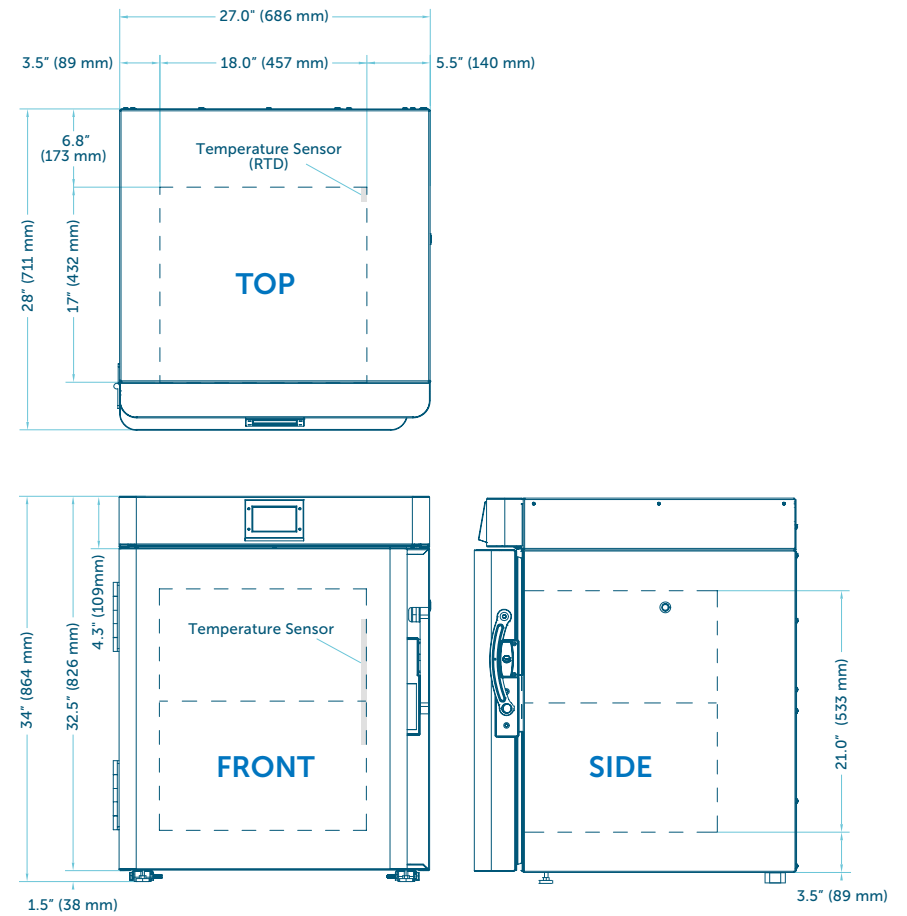
### 9.1 FREEZER SPECIFICATIONS (Continued)

Interior Dimensions	533 x 432 x 457 mm   (21" H x 17" D x 18" W)
Exterior Dimensions	864 x 711 x 686 mm   (34" H x 28" D x 27" W)
Net Weight, Empty	100 kg (220 lbs.)
Insulation	High performance vacuum insulated panels and polyurethane foam using the Ecomate® environmentally friendly, SNAP-compliant blowing agent
Noise	Advanced noise abatement, <48 dB(A) at 1 meter
Control Sensor	RTD (PT100 Class A)
Dry Contacts	Normally closed, normally open, common; activated by power outage or any alarm condition (24 Vdc maximum/500mA maximum)
Battery Back-up	12 hour control battery back-up for touchscreen (6V Lead Acid Battery)
Pull-Down from 25°C Ambient	12 hours to -80°C (empty cabinet)
Recovery from Door Opening (ENERGY STAR® Final Test Method)	40 minutes to -80°C
Warm-Up Profile	2 hours to -60°C at -80°C (empty cabinet) 5.2 hours to -40°C at -80°C (empty cabinet)
Steady State Energy Use	<4 kWh/day at -80°C (Average power 167 watts)
Heat Dissipation	569 BTU/h (load to HVAC) at -80°C (empty cabinet)

## 9.2 MATERIALS SPECIFICATIONS

Part	Material	Color	Treatment
<b>Body:</b> Main Body, Door, Front Cover and Top Cover	Mild steel	White	Powder coated
<b>Interior</b>	Stainless Steel	—	—
<b>Shelf</b>	Stainless Steel (non-adjustable)	—	—
<b>Handle</b>	Aluminum	Gray	Powder coated
<b>Hinges</b>	Steel	White	Powder coated
<b>LCD Bezel</b>	Polycarbonate	Gray	Natural

## 9.3 FREEZER DIMENSIONS



The following Warranty applies to the SU105UE manufactured by Global Cooling, Inc. In order to maintain maximum uptime and to optimize customer service, Global Cooling, Inc. reserves the right to exchange the SU105UE with a serviceable new or previously used replacement at its discretion.



**2/7**  
Engine Warranty

#### LIMITED WARRANTY, USA

- The warranty period starts **TWO WEEKS** after the original date of shipment from Global Cooling, Inc.
- The Stirling Ultracold freezer is warranted for a period of **TWO YEARS** for materials and labor.
- The Stirling Ultracold free-piston Stirling engine and thermosiphon is warranted for a full **SEVEN YEARS**, parts only.
- If a service issue arises, contact Global Cooling, Inc. Service Department to register Warranty Service and initiate a resolution.
- Advanced authorization for a service company to diagnose the problem must be approved by Global Cooling, Inc.
- Global Cooling, Inc. will not be responsible for charges incurred for service calls made by a third party prior to authorization by Global Cooling, Inc.
- Global Cooling, Inc. retains the right to replace any product in lieu of servicing it in the field.
- Liability in all events is limited to the purchase value only.
- Under no circumstances will Global Cooling, Inc. be responsible or held liable for consequential or incidental damages associated with loss of stored product in the event of an equipment failure.
- Extended warranty programs are available. Contact Global Cooling, Inc. for a custom warranty solution.

#### LIMITED WARRANTY, CANADA

- The warranty period starts **ONE MONTH** after the original date of shipment from Global Cooling, Inc.
- The Stirling Ultracold freezer is warranted for a period of **TWO YEARS** for materials and labor.
- The Stirling Ultracold free-piston Stirling engine and thermosiphon is warranted for a full **SEVEN YEARS**, parts only.
- If a service issue arises, contact Global Cooling, Inc. Service Department to register Warranty Service and initiate a resolution. Advanced authorization for a service company to diagnose the problem must be approved by Global Cooling, Inc.
- Global Cooling, Inc. will not be responsible for charges incurred for service calls made by a third party prior to authorization by Global Cooling, Inc.
- Global Cooling, Inc. retains the right to replace any product in lieu of servicing it in the field.
- Under no circumstances will Global Cooling, Inc. be responsible or held liable for consequential or incidental damages associated with loss of stored product in the event of an equipment failure.

#### INTERNATIONAL DISTRIBUTOR LIMITED WARRANTY

- Global Cooling warrants that Distributor shall acquire products purchased hereunder free and clear of all liens and encumbrances.
- Global Cooling further warrants all products to be free from defects in materials under normal use and service for a period of **TWO YEARS**.
- The Stirling Ultracold free-piston Stirling engine and thermosiphon is warranted for a full **SEVEN YEARS**, parts only.
- Warranty will start **ONE MONTH** after the ship date from Global Cooling.
- Global Cooling shall provide to Distributor, without charge, replacement parts to substitute for parts that must be replaced by reason of valid warranty claims.
- This warranty obligation is limited solely to the replacement of replaceable defective parts.
- All service charges with respect to the repair or replacement of defective parts of products shall be the responsibility of the Distributor and/or Distributor's customer.
- Distributor, on behalf of Global Cooling, shall perform such ordinary and customary servicing, repair and/or parts replacement within the Territory at Distributor's expense; which may be passed on to Distributor's customer, at Distributor's discretion.



#### **Stirling Ultracold**

6000 Poston Road, Athens, Ohio 45701, USA

**T** 740.274.7900 / 1.855.274.7900 | **F** 740.274.7901

[www.stirlingultracold.com](http://www.stirlingultracold.com)

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Refer to [stirlingultracold.com](http://stirlingultracold.com) for the latest specifications.

