STIRLING™
ULTRACOLD


# SU780XLE -86°C Ultra-Low Storage Freezer

## Operating Manual

2.10.17

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# SU780XLE 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 holes. |
| **2.** | Adjust the leveling feet (wrench included) to secure the freezer in place. |
| **3.** | Plug AC power cord into the main power socket at the back of the unit and then into an electrical outlet. |
| **4.** | Switch AC power to the "On" position. |
| **5.** | **Notice:** Ensure the access port stopper or sealant is in place. Remove factory tape at the port stopper prior to initial use. |
| **6.** | Ensure set point is within desired range (default is -80˚C) or change set point 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 adjacent to the AC cord. |
| Change Set Point | Tap *Home* > *Set-up* > *Set-up* > Enter PIN > *Enter* > *Change* > Select Set Point Type > *+/-* > *Save* |
| Silence Alarm | Tap *Home* > *Set-up* > *Silence* |
| Event Log | Tap *Home* > *Set-up* > *Event Log* > *Prev. Page, Next Page* |
| Chart History | Tap *Home* > *Set-up* > *Chart History* >Select Chart History Type > use < /> to view |

## Guide to Advanced GUI Functions

| | |
|---|---|
| Alarm Setup | Tap *Home* > *Set-up* > *Set-up* > Enter PIN > *Enter* > *Alarms* > Select Alarm Delay Type > *+/-* > *Save* |
| Date and Time | Tap *Home* > *Set-up* > *Set-up* > Enter PIN > *Enter* > *Date & Time* > *+/-* > *Save* |
| Change PIN | Tap *Home* > *Set-up* > *Set-up* > Enter PIN > *Enter* > *PIN* > Enter New PIN > *Enter* > Re-enter New PIN > *Enter* |
| Calibrate RTDs | **Requires Authorized Service & PIN** Tap *Home* > *Set-up* > *About* > *Service* > Enter Service PIN > *RTD Calibr.* > *RTD Select* > *+/-* > *Calib.* |
| Battery Replacement Alarm | Tap *Home* > *Set-up* > *Set-up* > Enter PIN > *Enter* > *Battery* > *Month/Day/Year* > *Save* |

### Handle Operation

The Stirling Ultracold handle is designed for one-handed operation. To open the freezer, rotate handle towards the user approximately 90°. To engage the Power-Release, apply firm downward pressure on the handle while in its open position. The Power-Release assists when the freezer door is adhered to the gasket after long periods of non-use as well as when air pressure is not yet equalized. To close, with handle in the horizontal position, push door to cabinet and return the handle to its original vertical position.

## Caution:

### Tipping Hazard

The unloaded freezer is TOP HEAVY. Use caution in moving and installation. Do not pitch the freezer more than 12 degrees from horizontal. Doing so may cause it to tip over.

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# SU780XLE
## Ultra-Low Temperature Freezer -86ºC

*The SU780XLE model 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 compact package.*

### Table of Contents:

# 1. Introduction

## 1.1 – Description

The Stirling Ultracold SU780XLE Ultra-Low Temperature Freezer uses a unique free-piston Stirling engine to provide high efficiency, deep-temperature cooling.

## 1.2 – Intended Uses

The SU780XLE 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.

## 1.3 – Documentation

This operating manual describes all aspects of receiving, installing, set-up, use, moving and storage of the Stirling Ultracold SU780XLE Freezer.

The freezer is controlled with a Graphical User Interface (GUI). This operating manual describes use of the GUI in Section 5.

## 1.4 – Organization of this Manual

This manual is organized as follows:

- Features
- Safety Precautions
- Unpacking and Installation
- Operation
- Transporting, Moving and Storage
- Preventative Maintenance
- Troubleshooting
- Specifications
- Warranty

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


*Model SU780XLE*

## 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, a 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, a 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.

## Flammable Refrigerant Use:

SU780XLE uses 90 grams of R-170 (Ethane) in a hermetically sealed thermosiphon tubing. It requires caution in use and 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 SU780XLE

## 2.1 – Free-Piston Stirling Engine

The SU780XLE Ultra-Low Temperature Freezer uses the Stirling Ultracold Model M600 free-piston Stirling engine to provide high efficiency, deep-temperature cooling. No HCFC or CFC refrigerants are used in the M600 and SU780XLE. The M600 Stirling engine uses approximately 10 grams of helium gas as a working fluid. Approximately 90 grams of R-170 (Ethane) is used in the thermosiphon which removes heat from the freezer.

## 2.2 – Cabinet Design Features

The cabinet utilizes vacuum-insulated panels with non-HFC polyurethane foam support providing an internal volume of approximately 780 liters. The environmentally friendly blowing agent is Ecomate®. Door sealing consists of three gaskets that are fully replaceable. The handle uses cam-actuated, 90° rotation to apply a mechanical advantage in opening the freezer door. An integrated door gasket heater minimizes water or ice deposits on the gasket interface.

## 2.3 - Handle Features

The Stirling Ultracold handle is designed for one-handed operation. A Power-Release cam assists when the freezer door is adhered to the gasket after long periods of non-use as well as when air pressure is not yet equalized.

## 2.4 – Temperature Monitoring Features

One Resistance Temperature Detector (RTD) measures the internal cabinet temperature of the SU780XLE. The RTD provides input to the controller and the GUI (Graphical User Interface) display for reporting and logging. The RTD may be calibrated by the user through the GUI. The GUI provides a door open time-out alarm and monitors the temperature for instances beyond high and low limits. These limits can be set automatically or adjusted 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.

## 2.5 – Graphical User Interface

The Graphical User Interface (GUI) is implemented on a touch screen control panel on the front of the cabinet. The GUI allows the user to:

- Set freezer control, battery, 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

The following SU780XLE parameters are accessed and modified through the GUI touch screen (for complete instructions see Section 5).

| Accessible Values | Modifiable Values |
|---|---|
| Current freezer temperature | Temperature set point |
| Temperature history chart | Under temperature limit |
| Alarm status | Over temperature limit |
| Event log | Battery replacement date |
| Battery replacement date | Over temperature alarm delay after door opening |
| "About" screen (general information) | Audible alarm silence interval |
| Service contact information | External contact delay upon alarm |
| | Door open alarm delay |
| | Door defrost schedule |
| | Password Identification Number (PIN) status |
| | Current date |
| | Current time |
| | RTD calibration adjustments |

## 2.6 – Pictorial Tour

**1.** Mechanical compartment containing M600 Stirling engine

**2.** Temperature recorder location (optional)
— Factory or field installed

**3.** LCD Display and Graphical User Interface (GUI)

**4.** Magnetic latching inner doors

**5.** Vacuum relief port (interior, not shown)

**6.** Recessed electrical panel

**A.** AC Power Switch

**B.** AC Power Connector - Universal power input
100 to 240 VAC, 50/60 Hz, single phase

**C.** Seismic Strap Anchor Location (accepts - 5/16"-18 x 5/8" screw)

**7.** Recessed accessory panel

**C.** Seismic Strap Anchor Location (accepts - 5/16"-18 x 5/8" screw)

**D.** External Alarm Terminal (dry contacts), 4-20mA (optional) [ (+) : (-) : G : NC : NO : C ]
(+) - Positive
(-) - Negative
G - Ground
NC - normally closed, opened at alarm
NO - normally opened, closed at alarm
C - common

**E.** $CO_2$/$LN_2$ Backup connector (optional - factory or field installed)

**8.** Air vent

**9.** Outer door hinges

**10.** Access port for independent thermocouple
— 0.5" (12.7 mm) with plug

**11.** Cabinet breaker

**12.** Dual-wheel casters and leveling feet at front casters

**13.** Stainless steel shelves (shown with 2 shelves)
— Adjustable on 0.5" (12.7 mm) centers

**14.** Temperature sensor (RTD)

**15.** Lockable door handle

**16.** Flexible door gasket

**17.** Electrical grounding stud
— Inside mechanical compartment, not shown

## 2.7 – Included Items

- Packing List
- Operating Manual (this document)
- Quick Guide
- Port Sealant
- Dry Contacts Plug
- 2 Keys
- Ice Scraper
- 1 Wrench


## CAUTION:

**Tipping Hazard**

The unloaded freezer is TOP HEAVY. Use caution in moving and installation. Do not pitch the freezer more than 12 degrees from horizontal. Doing so may cause it to tip over.

# 3. Safety Precautions

Potential hazards associated with use of the SU780XLE 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 and/or its warranty voided by improper operation or usage. All personnel that install, operate, transport or place the freezer into storage should read this entire manual to understand those hazards. Consider storing this manual for ready reference within close proximity of the freezer.

Specific 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. Contact Stirling Ultracold for authorized repair procedures as required.
- **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.*
- **Do not** modify the cabinet, controls or free-piston Stirling engine.* .
- **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 designed for Flammable Material Storage or 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.
- **Do not** use solvents to clean the panel or the outside or inside of the freezer.
- **Do not** remove the power cable by pulling on the cable, instead grasp the plug firmly and pull away from the outlet.

**Doing so will void the warranty.*

- **Do not** block the air vents from the mechanical compartment.
  — 4" clearance on right side of unit is recommended.
- Frostbite can occur instantly at -86°C. Safe operating procedures are essential
  — **Do not** 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 ultra-low temperature 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

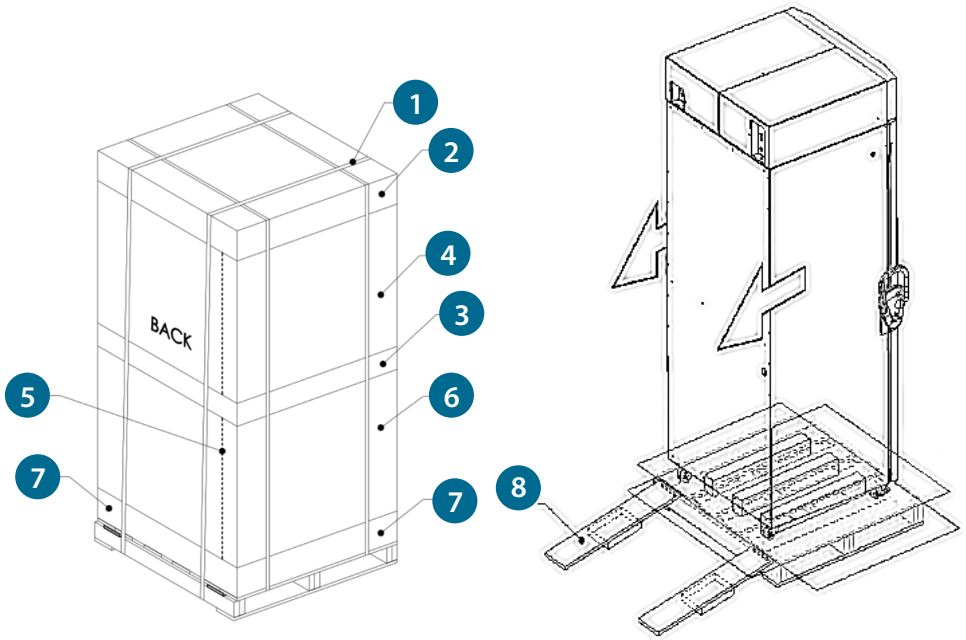
**NOTE:** Prior to installing the SU780XLE, inspect the unpacked unit and any included items for shipping damage. Compare all contents to the packing list for completeness.

## 4.1 – Freezer Site Qualification

| | |
|---|---|
| **1.** | Note the shipping packaging dimensions of 86" H x 43" D x 44" W (2184 x 1092 x 1118 mm) and shipping weight of 721 lbs. (327 kg). |
| **2.** | Be mindful when moving the shipment from the point of receipt to the place where it will be unpacked. The installation site must accommodate the freezer exterior dimensions of 78.5" H x 34.3" D x 36" W (1994 x 870 x 915 mm) and weight of 625lbs. (283 kg). |
| **3.** | There are no specific required clearances for the top and back of the freezer; however allowances must be made for electrical connections to the panel on the back of the freezer. The left side requires appropriate space for handle access. The right side requires appropriate space for door opening and air vent. |
| **4.** | The access port must be plugged at all times for normal operation. Ingress to the access port (see Section 2.6) is required during normal operation. |
| **5.** | The freezer should be installed on a level surface. The leveling feet can accommodate small variations. |
| **6.** | There must be sufficient room to fully open the freezer door in order to access contents. |
| **7.** | 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. |
| **8.** | Do not block the air vents from the mechanical compartment. 4" clearance on right side of unit is recommended. |
| **9.** | Care must be taken while unpacking and installing the freezer. Be mindful of its size and weight. Dropping the freezer is likely to damage it. |
| **10.** | **TIPPING HAZARD:** Do not pitch the freezer more than 12 degrees from horizontal. Doing so may cause it to tip over. **CAUTION: TOP HEAVY.** |

## 4.2 – Unpacking and Unloading Procedure

| | |
|---|---|
| **1.** | Remove strapping **(1)**. |
| **2.** | Remove the top-cover **(2)** (comprised of wooden frame & cardboard box lid). |
| **3.** | Remove taping **(3)** from the middle of cardboard shipping unit. Note: the shipping unit is configured as two square cardboard sections covering the top portion and lower portion of the freezer separately. |
| **4.** | Remove the top section of the shipping unit **(4)**. Cut the cardboard using a utility knife along the cutting line **(5)**, located at the back of the unit.<br><br>**CAUTION:** Do not cut too deeply through the cardboard, as doing so may damage the freezer. |
| **5.** | Remove cardboard/foam supports. |
| **6.** | Remove the bottom portion of cardboard shipping unit **(6)**. |
| **7.** | Remove plastic cover from the freezer. |
| **8.** | Collapse all side walls of the bottom portion of the cardboard shipping unit **(7)** to move the freezer. |
| **9.** | Remove two ramps **(8)** from the bottom portion of the shipping unit and place them at the back of the pallet, hooking the ramp - slot to the metal plate located at the back of the shipping unit. |
| **10.** | Make sure the two ramps are spaced appropriately for the width of the casters and are parallel to each other. |
| **11.** | Move the freezer slowly onto the ramp, with one person guiding each side for balance. Have a third person assist in slowly guiding the freezer down the ramp to the floor to avoid damage to equipment, facilities, or injury to personnel. |

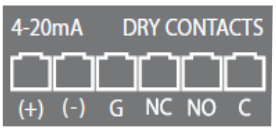


## 4.3 – Setup

1. Unpack freezer unit and included components, ensure all packaging material has been removed from around the fan inlet and outlet holes.
2. Adjust the leveling feet (wrench included) to secure the freezer in place.
3. Before switching on electrical power to the freezer, make all desired external connections:

   A. AC power connection

   B. External alarm




4. Switch the AC power to the "On" position.
5. **Notice:** Ensure the access port stopper or sealant is in place. Remove factory tape at the port stopper prior to initial use.
6. Review the date, time and temperature set point within the Graphical User Interface and adjust as needed. Default set point is -80°C.
7. A one-time temperature alarm suppression provided by the software allows for the initial cooling of the freezer after start-up.
8. 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.
9. Be mindful of any electrical shock hazards associated with making electrical connections to the freezer, especially the external alarm connection.

# 5. Operation

## 5.1 – Responsible Operation

Responsibility for freezer operation should be part of the policy and procedure documentation or guidelines for the clinical, laboratory, or other activity for which the freezer is used. Safety requirements are integral to these responsibilities.

## 5.2 – Handle Operation

The Stirling Ultracold handle is designed for one-handed operation. To open the freezer, rotate handle towards the user through an angle of about 90°. To engage the Power-Release, gently apply firm, downward pressure on the handle while in its open position. The Power-Release assists when the freezer door is adhered to the gasket after long periods of non-use as well as when air pressure is not yet equalized. To close, with handle in the horizontal position, push door to closed position and return the handle to its original vertical position.

## 5.3 – Graphical User Interface (GUI)

Values for the following SU780XLE parameters are viewed and modified through the GUI touch screen.

### 5.3.1 Modifiable Values

The GUI is preprogrammed with default values for most parameters. Unless temperature limits are set manually, the software calculates default values appropriate for the temperature set point.

| Accessible Values | Modifiable Values |
|---|---|
| Current freezer temperature | Temperature set point |
| Temperature history chart | Under temperature limit |
| Alarm status | Over temperature limit |
| Event log | Battery replacement date |
| Battery replacement date | Over temperature alarm delay after door opening |
| "About" screen (general information) | Audible alarm silence interval |
| Service contact information | External contact delay upon alarm |
| | Door open alarm delay |
| | Door defrost schedule |
| | Password Identification Number (PIN) status |
| | Current date |
| | Current time |
| | RTD calibration adjustments |

### 5.3.2 PIN

A Password Identification Number (PIN) may be set, but is not displayed. Use the PIN to restrict access to GUI controls. The default PIN is 1234 and may be changed by the user to any four-digit numeric code or disabled.

### 5.3.3 – GUI Menu

A hierarchical menu system is used to display and adjust system values. Each screen has a button to return to the default "Home" screen and a "Back" button to return to the prior level of the menu. Screen names (where applicable) are within brackets.

**Home** – display of current freezer temperature.

**Set-up [Data and Setup]** – display Password Identification Number (PIN) status (enabled/disabled), door defrost status, temperature set point, system date and time, and alarm status.

- **Set-up [Setup]** – display current temperature set point. *PIN required if enabled.*
  - **Change [Change Set Point]** – display and adjust over temperature set point, temperature set point, and under temperature set point
  - **Battery [Battery Replace Date]** – display and adjust battery replacement date.
  - **Alarms [Alarm Set-up]** – display and change alarm delay settings
    - **Temp. Delay [Temperature Delay]** – duration of time in which the audible alarm is delayed when temperature is out-of-specification.
    - **Aud. Delay [Silence Duration]** – duration of time in which the audible alarm is delayed after the 'Silence' button is tapped.
    - **Ext. Delay [External Contact Delay]** – duration of time in which the alarm dry contact activation is delayed after the alarm condition is detected.
    - **Door Delay [Door Delay]** – duration of time that the door may remain open before an audible alarm sounds.
  - **Date & Time [Date/Time Setup]** – display and change system date and time.
  - **Door Defrost [Door Defrost]** – adjust defrost heater between 0 to 100%. A warning will be displayed on 'Home' screen if set to 0.
  - **PIN** – disable/enable the system PIN and change PIN.
- **Silence** – temporarily silence audible alarm.
- **Event Log [Event Log]** – track the last 200 alarm conditions such as: door openings, temperature set point changes, over temperature condition, and power outages.
- **Chart History [Chart History]** – display the cabinet interior air temperature over the last 12 hours, 24 hours or 7 days. Increase chart resolution by tapping the screen.
- **About [About]** – display freezer model number, serial number, firmware version, engine number, run hours, temperature set point, and date.
    - **Alarm Test** – test the system alarm.
    - **Service Contact [Service Contact]** – display manufacturer contact information.
    - **Service [Service]** – display cabinet, control, and cold-head RTD temperatures, warm-head thermistor temperature, as well as engine voltage, current and power. *Service screen information is used for service by authorized personnel only.*

      *Service PIN required.*
    - **RTD Calibration [Calibration]** – display RTD readings and calibration offsets. Calibration is used to compensate for discrepancies between Display RTD and user-supplied temperature measurement.

### 5.3.4 Basic GUI Controls

- To change a value on the screen
  - Tap the appropriate button to highlight the parameter
  - Use the +/- or </> buttons to enter the desired value
  - Then use the "Save" button to complete the change.
- Each screen has a button to return to the default "Home" screen and a "Back" button to return to the prior level of the menu.
- PINs are entered through a numeric keypad screen with an "Enter" button to complete the entry and an "Exit" button to terminate the entry.
- 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 changing the temperature set point and alarm settings.*

The following examples of GUI usage describe sequential button taps, e.g., 1 > 2 means: tap button labeled "1" then tap button labeled "2". Access to certain screens requires entry of a PIN; this entry is noted as 'Enter PIN' below.

#### Guide to Basic GUI Functions

| | |
|---|---|
| ON / OFF | Switch the main power on, located at the back of the unit adjacent to the AC cord. |
| Change Set Point | Tap *Home* > *Set-up* > *Set-up* > Enter PIN > *Enter* > *Change* > *Setpoint* > *+/-* > *Save* |
| Silence Alarm | Tap *Home* > *Set-up* > *Silence* |
| Event Log | Tap *Home* > *Set-up* > *Event Log* > *Prev. Page, Next Page* |
| Chart History | Tap *Home* > *Set-up* > *Chart History* |

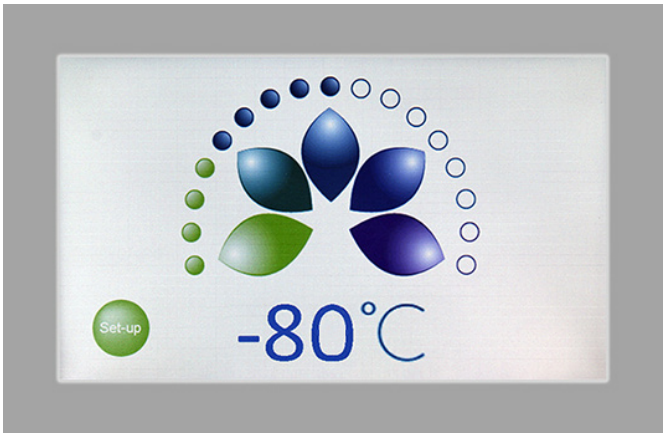
#### Guide to Advanced GUI Functions

| | |
|---|---|
| Alarm Setup | Tap *Home* > *Setup* > *Setup* > Enter PIN > *Enter* > *Alarms* > Select Alarm Delay Type > *+/-* > *Save* |
| Date and Time | Tap *Home* > *Setup* > *Setup* > Enter PIN > *Enter* > *Date & Time* > *+/-* > *Save* |
| Change PIN | Tap *Home* > *Setup* > *Setup* > Enter PIN > *Enter* > *PIN* > Enter New PIN > *Enter* > Re-enter New PIN > *Enter* |
| Calibrate RTDs | **Requires Authorized Service & PIN**<br>Tap *Home* > *Setup* > *About* > *Service* > Enter Service PIN > *RTD Calibr.* > *RTD Select* > *+/-* > *Calib.* |
| Battery Replacement Alarm | Tap *Home* > *Setup* > *Setup* > Enter PIN > *Enter* > *Battery* > *Enter Month/Day/Year*> *Save* |

### 5.3.5 – Graphical User Interface (GUI) Instructions


#### 1. Splash Screen

*The Stirling Ultracold splash screen will appear for three seconds when the freezer is turned on.*




#### 2. Home

*The Home Screen displays the current temperature of the freezer.*

- Tap the **Set-up** button to proceed to system settings


## 3. Data and Setup

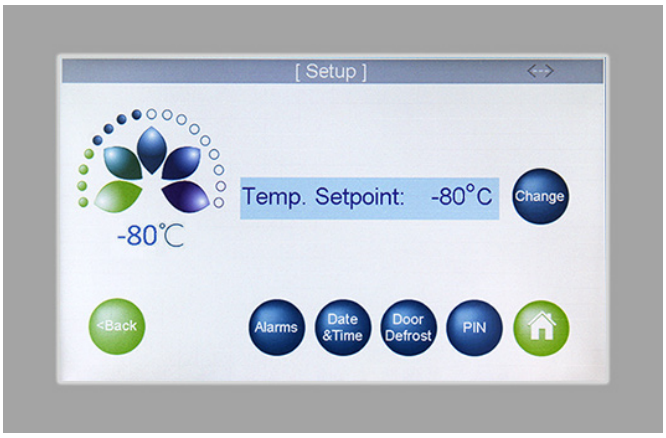
Tap *Home* > *Set-up*

- Tap the **Set-up** button to access menus for battery alarm, alarms, date & time, door defrost and PIN *
- Tap the **Silence** button to temporarily silence the audible alarm
- Tap the **Event Log** button to view the last approximately 200 events
- Tap the **Chart History** button to view the cabinet air temperature over the last 12 hours, 24 hours or 7 days
- Tap the **About** button for freezer information including serial number, service contact and alarm test.

** Accessing GUI menus within Set-up requires a PIN (if PIN is enabled)*


## 4. PIN Entry Screen

- Tap **1 2 3 4 (default PIN)**
- Tap **Enter**

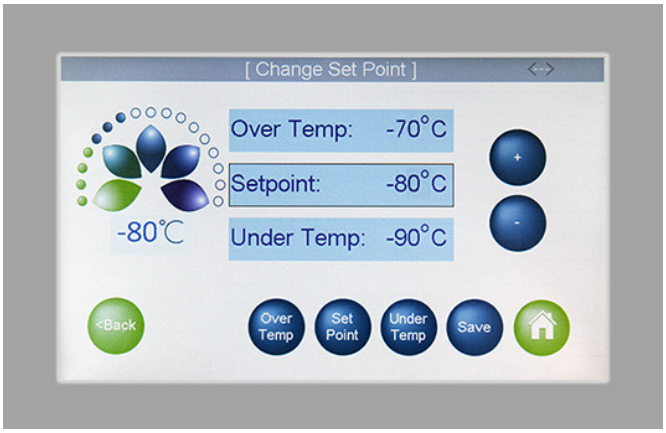



## 5. Setup

*The Setup screen displays the current temperature set point.*

Tap *Home* > *Set-up* > *Set-up* > Enter PIN > *Enter :*

- Tap **Change** to alter the temperature set point
- Tap the **Alarms** button to view/change the alarm delays
- Tap the **Date & Time** button to view/change system date and time
- Tap the **Door Defrost** button to view/change defrost percentage
- Tap the **PIN** button to change or disable the PIN

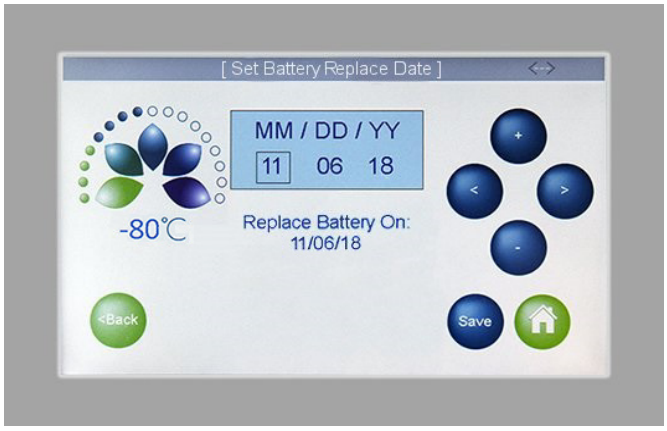



## 6. Change Set Point

*Access this screen to change the temperature set point or over/under temperature thresholds.*

Tap *Home* > *Set-up* > *Set-up* > Enter PIN > *Enter* > *Change :*

- 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).
- Over and Under Temperature thresholds can be no less than 4° and no more than 10° from the setpoint.
- Over and Under Temperature thresholds will automatically be kept within this range.




## 7. Set Battery Replace Date

*The freezer battery should be replaced every two years and an audible alarm sounds as a reminder on a set date. Silencing the battery replacement alarm delays the alarm for three days. Once the battery is replaced (see section 7.3.1) a new replacement date should be set.*

Tap *Home* > *Set-up* > *Set-up* > Enter PIN > *Enter* > *Battery*

- The current Battery Replace Date is displayed.
- Use the **<**, **>**, **+**, **-** buttons to set the date then tap **Save.**


## 8. Setup Alarms

*Access this screen to view or alter freezer alarms.*

Tap *Home* > *Set-up* > *Set-up* > Enter PIN > *Enter* > *Alarms*

- Select the appropriate delay type using the buttons at the bottom of the screen.
- Use the **+** and **–** buttons to adjust to preferred values.
- Tap **Save** . (Note: If Save is not tapped, new values will not be used)
  - **Temp. Delay** [Temperature Delay] delays the over temperature alarm after a door opening
  - **Aud. Delay** [Audible Delay/Silence Duration] delays alarm for a specified period of time when silence is tapped
  - **Ext. Delay** [External Delay] delay between audible alarm and remote alarm
  - **Door Delay** [Door Delay] period of time that the door can be open before sounding an alarm


## 9. Date/Time Setup

*Access this screen to enter date and time values.*

Tap *Home* > *Set-up* > *Set-up* > Enter PIN > *Enter* > *Date & Time*

- **Change Time** – use the **<**, **>**, **+**, **-** buttons to set the time, then tap **Save**
- **Change Date** – use the **<**, **>**, **+**, **-** buttons to set the date, then tap **Save**


## 10. Door Defrost

*Adjust defrost heater levels percent based on 30 minute periods*

Tap *Home* > *Set-up* > *Set-up* > Enter PIN > *Enter* > *Door Defrost*

- Use the **+** and **–** buttons to adjust the percent then tap **Save**
  - 100% turns the heater on for maximum duty cycle
  - 60% is recommended for most laboratory environments
  - 0 % provides no-defrost heating (Note: Warning will display on Home screen.)

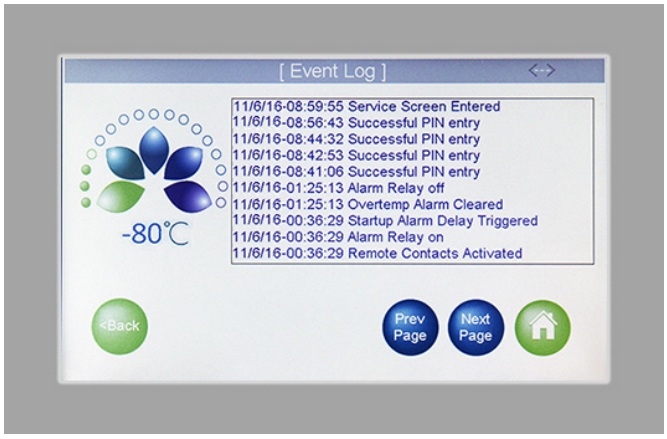

## 11. Change PIN

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

Tap *Home* > *Set-up* > *Set-up* > Enter PIN > *Enter* > *PIN*

- To change the PIN:
  - Using the keypad, enter a new 4 digit PIN then tap **Enter.** You will then be prompted to reenter the new PIN, then tap **Enter**
- To disable the PIN:
  - Leave the Enter New PIN field blank and tap **Enter**. PIN is disabled and user is returned to the Setup Screen.

Tap **Exit**



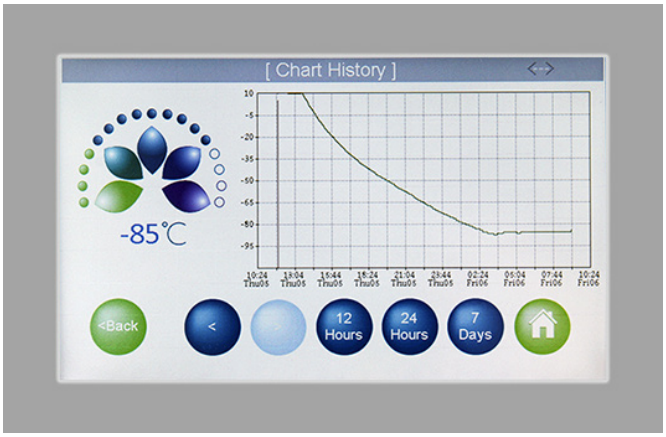

## 12. Event Log

*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 *Home* > *Set-up* > *Event Log*

- Tap **Prev Page** and **Next Page** to scroll through the pages

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

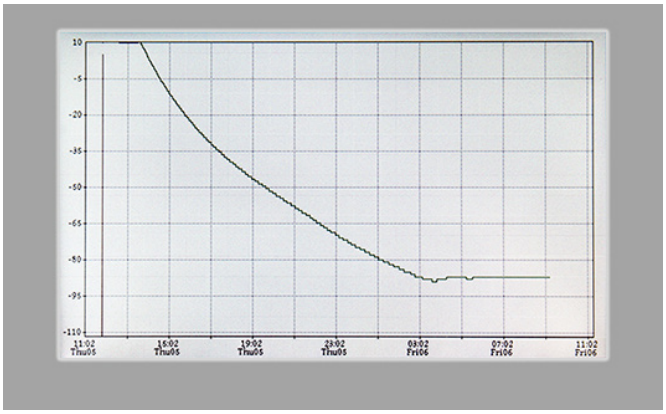



## 13. Chart History

*The Chart History screen will display the internal air temperature of the freezer for the last 12 hours, 24 hours, or 7 days*

Tap *Home > Set-up > Chart History*

- Tap **12 Hours**, **24 Hours** or **7 Days** as desired
- Tap **<** for Previous Data and **>** for Next Data

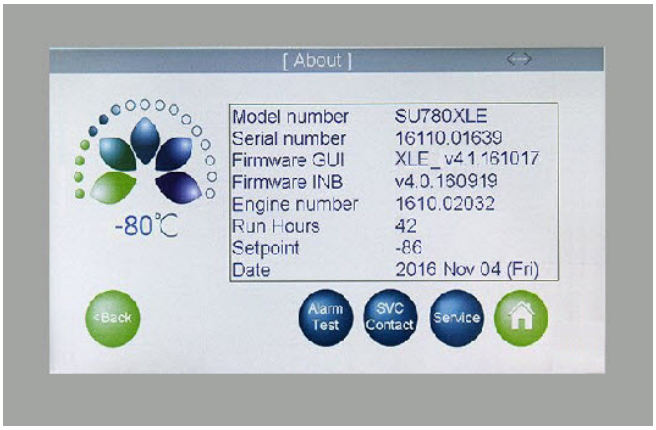


## 14. Chart History Zoom

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

Tap *Home > Set-up > Chart History*

- Tap the chart to enlarge for full screen display
- Tap the chart again to return to the default display.

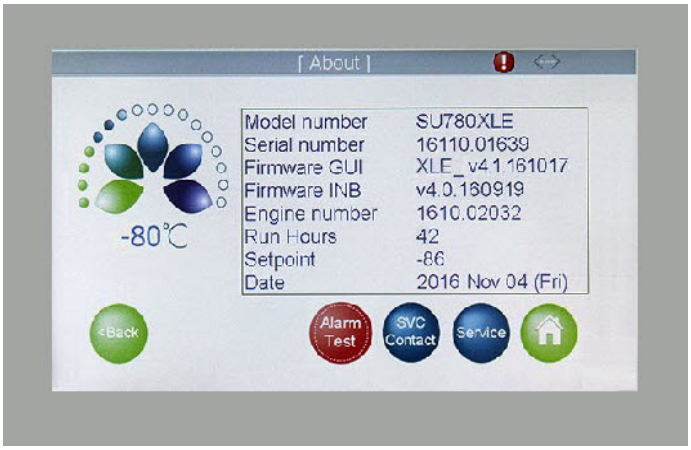



## 15. About

*Access this screen to observe specific freezer information including Model, Serial Number, Firmware Version, Engine Number, Run Hours, Set Point, and Date*

Tap *Home* > *Set-up* > *About*

- Tap **Alarm Test** button to test alarms
- Tap **SVC Contact** to see service contact information
- Tap the **Service** button to view freezer parameters such as temperatures and engine voltage, current, and power

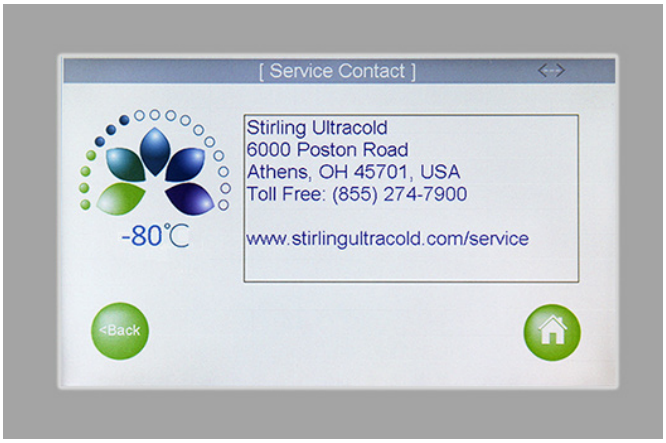



## 16. Alarm Test

*Use this button to test the alarms.*

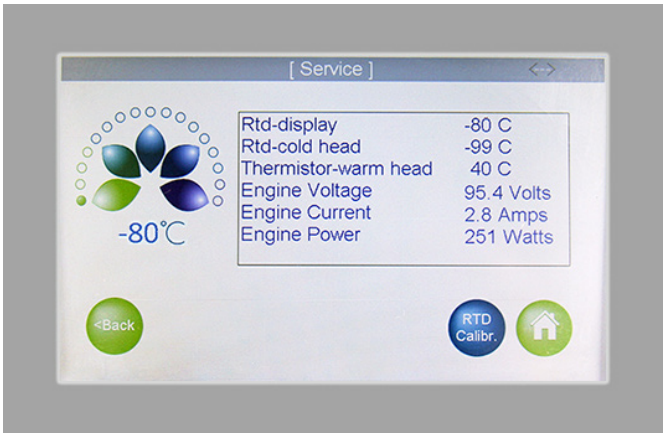
Tap *Home* > *Set-up* > *About* > *Alarm Test*

- Tap the **Alarm Test** button to test temperature alarm
  - Alarm sounds and button becomes red (see above)
- Tap the **Alarm Test** button again to silence the alarm
  - Alarm is silenced and button returns to blue




## 17. Service Contact

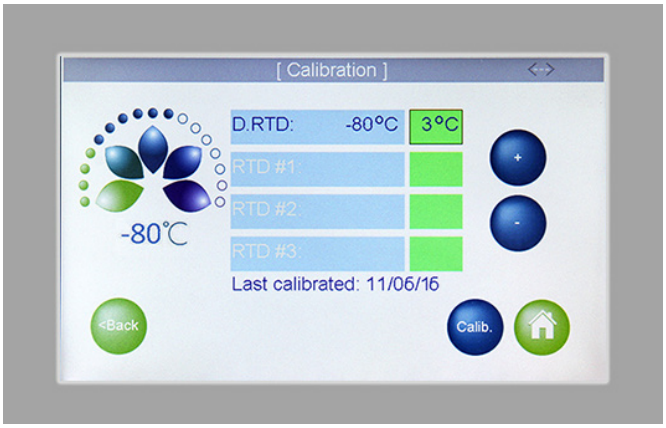
*The Service Contact Screen provides manufacturer contact information.*
Tap *Home* > *Set-up* > *About* > *SVC Contact*




## 18. Service Snapshot

*The service screen provides technical information for service and RTD calibration, accessible only through the use of the service-PIN number*
Tap *Home* > *Set-up* > *About* > *Service*

- Tap the **RTD Calibr.** button to calibrate the RTD




## 19. Calibration

*RTD Calibration Screen is used to compensate for discrepancies between the Display RTD and a user provided standard. This screen requires Authorized Service & PIN .*

Tap *Home* > *Set-up* > *About* > *Service* > Enter Service PIN > *Enter*> *RTD Calibr.*

- Use the **+** and **–** buttons to adjust the offset.
- Tap the **Calib.** button to save changes

## 5.4 – Managing Freezer Contents

The SU780XLE freezer is designed for long-term storage of sample materials with ultra-low, well-regulated temperature storage requirements.

- The temperature set point for the freezer should be changed as appropriate for the materials being stored using the Graphical User Interface (GUI) - adjusting 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.
- For best results operate freezer at full capacity with real or simulated product to increase the thermal mass, displace air, and maintain optimal stability.
- Please review the safety precautions in Section 3.

## 5.5 – Cleaning

### Cleaning the Freezer Surfaces

- Clean the exterior surfaces of the SU780XLE cabinet as needed by using a soft cloth and mild detergent. Do not use solvent (such as bleach) or harsh abrasive cleansers or pads.
- In the event of excess ice accumulation, remove any 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 set point, return the contents to the freezer.
- Refer to Safety Precautions (Section 3) of this Operating Manual while defrosting the freezer.

## 5.6 – Calibration of the Resistance Temperature Detector (RTD)

The SU780XLE RTD may be calibrated by inserting a temperature sensor through the access port of the cabinet wall and securing it next to the RTD located in the right rear corner of the interior, just above the shelf.

- To provide access to the RTD, it may be necessary to transfer the contents of the freezer to alternate storage. Note the Safety Precautions in Section 3 of this Operating Manual while making such transfers.
- Navigate to the RTD Calibration screen using the Graphical User Interface (GUI). This requires a service PIN.
- To change offsets:
  - — Use the "+" and "–"buttons to adjust the offset to the desired value.
  - — Tap the "Calib." button to save changes.

# 6. Transporting, Moving and Storage

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. Refer to Safety Precautions (Section 3) 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 4.3 "Setup" 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. See Section 4 for precautions associated with this task.

# 7. Preventative Maintenance

The SU780XLE 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, the following preventative maintenance schedule is recommended:

## 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 provided 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 provided scraper.

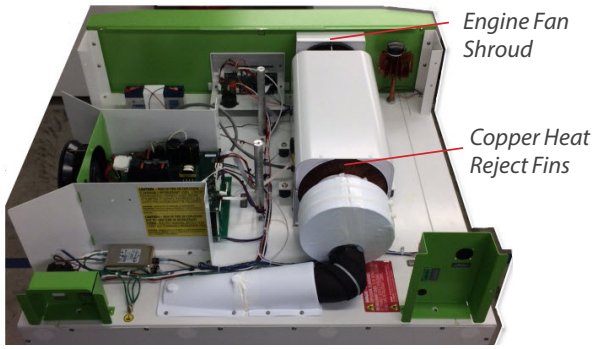
## 7.2 – Yearly Maintenance

### 7.2.1 – Check and Clean Heat Reject Fins

**CAUTION:** Stored voltage hazard – performed by authorized service personnel only.
**CAUTION:** Cover is in two parts and together weighs approximately 24 lbs.

**Tools:** 1/8" allen wrench | compressed air | vacuum

1. Turn freezer off and disconnect power.
2. Wait a minimum of 5 minutes.
3. Remove screws from mechanical compartment top (2), right side (1) and from within rear, right recessed electrical panel (2). Lift off right panel and set aside.
4. Remove screws from left side (1) and within rear, left, recessed accessory panel (2). Lift off left panel and set aside.
5. Remove screws (2) from engine fan shroud. Remove shroud and foam insert and set aside.
6. Direct compressed air at copper heat reject fins to dislodge dust. Use vacuum to remove debris at engine fan shroud location and surrounding area
7. Inspect fins for damage or corrosion. *Slight discoloration due to copper patina is normal and will not affect performance.*
8. Re-install engine fan shroud foam, fan shroud, and freezer top panels in reverse order of removal and tighten screws hand tight.






### 7.2.2 – Check Door Alignment

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

## 7.3 – Biennial Maintenance

### 7.3.1 – Replace Battery

1. Remove top panels per directions above.
2. Disconnect battery wire clips and move aside.
3. Loosen and remove screws (2) fastening battery bracket.
4. Replace battery - being mindful of polarity - and reinstall bracket, screws, and wire clips.
5. Reinstall freezer top panels per directions above.
6. Update battery replacement date within GUI.

# 8. Troubleshooting

| Problem | Possible Cause | Solution |
|---|---|---|
| **Freezer does not power on** | Power is not getting to the freezer from the Power Supply | Check the connections of the AC cord |
| | | Assure that the wall plug is firmly seated |
| **Freezer does not achieve or maintain desired set point** | Inadequate air circulation | Remove airflow obstructions from external fan inlet and outlet vents |
| | Inadequate power | Assure that the wall plug is firmly seated |
| | Improper environment | Remove freezer from direct sunlight, hot room, etc. |
| | | Check that freezer is level. Tilts of more than 5 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

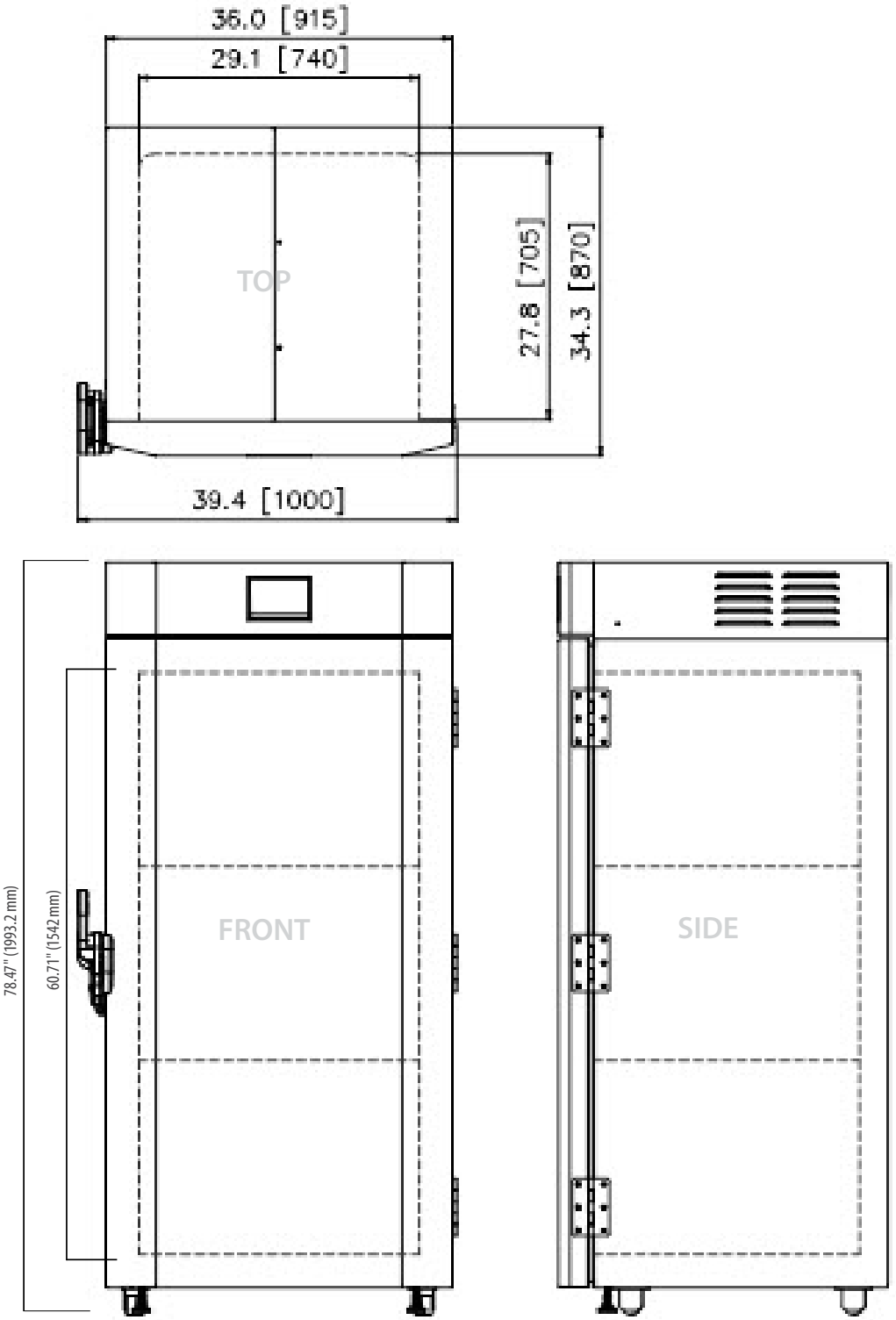
This freezer is designed for storage of frozen product.
For best results:

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

# 9. Specifications

## 9.1 – Freezer Specifications

| | |
|---|---|
| **Electric Power** | 100V - 240V (±10%) at either 50 or 60Hz |
| **Maximum Power (Current)** | 1200 watts (10 amps @120V, 5 amps @240V), nominal |
| **Electric Supply Rating** | 15 amp or greater grounded circuit |
| **Cooling Engine** | Helium charged free-piston Stirling engine |
| **Heat Transport System** | Gravity driven thermosiphon |
| **Refrigerant, Thermosiphon**<br>Risk of fire or explosion. Flammable refrigerant used. Do not drill or puncture inner liner. | R-170 (Ethane) CFC/HCFC-Free, 90 grams<br>*To be repaired only by trained service personnel. Component parts shall be replaced with like components.*<br>*Consult Service Manual before attempting to service this product. All safety precautions must be followed.*<br>*Dispose of properly in accordance with federal or local regulations.*<br>*Follow handling instructions carefully.* |
| **Temperature Range** | -86°C to -20°C @ 32°C (90°F) ambient, adjustable to 1°C increments |
| **Ambient Operating Temperature** | +5°C to +35°C (41°F to 95°F) |
| **Warehouse Storage Temperature** | -5°C to +60°C (23°F to 140°F) at RH 65% |
| **Operational Environment** | This ultra-low temperature freezer is designed for use in a normal laboratory environment. Avoid unusual dust or particulate circulation. |
| **Useful Life** | 12 years, nominal |
| **Volume** | 27.5 cu.ft. \| (780 liters) |
| **Interior Dimensions** | 60.7" H x 27.8" D x 29.1" W \| (1542 x 705 x 740 mm) |
| **Exterior Dimensions** | 78.5" H x 34.3" D x 36" W \| (1994 x 870 x 915 mm) |
| **Net Weight, Two Shelves, No Load** | 283 kg (625 lbs.) |
| **Insulation** | High performance vacuum insulated panels and polyurethane foam using the Ecomate® environmentally friendly blowing agent |
| **Noise** | Advanced noise abatement, <45 dB(A) at 1 meter |
| **Current Fuse** | Maximum current is 10 Amps at 120 Volts. No surge current occurs at start and stop. (3AB fuse 12A/250 VAC slow) |
| **Control Sensor** | One RTD (PT100 Class B) |
| **Dry Contacts** | Positive, Negative, Ground, Normally Closed, Closed, Normally Open, and Common; activated by power outage or any alarm condition |
| **Battery Back-up** | 12 hour control battery back-up for touchscreen |



## 9.2 – Performance Data

### Empty Cabinet

| Setpoint | -80°C |
|---|---|
| **Pull-Down from Ambient** | 6.5 hours |
| **Recovery from 2 minute door opening** | 1.5 hours |
| **Warm-Up Profile** | 2.5 hours to -60°C<br>6.5 hours to -40°C<br>12 hours to -20°C |
| **Energy Use** | < 6.9 kWh/day<br>(average 288 watts) |
| **Heat Dissipation** | 981 BTU/h<br>(load to HVAC) |

## ENERGY STAR Final Test

| Setpoint | -75°C (Weighted Average) |
|---|---|
| **Steady State Energy Use** | 6.86 kWh/day |

## 9.3 – Materials Specifications

| Part | Material | Color | Treatment |
|---|---|---|---|
| **Body:** Main Body, Door, Front Cover and Top Cover | Mild steel | White/Green | Powder coated |
| **Interior** | Steel | White | Powder coated |
| **Shelves** | Stainless Steel (adjustable) | - | - |
| **Handle** | Zinc Alloy | Green | Powder coated |
| **Hinges** | Steel | White | Powder coated |
| **LCD Bezel** | Polycarbonate | Gray | Natural |

# 10. Warranty


The following Warranty applies to the SU780XLE 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 SU780XLE with a serviceable new or previously used replacement at its discretion.

## 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, from original date of shipment from Global Cooling, Inc.
- 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, from original date of shipment from Global Cooling, Inc.

- 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.
- Extended warranty programs are available. Contact Global Cooling, Inc. for a custom warranty solution.

## International Distributor Limited Warranty

- Warranty will start **ONE MONTH** after the ship date from Global Cooling.
- 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, from original date of shipment from Global Cooling, Inc.
- 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

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