Freezer Service and Maintenance Manual

i.Series® and Horizon Series™ - Undercounter

Laboratory

i.Series
iLF104-ADA, iLF105

Horizon Series
HLF104-ADA, HLF105

Plasma Storage
i.Series
iPF104-ADA, iPF105

Horizon Series
HPF104-ADA, HPF105

360377/C

Document History

Revision	Date	CO	Supersession	Revision Description
A	1 DEC 2016	12355	n/a	Initial release (all units with serial numbers 2036500 and greater).
B	5 MAR 2018	13358	B supersedes A	• Updated Amperage value for 230V 50Hz in Model and Input Power Table. • Updated schematics to reflect change in Horizon Access Control keypad.
C	06 JAN 2020	15180	C supersedes B	• Updated i.Series schematics • Changed the temperature calibration task in the PM schedule from quarterly to annually • Updated symbols and regulatory information

* Date submitted for Change Order review. Actual release date may vary.

Document Updates

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The screenshots and component images appearing in this guide are provided for illustrative purposes only, and may vary slightly from the actual software screens and/or product components.

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Part No. 360377/C

Contents

1 About this Manual 4
1.1 Safety Precautions and Symbols. 4
1.2 Model and Input Power 5
1.3 Product Labels. 5

i.Series Information 6

2 Installation and Configuration 6
2.1 Location Requirements 6
2.2 Placement and Leveling 6
2.3 Stacked Undercounter Units 6
2.4 Connect Back-Up Power 6
2.5 Prepare for Monitoring. 7
2.6 Configure Storage 10
2.7 Optional Adapter Kits for Medication Dispensing Locks 11
2.8 Reverse Door Hinges and Handle. 12

3 Controls. 15
3.1 Home Screen and Screensaver 15
3.2 Home Screen Functions 15
3.3 Alarm Reference 15
3.4 Settings 16
3.5 Sensor Calibration. 20

4 Maintenance 24
4.1 Alarm Tests 25
4.2 Upgrade System Firmware 26
4.3 Test and Replace Back-up Batteries 27
4.4 Check Probe Bottle 27
4.5 Clean Freezer 27

5 Service. 29
5.1 Refrigerant. 29
5.2 Remove / Replace Unit Cooler Cover 29

6 Troubleshooting 31
6.1 Accessing System 31
6.2 Alarm Activation Problems. 31
6.3 Chamber Temperature Problems 32
6.4 Condensation and Icing Problems. 32

7 i.Series® Parts 33

8 Schematics 36
8.1 iPF and iLF Models; 104 and 105 Configuration 36
8.2 iPF and iLF Models; 104 and 105 Configuration 37

Horizon Series™ Information . . . 38

9 Installation and Configuration . . . 38
9.1 Location Requirements . . . 38
9.2 Placement and Leveling . . . 38
9.3 Stacked Undercounter Units . . . 38
9.4 Connect Back-Up Power . . . 38
9.5 Defrost Events . . . 39
9.6 Prepare for Monitoring . . . 40
9.7 Configure Storage . . . 42
9.8 Optional Adapter Kits for Medication Dispensing Locks . . . 43
9.9 Reverse Door Hinges and Handle . . . 43

10 Controls . . . 47
10.1 Monitor and Control Interface . . . 47
10.2 Alarm Reference . . . 48
10.3 Settings . . . 49

11 Maintenance . . . 52
11.1 Alarm Tests . . . 53
11.2 Test and Replace Back-up Batteries . . . 53
11.3 Check Probe Bottle . . . 54
11.4 Clean the Freezer . . . 54

12 Service . . . 55
12.1 Refrigerant . . . 55
12.2 Remove / Replace Unit Cooler Cover . . . 55

13 Troubleshooting . . . 57
13.1 Accessing System . . . 57
13.2 Alarm Activation Problems . . . 57
13.3 Chamber Temperature Problems . . . 58
13.4 Condensation and Icing Problems . . . 58

14 Horizon Parts . . . 59

15 Schematics . . . 62
15.1 HPF and HLF Models; 104 and 105 Configuration (without Access Control) . . . 62
15.2 HPF and HLF Models; 104 and 105 Configuration (with Access Control) . . . 63

Appendix A: Warranty . . . 64

1 About this Manual

This manual provides information on how to use i.Series® and Horizon Series™ undercounter laboratory and plasma storage freezers. It is intended for use by end users of the freezer and authorized service technicians.

Models are indicated by a distinguishing model number that corresponds to the series, type, number of doors, and capacity of the freezer. For example, “iLF105” refers to an i.Series Laboratory Freezer with 1 door and a capacity of 5 cu ft, while “HLF104” refers to a Horizon Series Laboratory Freezer with 1 door and a capacity of 4 cu ft.

Generic references are used throughout this manual to group models that contain similar features. For example, “105 models” refers to all models of that size (iPF105, HPF105, iLF105, HLF105). This manual covers all undercounter freezers, which may be identified singly, by their size, or by their respective “Series.”

1.1 Safety Precautions and Symbols

Symbols found in this document

The following symbols are used in this manual to emphasize certain details for the user:

Task Indicates procedures which need to be followed.

Note Provides useful information regarding a procedure or operating technique when using Helmer Scientific products.

NOTICE Advises the user against initiating an action or creating a situation which could result in damage to equipment; person injury is unlikely.

Symbols found on the units

The following symbols may be found on the freezer or freezer packaging:

Caution: Shock/electrical hazard

Refer to documentation

Caution: Risk of damage to equipment or danger to operator

Avoiding Injury

Review safety instructions before installing, using, or maintaining the equipment.

- Before moving unit, ensure door is closed and casters (if installed) are unlocked and free of debris.
- Before moving unit, disconnect the AC power cord and secure the cord.
- Never physically restrict any moving component.
- Avoid removing electrical service panels and access panels unless so instructed.
- Keep hands away from pinch points when closing the door.
- Avoid sharp edges when working inside the electrical compartment and refrigeration compartment.
- Ensure biological materials are stored at recommended temperatures determined by standards, literature, or good laboratory practices.
- Proceed with caution when adding and removing samples from the freezer.
- Do not open multiple, loaded drawers or baskets at the same time.
- Use manufacturer supplied power cord only.
- Using the equipment in a manner not specified by Helmer Scientific may impair the protection provided by the equipment.
- The freezer is not considered to be a storage cabinet for flammable or hazardous materials.
- Ensure biological materials are stored safely, in accordance with all applicable organizational, regulatory, and legal requirements.
- **REQUIRED:** Decontaminate parts prior to sending for service or repair. Contact Helmer or your distributor for decontamination instructions and a Return Authorization Number.

1.2 Model and Input Power

Note

Service information varies depending on the model and power requirements.

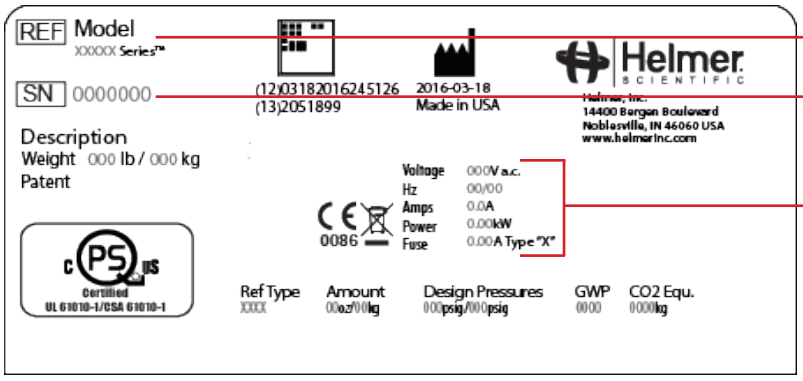
Table 1. Model and Input Power

Model	Voltage	Frequency	Current Draw
104	115V	60 Hz	5.75 A
105	115V	60 Hz	5.75 A
	230V	50 Hz	2.9 A
	230V	60 Hz	3.1 A

** Amperage values are subject to change. Refer to the product specification label on your unit for current values.*

1.3 Product Labels

This information appears on the product specification label, located on the rear of the freezer. The model also appears on a label located in the chamber on the upper side of the right wall.



Label	Description
A	Model (REF)
B	Serial number (SN)
C	Power requirements

Sample Product Specification label

i.Series Information

2 Installation and Configuration

2.1 Location Requirements

- Grounded outlet meeting the electrical requirements listed on the product specification label.
- Clear of direct sunlight, high temperature sources, and heating and air conditioning vents.
- Minimum 3”(76 mm) of space behind unit.
- Meets limits specified for ambient temperature (15 °C to 32 °C) and relative humidity.

2.2 Placement and Leveling

NOTICE

- To prevent tipping, ensure the casters (if installed) are unlocked and the door is closed before moving the freezer.
- Do not sit, lean, push or place heavy objects on top surface.

1. Move freezer into place. Lock casters if installed.
2. Ensure freezer is level.

Note

Helmer recommends the use of leveling feet and wall and floor brackets (PN 400472-2) for stabilization. Contact Helmer Technical Service for parts and instruction.

2.3 Stacked Undercounter Units

NOTICE

- For stacked configuration, both units must have leveling feet installed.
- Back brace bars and front stabilizing brackets must be installed (Blue - PN 400821-1; Stainless Steel - PN 400821-2).
- When stacking units, place the heavier unit on the bottom.
- Do not open multiple loaded drawers or baskets at the same time.

Contact Helmer or your distributor for more information regarding the stacking kit and methods to secure both units to the wall and/or floor.

2.4 Connect Back-Up Power

The monitoring system and chart recorder each have a back-up battery system enabling a period of continuous operation if power is lost.

Battery life varies by manufacturer as well as voltage level remaining. Providing full power is available and no battery-related alarms are active, back-up power for the monitoring system is available for up to 20 hours. Providing full power is available, back-up power for the optional Access Control system is available for up to 2.5 hours.

Before installing or replacing batteries, switch AC power and back-up battery switch OFF. Disconnect freezer from AC power.

Notes

- The optional Access Control system uses the monitoring system back-up battery for back-up power in the event of power failure.
- The monitoring system will start on back-up battery power alone. If the freezer was not previously connected to AC power and the back-up battery is switched on, the monitoring system will begin running on back-up power.
- If AC power is lost, the monitoring system will automatically disable some features to prolong back-up battery power. Data collection will continue until back-up power is depleted.

The back-up battery is located below the chamber, behind the front panel. The panel cover must be removed to access the battery.

Monitoring system back-up battery.

2.5 Prepare for Monitoring

The back-up battery is switched OFF for shipping. Switch back-up battery ON to provide the monitoring system and optional Access Control system with back-up power in the event of AC power failure.

Temperature Probes

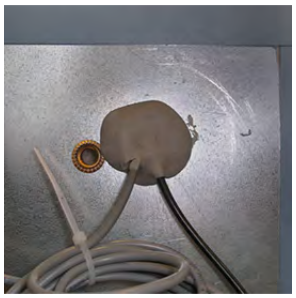
Notes

- Temperature probes are fragile; handle with care.
- Remote probes may also be introduced through the existing port and immersed in existing probe bottles.

The probe bottle along with a container of propylene glycol have been provided with this unit. The propylene glycol is mixed with water to create a solution which simulates the product stored in the freezer. The product simulation solution temperature reflects the product's temperature during normal operation.

The probe bottle should contain 4 oz. (120 mL) of product simulation solution at a 1:1 ratio of water to propylene glycol.

Left: Probe bottle with temperature probe



Right: Rear access port

Fill Probe Bottle

1. Remove all probes from bottle and remove bottle from bracket.
2. Remove cap and fill with 4 oz (120 mL) of product simulation solution.
3. Install cap and place bottle in bracket.
4. Replace probes, immersing at least 2" (50 mm) in solution.

Install Additional Probe Through Rear Port

1. Peel back putty to expose port.
2. Insert probe through port into chamber.
3. Insert probe into bottle.
4. Replace putty, ensuring a tight seal.

Chart Recorder (if included)

Notes

- If chart recorder has been operating on battery power, the battery should be replaced to ensure the back-up source has proper charge.
- For complete information, refer to the Temperature Chart Recorder Operation and Service Manual included with the unit.

The chart recorder has a back-up battery system, enabling a period of continuous operation if power is lost. Battery life varies by manufacturer as well as voltage level remaining. Providing full power is available, back-up power for the temperature chart recorder is available for up to 14 hours.

Prior to use:

Route the chart recorder probe through the rear access port and place in bottle with primary monitor probe.

Set Up and Operation

Access chart recorder by pulling the door open.

Install Battery

Connect the leads to the battery to provide back-up power to the chart recorder.

Install / Replace Chart Paper

Notes

- For accurate temperature reading, ensure the current time is aligned with the time line groove when chart knob is tightened.
- Contact Helmer Customer Service to reorder chart paper; part number 220366 (52 sheets).

Chart recorder stylus and time line groove

1. Press and hold **C** button. When stylus begins to move left, release button. The LED flashes to indicate current temperature range.
2. When stylus stops moving, remove chart knob then move knob up and away.
3. Place chart paper on chart recorder.
4. Gently lift stylus and rotate paper so current time line corresponds to time line groove.
5. Hold chart paper and reinstall chart knob is fully tightened. *(Failure to fully tighten the knob can result in paper slipping and losing time.)*
6. Press and hold **C** button. When stylus begins to move right, release button.
7. Confirm stylus is marking on paper and stops at the correct temperature.
8. Calibrate chart recorder to match primary temperature if needed and close recorder door.

External Monitoring Devices

The remote alarm interface is a relay switch with three terminals:

- Common (COM)
- Normally Open (NO)
- Normally Closed (NC)

Terminals are dry contacts and do not supply voltage. Interface circuit is either normally open or normally closed, depending on terminals used.

Requirements for your alarm system determine which alarm wires must connect to terminals.

- The interface on the remote alarm monitoring system is intended for connection to the end user's central alarm system(s) that uses normally-open or normally-closed dry contacts.
- If an external power supply exceeding 33 V (RMS) or 70 V (DC) is connected to the remote alarm monitoring system's circuit, the remote alarm will not function properly and may cause damage to the control board or result in injury to the user.

The terminal on the remote alarm interface have the following maximum load capacity:

- 0.5 A at 125 V (AC)
- 1 A at 250 V (DC)

Connect to Remote Alarm Interface

1. On back of freezer, locate the remote alarm terminals.
2. Connect remote alarm wires to appropriate terminals, according to requirements for your alarm system.
3. Use a cable tie to relieve strain on alarm wires (as necessary).

2.6 Configure Storage

Notes

- Before moving storage components, protect stored items in freezer from extended exposure to adverse temperature.
- Before moving drawers, ensure they are completely empty for safe lifting.
- Maximum basket, drawer, or shelf load is 100 lbs (46 kg).

Product Loading Guidelines

When loading your freezer, take care to observe the following guidelines:

- Never load freezer beyond capacity.
- Always store items within shelves, drawers or baskets.
- Temperature uniformity is maintained by air circulation, which could be impeded if unit is overfilled, particularly at the top or back. Ensure proper clearance is provided below the fan.

Note

Products stacked against back wall may obstruct air flow and affect performance of unit.

Drawers and Baskets

Remove drawer or basket

1. Pull drawer or basket out until it stops.
2. Tilt the front of the drawer or basket upward.
3. Pull drawer or basket free of the slides.

Install a drawer or basket

1. Align end guides on drawer or basket with the slides.
2. Gently push drawer or basket into chamber until it stops.
3. Pull drawer or basket out until it stops; check for smooth operation.

Move drawer slides

1. Using a screwdriver, remove front bracket retainers.
2. Tap front brackets upward to disengage standards.
3. Remove slides from standards.
4. Insert slides into standard at appropriate height.
5. Tap front brackets downward to engage standards.
6. Using a screwdriver, install front bracket retainers.

Shelves

Remove shelf

1. With one hand, lift front edge of the shelf from the front brackets.
2. With the other hand, reach under the shelf and bump rear edge of the shelf upward to disengage rear brackets.

Install shelf

1. Insert shelf into chamber, placing it on brackets.
2. Gently bump rear edge of the shelf downward to engage brackets.
3. Pulling shelf forward gently; shelf should not disengage from rear brackets.

Move shelf brackets

1. Using a screwdriver, remove front bracket retainers.
2. Tap front brackets upward to disengage standards.
3. Remove front brackets from standards.
4. Insert front brackets into standard at appropriate height.
5. Tap front brackets downward to engage standards.
6. Using a screwdriver, install front bracket retainers.

2.7 Optional Adapter Kits for Medication Dispensing Locks

Contact Helmer Technical Service or your distributor for service documentation pertaining to medication dispensing locks.

2.8 Reverse Door Hinges and Handle

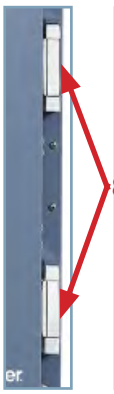
Notes

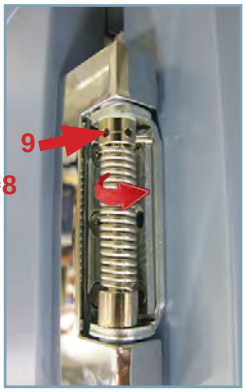
- The following instructions apply to a reversing right-hinged door to a left-hinged door. Some steps will need to be reversed if changing from left-hinged to right-hinged.
- Before reversing door hinge and handle, protect stored items in freezer from extended exposure to adverse temperature.
- The door hinge and handle cannot be reversed on freezers equipped with Access Control.
- Unit must be on floor or an elevated work surface with adequate space to place door face-down in front of unit.
- To prevent personal injury and/or damage to the door, Helmer recommends two people for this procedure.

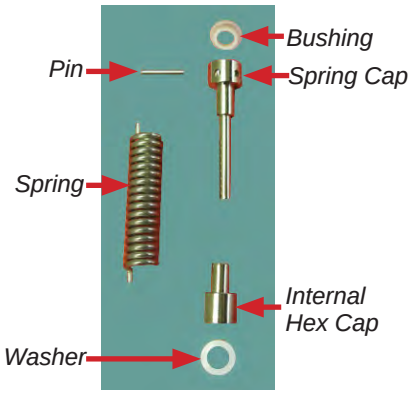
Remove door and hinges

1. With access panel cover closed, remove four screws securing kick plate to unit. Set kick plate and screws aside.
2. Open front access panel and switch main power switch to OFF; switch back-up battery switch to OFF; disconnect AC power cord from power receptacle.
3. Remove six screws securing access panel and cover to unit and carefully place them in front of unit ensuring there is no strain on wiring.
4. Remove plug from access panel on handle-side of unit. Remove grommet from hole on hinged-side of unit and slide braided sleeve out of slot.
5. Cut zip tie holding power cable inside unit.

6. Remove four screws securing door handle assembly to door and set assembly aside.
7. Remove two screws attaching strike plate and spacer to unit and set aside.

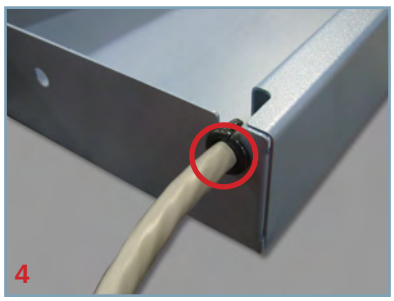




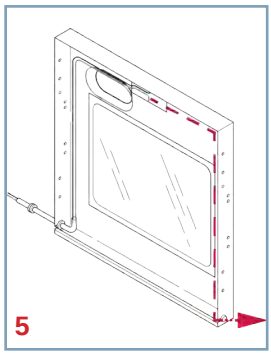


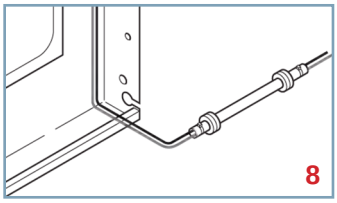
8. With door shut, remove cover plate from both hinges.
9. Remove lower hinge spring assembly using a punch or J-hook tool to engage left-most hole in spring cap and rotate spring cap from left to right and hold.
10. Using needle-nose pliers, remove pin from spring cap and slowly release spring back to left.
11. Using a punch or J-hook tool to engage any hole in spring cap, compress spring downward.
12. Remove spring assembly from lower hinge and set aside.
13. Supporting door, remove five screws attaching lower hinge to door and unit, and noting size and location of each screw. Set the hinge aside.
14. Remove five screws attaching upper hinge to door and unit, and noting size and location of each screw. Set hinge aside.

Reroute communication cables



1. Carefully place door face-down in front of unit taking care not to damage display assembly and ensuring there is no strain on cables running from the cabinet to the door.
2. Remove remaining screws from the door assembly. Using a punch or J-hook tool along the bottom edge, lift inner door frame out of outer door frame.
3. Remove plug from door on handle-side and set aside.
4. Pull grommet out of hole in door on hinged-side and slide braided sleeve out of slot.

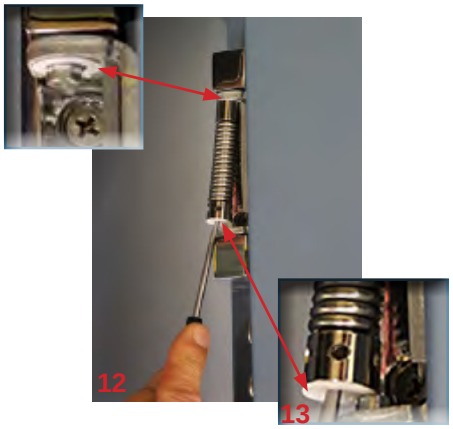




5. Reroute power and communication cables along inside edge of door and through slot in corner opposite their initial location.
6. Tape cables to inside of door ensuring any excess cable is on outside of door.
7. Cut zip ties that are securing braided sleeve and slide sleeve and grommets along cables toward door.
8. Slip braided sleeve through slot in door and insert door-side grommet into hole in door.
9. Secure braided sleeve around cables using zip ties at each end to prevent sleeve from sliding.

Reassemble door / Reverse hinges

1. Reinstall inner door panel and secure with screws in holes opposite original configuration.
2. Reinstall hinges onto opposite side of door frame by aligning holes in hinge plates with holes in door frame and hand-threading two long screws in each hinge (leave screws slightly loose).
3. Lift door to cabinet and align holes in hinge plates with corresponding holes in cabinet.
4. Hand-thread three short screws through hinge and into cabinet ensuring the weight of the door does not rest on hinges.
5. Level door and tighten all screws securing hinges to unit.
6. Reroute power and communication cables across front of unit behind access panel and secure with zip tie.
7. Slide braided sleeve through slot in access panel allowing approximately 3” (76 mm) of slack between door and cabinet so door can open and close without straining cables. Install grommet in access panel.
8. Attach door handle on opposite side of door with four screws.
9. Attach strike plate and spacer to opposite side of unit with two screws. Test locking mechanism to ensure proper functionality.
10. With door closed, configure the hinge spring assembly for the opposite side of door.



11. Orient bend in coil toward front of freezer and slide internal hex cap with washer onto upper hex bolt in lower hinge plate.
12. Compress spring upward using a punch or J-hook tool in spring cap.
13. Slide spring cap over lower hex bolt in lower hinge plate while compressing spring.
14. Use a punch or J-hook tool to engage right-most hole in spring cap and rotate the spring cap from right to left, and hold.
15. Count four holes, beginning with and including hole closest to end of coil, and insert pin in fourth hole
16. Replace hinge cover plates.
17. Reinstall access panel and cover securing with six screws.
18. Reinstall kick plate securing with four screws.
19. Plug power cord into power receptacle. Switch AC power switch ON. Switch back-up battery switch ON.
20. Verify door is level, hinges operate smoothly and door seals tightly.
21. Touch Mute to disable high temperature alarm while freezer reaches operating temperature.

3 Controls

i.Series models are equipped with the i.C³ monitoring and control system. The i.C³ system combines temperature control and monitoring into a single user interface.

Note

Please refer to the i.C³ User Guide for complete information regarding the i.C³ User Interface.

3.1 Home Screen and Screensaver

The Home Screen is the default screen and is displayed when:

- The Home icon is touched from any other screen.
- There is no interaction for two minutes or any screen other than those used to enter a password.

Home Screen

Screensaver

3.2 Home Screen Functions

Note

Refer to the i.C³ User Guide for options available on all i.C³ screens.

- View current interior cabinet temperature readings
- View the current system time and date
- Access any of the five homescreen applications (touch **i.C³ APPS** for additional applications)
- View information about current alarm events
- View whether the monitoring system is running on battery power
- Mute audible alarms
- Turn the chamber light on and off
- View a graph of the chamber temperature
- View unit ID
- Shortcut to Event Log

3.3 Alarm Reference

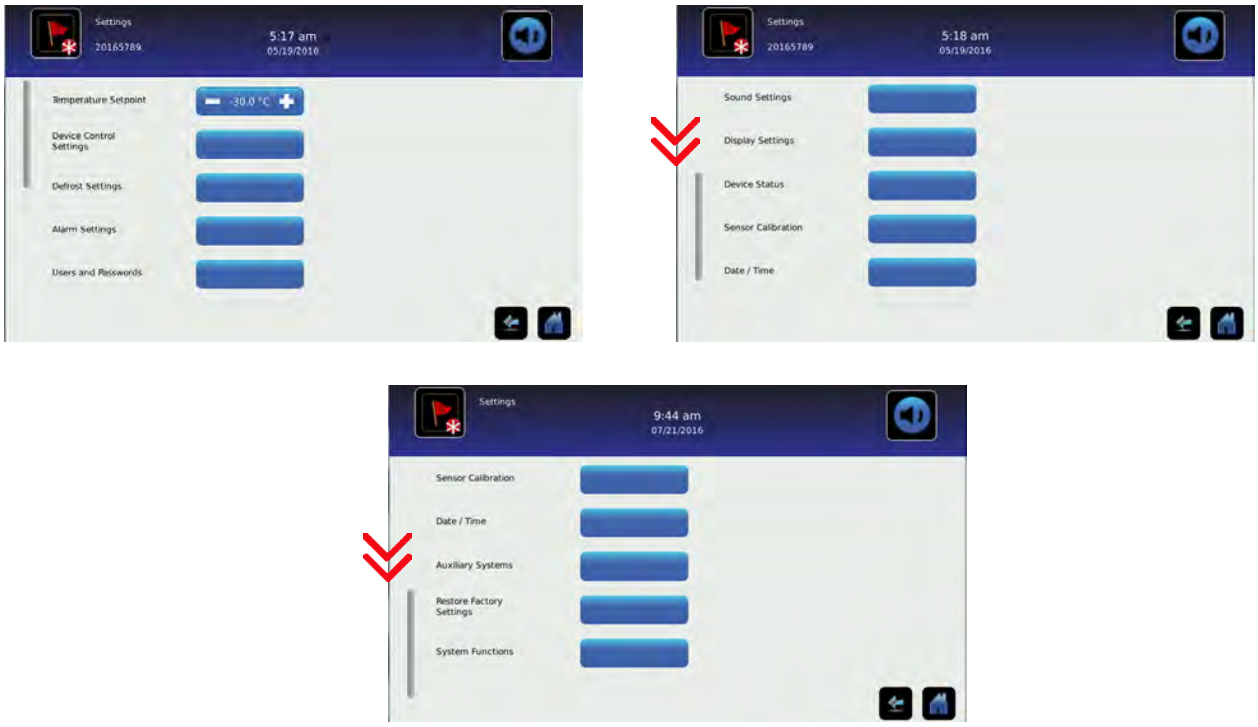
If an alarm condition is met, an alarm activates. Some alarms are visual only; others are visual and audible. Some alarms are sent through the remote alarm interface. The table indicates if an alarm is audible (A), visual (V), or sent through the remote alarm interface (R).

Table 3. i.Series Alarm Reference

Alarm	Alarm Type	Alarm	Alarm Type
High Temperature	A, V, R	Low Battery	V
Low Temperature	A, V, R	No Battery	A, V, R
Compressor Temperature	A, V, R	Probe Failure	A, V, R
Door Open (Time)	A, V, R	Communication Failure	A, V, R
Power Failure	A, V, R		

3.4 Settings

Through the i.C³ monitoring and control system, current settings may be viewed and changed. To view settings, touch **i.C³ APPS**, **Settings**. Use a touch-drag motion to scroll up or down to display additional settings.



Settings screens

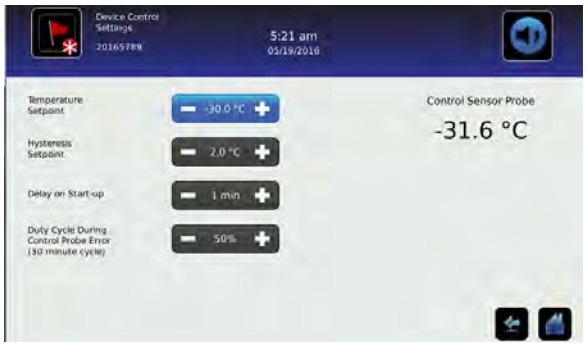
Notes

- If the Settings screen is password protected enter appropriate password. If viewing settings for the first time, enter factory default password of “1234”.
- Default values for general settings, alarm settings, and display settings are available in the i.C³ User Guide.
- Changing temperature settings affects operation of the freezer. Do not change settings unless instructed in product documentation or by Helmer Technical Service.

The i.C³ temperature monitor and controller is programmed at the factory. To change a setting, first enter the Settings screen, then the setting. The method for accessing the Settings mode for each setting varies.

Device Control Settings

Device control settings are programmed at the factory. Setpoints can be viewed and changed through the i.C³ monitoring and control system. To view temperature setpoints, touch **i.C³ APPS**, **Settings, Device Control Settings**.



Device Control Settings screen

Table 4. Setpoints

Setting	Model
	104 / 105
Temperature Setpoint	-30.0 °C
Hysteresis Setpoint	2.0 °C
Delay on Start-Up	2 minutes
Duty Cycle During Control Probe Error	100%

Temperature Setpoint

The setpoint is the temperature at which the unit operates.

Notes

- If the Settings screen is password protected enter appropriate password. If viewing for the first time, enter the factory default password of “1234”.
- Change the setpoint if your organization requires a chamber temperature other than -30.0 °C.

Change Temperature Setpoint

1. Touch **i.C³ APPS**, **i.C³ Settings**.
2. Enter the Settings password.
3. Touch minus (**–**) or plus (**+**) on the **Temperature Setpoint** spin box.

Hysteresis Setpoint

Hysteresis is the allowable temperature variance on each side of the freezer setpoint.

Delay on Start-Up

Compressor start-up is delayed to allow the i.C³ monitoring and control system to start first.

Duty Cycle During Control Probe Error

The duty cycle is the percentage of time the compressor will run in the event of a temperature control probe failure.

Note

Hysteresis, Delay on Start-up and Duty Cycle During Control Probe Error are factory-preset and should not be changed unless directed by Helmer Technical Service.

Defrost Time

Notes

- Depending on the high temperature alarm setpoint and the actual temperature increase during the defrost cycle, frequent door openings may trigger repeated high temperature alarms.
- There must be a minimum of four hours between defrost cycles.

Defrost events may be scheduled to occur at specific times. A defrost event can be triggered on demand without affecting a programmed defrosting schedule. The number of programmed defrost events is dependent on environmental conditions and the frequency of usage. The recommended number of daily defrost cycles is three to four, at even intervals. Defrost events should take place when the freezer door is opened infrequently.

The i.C³ monitoring and control system can perform a maximum of four defrost cycles per day.

Schedule or Start a Defrost Event

1. Touch **i.C³ APPS**, **Defrost Settings**.
2. Toggle the **ON/OFF** button to schedule the defrost event(s), or
   Toggle the **Start/Stop** button. The Defrost icon will appear for the duration of the defrost cycle.
3. Touch the corresponding Time spin box to set the starting time for each defrost event selected.

Table 2. Default Defrost Cycles

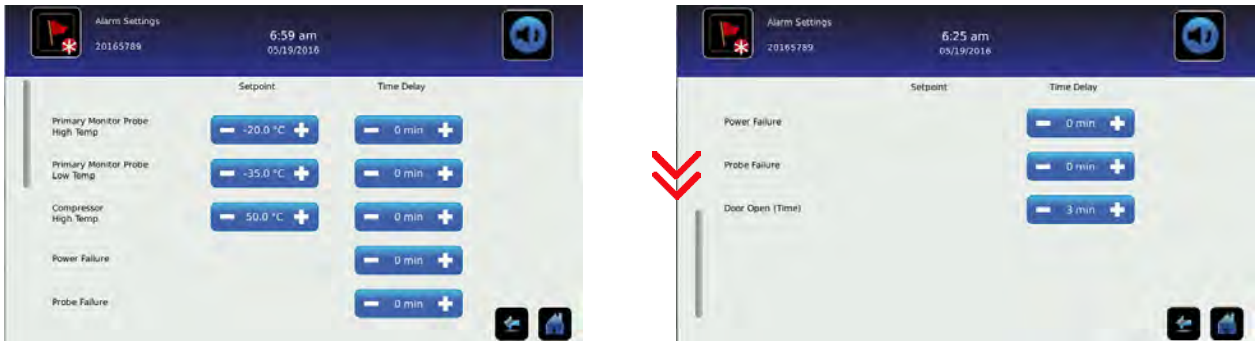
Defrost Event	On/Off	Default Time
1	On	12:15 AM
2	On	8:00 AM
3	On	4:00 PM
4	Off	6:00 PM

User Configurable Alarm Settings

The following alarm settings may be changed by the operator. The setpoint for temperature alarms may be changed (where applicable), as well as the time delay between when the alarm condition commences and when the visual and audible alarms are initiated.

Table 5. User Configurable Alarms

Setting	Description	Default Value	Default Time Delay
Primary Monitor Probe High Temp	High temperature at which alarm condition occurs	-20 °C	0 minutes
Primary Monitor Probe Low Temp	Low temperature at which alarm condition occurs	-35 °C	0 minutes
Compressor High Temp	High temperature at which alarm condition occurs	50 °C	0 minutes
Power Failure	Time after power failure occurs until alarm sounds		1 minutes
Probe Failure	Time after probe failure occurs until alarm sounds		0 minutes
Door Open (Time)	Time door remains open until alarm sounds		3 minutes
Low Battery	Triggered after approximately 18 hours of power loss (units without access control)	Not adjustable	



Alarm Settings screens

Change an alarm setting

1. Touch **i.C³ APPS**, **Settings**.
2. Enter the Settings password (default password is “1234”).
3. Scroll down and touch **Alarm Settings.**
4. Touch the minus (-) or plus (+) on the corresponding **Setpoint** spin box to change an alarm setpoint.
5. Touch the minus (-) or plus (+) on the corresponding **Time Delay** spin box to change the time delay duration
6. Touch **Home** to exit the Alarm Settings screen.

Non-Configurable Alarms

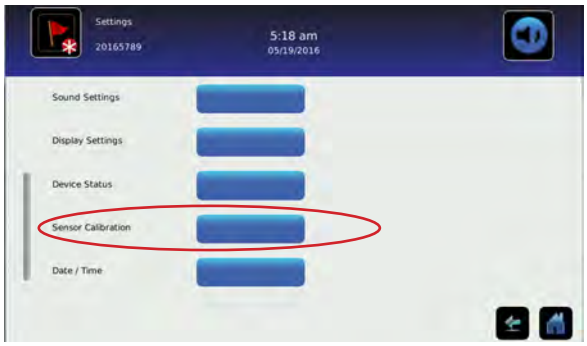
The following alarms indicate operational conditions which require the attention of the operator or a qualified service technician.

Table 6. Non-Configurable Alarm

Alarm	Description
Low Battery	Rechargeable battery voltage is low
Communication Failure	**Communication Failure 1** • Triggered if communication is lost between i.C³ display board and control board • Unit will continue to run with previously saved settings • Screen will not display temperature changes or alarm conditions • i.C³ system will continue to reset until connection is re-established **Communication Failure 2** • Triggered if communication is lost between i.C³ display board and internal system memory • Unit will continue to run with previously saved settings **Communication Failure 3** • Triggered if the database is corrupted • The database is archived and a new database is automatically created • Unit will continue to run with previously saved settings

3.5 Sensor Calibration

Sensor calibration values are programmed at the factory. Calibration values can be viewed and changed through the i.C³ monitoring and control system. To view calibration settings, touch **i.C³ APPS**, **Settings** and scroll down to **Sensor Calibration.**



Settings screen

Sensor Calibration screens

Notes

- If the Settings screen is password protected, enter the appropriate password. If viewing settings for the first time, enter factory default password of “1234”.
- After one hour of no interaction, the Home screen or Temperature Graph screensaver (if enabled) is displayed.
- The Secondary Monitor Probe is not available on undercounter units and is not an adjustable setting.
- The Compressor Probe Offset and Evaporator Defrost Probe Offset settings are factory-preset and should not be changed unless directed by Helmer Technical Service.

Primary Monitor Probe

Verify primary monitor probe is reading chamber temperature correctly by comparing probe reading to the temperature measured by calibrated reference thermometer. If the probe is not reading correctly, change the value displayed on the monitor.

The factory default setting for the primary monitor probe is -30.0 °C.

Notes

- Ensure product simulation bottle is full of solution.
- Probe in the bottle is connected to the monitoring system and senses chamber temperature. This probe activates the temperature alarms, but does not affect freezer setpoint.

Calibrate primary monitor probe

1. Remove monitor probe from the probe bottle.
2. Unscrew the cap and remove.
3. Attach a calibrated independent reference thermometer traceable per national standards to the probe, and immerse at least 2” (50 mm) in the probe bottle.
4. Close the door and allow the chamber temperature to stabilize for 10 minutes. Ensure both the display temperature and thermometer temperatures have stabilized before proceeding.
5. Observe and note the temperature on the calibrated reference thermometer and compare the chamber temperature displayed. If the independent thermometer corresponds to the displayed temperature, proceed to **Step 9**.
6. Subtract the displayed temperature reading from the independent probe reading to determine the offset value.
7. Touch, **i.C³ APPS**, **Settings**, **Sensor Calibration**.
8. Touch minus (-) or plus (+) on the corresponding spin box to increase or decrease the value by the value calculated in **Step 6**. The message “New Setting Saved” appears next to the spin box.
9. Remove thermometer from probe.
10. Replace bottle cap, ensuring a tight fit.
11. Place probe in bottle, immersing at least 2” (50 mm).

Control Probe

The temperature controller senses unit cooler temperature through the control probe in the unit cooler. The unit cooler temperature typically varies from the chamber temperature, so an offset value is used by the control system to compensate for the difference.

The temperature controller adjusts chamber temperature around the freezer setpoint by activating the compressor when the control probe registers above the setpoint based on the hysteresis value.

Determine control probe offset

NOTICE

The monitor temperature must be verified and accurate prior to adjusting the Control Sensor Offset.

1. View and record the freezer setpoint.
2. Allow the unit to run with calibrated monitor temperature for several compressor cycles, and record the average monitor temperature .
3. View and record the current Control Offset value.
4. Subtract the freezer setpoint from the average monitor temperature and record the difference.
5. Add the current Control Probe Offset value to the recorded difference determined in the previous step to establish the new Control Probe Offset value.

EXAMPLE 1	EXAMPLE 2
Freezer Setpoint is -30.0	Freezer Setpoint is -30.0
Average monitor temperature is -29.2	Average monitor temperature is -31.2
Current Control Offset is 0.3	Current Control Offset is 0.3
Subtract: -29.2 - (-30.0) = 0.8 (difference between average temperature and setpoint)	Subtract: -31.2 - (-30.0) = -1.2 (difference between average temperature and setpoint)
Add 0.3 + 0.8 = 1.1; new Control Offset value	Add 0.3 + (-1.2) = -0.9; new Control Offset value

Enter the new offset value

1. Touch **i.C³ APPS**, **Settings**.
2. Enter the Settings password.
3. Touch **Sensor Calibration**.
4. Touch the minus (-) or plus (+) on the **Control Probe Offset** spin box.
   - ♦ Raise the offset value to lower chamber temperature; lower the offset value to raise chamber temperature.
5. Touch **Home** to return to home screen.

Compressor and Evaporator Probe

The compressor and evaporator temperature probes have been factory-calibrated. Changing the calibration settings is not typically necessary and should not be performed unless directed by Helmer Technical Service.

Factory Default Settings

Settings listed below may be simultaneously returned to factory default values.

Note

The factory default settings may not be the same as the settings that were factory-calibrated before the freezer was shipped.

Table 7. Restored Settings

Setting	Restored Value
Home Screen Application Icons	i.C³ APPS, Temperature Alarm Test, Temperature Graph, Information Logs, Download
Display Brightness	High (3 symbols)
Password (for Settings screen)	1234
Sounds	On
Alarm Volume	9
Alarm Tone	3
Temperature Calibration Values	Not affected (values previously entered during setup)
Unit ID	Not affected (previously selected during setup)
Date Format	MM/DD/YYYY
Day	Not affected (maintained in real-time clock)
Month	
Year	
Time Format	12-hour
Minute	Not affected (maintained in real-time clock)
Hour	
AM/PM	
Language	Not affected (language previously selected during setup)
Temperature Units	°C
Password Protection (for Settings screen)	On
Temperature Graph Screensaver	On
Access Control (optional) as Home Page	On
High Temperature Alarm Setpoint	-20.0 °C
High Temperature Alarm Time Delay	0 minutes
Low Temperature Alarm Setpoint *	-35.0 °C
Low Temperature Alarm Time Delay	0 minutes
Power Failure Alarm Time Delay	1 minute
Probe Failure Alarm Time Delay	0 minutes

Setting	Restored Value
Door Open (Time) Alarm Time Delay	3 minutes
Compressor Temperature Alarm Setpoint	50.0 °C
Compressor Temperature Alarm Time Delay	0 minutes
Chamber Setpoint	-30.0 °C
Chamber Hysteresis	2.0 °C
Delay on Start-Up	2 minutes
Control Relay Probe Failure Duty Cycle	100%
Defrost Event #1 On/Off	On
Defrost Event #1 Start Time	12:15 AM
Defrost Event #2 On/Off	On
Defrost Event #2 Start Time	8:00 AM
Defrost Event #3 On/Off	On
Defrost Event #3 Start Time	4:00 PM
Defrost Event #4 On/Off	Off
Defrost Event #4 Start Time	6:00 PM
Defrost Time/Defrost Safety Operation Time	15 minutes

Restore Settings

1. Touch the **Settings** icon.
2. Scroll down and touch the **Restore Factory Settings** button. The Restore Factory Settings confirmation box appears.
3. Touch to confirm, or to cancel.

4 Maintenance

Maintenance tasks should be completed according to the schedule below.

Notes

- The preventive maintenance schedule provides recommended minimum requirements. Regulations or physical conditions at your organization may require maintenance items be performed more frequently, or only by designated service personnel.
- Before performing maintenance, protect items in freezer from extended exposure to adverse temperature.
- Allow freezer temperature to stabilize at setpoint after performing service or after extended door opening.

Table 9. i.Series Preventive maintenance Schedule

Task	Frequency			
	Quarterly	1 year	2 years	As Needed
Test the high and low temperature alarms.	✓			
Test the power failure alarm (as required by your organization's protocols).	✓			
Test the door alarm (as required by your organization's protocols).				✓
Check the temperature calibration on the monitor and change it if necessary.		✓		
Replace the monitoring system back-up battery.			✓	
Check the level of the solution in the probe bottle. Refill or replace solution if necessary.				✓
Examine the probe bottle and clean or replace if necessary.		✓		
Clean the condenser grill.	✓			
Clean the door gaskets, interior, and exterior of the freezer.				✓
Electrical Compartment • Inspect electrical components and wiring terminals in the electrical box for discoloration. Contact Helmer Technical Service if any discoloration is found. • Inspect all wiring for terminal strips for secure connections. Tighten connections as necessary.	✓			
Models with Chart Recorders Check the back-up battery for the chart recorder after an extended power failure and change it if necessary, or change the battery if it has been in service for one year. Refer to the Temperature Chart Recorder Operation and Service Manual.				✓
Models with Access Control Test the Access Control battery.	✓			
Replace Access Control back-up battery			✓	

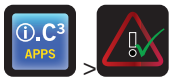
NOTICE

Clean the condenser grill on a quarterly basis.

Notes

- During a power failure the back-up battery provides power to the monitoring system, power failure alarm, and optional Access Control. If the back-up battery is not functioning, the power failure alarm will not be activated and the battery should be replaced.
- During a power failure, the back-up battery continues to provide power to the optional Access Control lock (if equipped). If the back-up battery is not functioning, the optional Access Control lock will not secure the door.

4.1 Alarm Tests



Test alarms to ensure they are working correctly. The freezer has alarms for chamber temperature, compressor temperature, door open (time), power failure, low battery, and power failure. To initiate alarm tests, touch **i.C³ APPS**, **Temperature Alarm Test**.

Automatic Chamber Temperature Alarm Test

Temperature Alarm Test screen

Notes

- A test can be aborted by touching **Cancel Test**.
- Tests takes less than five minutes.
- If the temperature alarm test does not automatically complete within two minutes, restart the i.C³ monitoring system.

When performing an automatic temperature alarm test, the Peltier device heats or cools the monitor probe until the high or low alarm setpoint is reached. An event is added to the Event Log to indicate a temperature alarm was activated. The Alarm Test icon is displayed on the Temperature Graph to indicate the temperature alarm was test-induced.

Test the low alarm

1. Identify current setting for low alarm setpoint.
2. Touch **i.C³ APPS**, **Temperature Alarm Test**.
3. Touch **Low Alarm Test**.
4. “Peltier Test Probe Cooling” message appears.
5. When displayed temperature reaches the alarm setpoint, temperature reading turns red.
6. When completed, “Test Complete” appears.
7. Touch **i.C³ APPS**, **Information Logs**, **Event Log**. Touch the event to view event details.
8. Observe the temperature at the time of the low temperature alarm event. Compare this to the alarm setpoint.

Test the high alarm

1. Identify current setting for high alarm setpoint.
2. Touch **Home**, **i.C³ APPS**, **Temperature Alarm Test**.
3. Touch **High Alarm Test**.
4. “Peltier Test Probe Warming” message appears.
5. When displayed temperature reaches the alarm setpoint, the temperature reading turns red.
6. When completed, “Test Complete” appears.
7. Touch **Home**, **i.C³ APPS**, **Information Logs**, **Event Log**. Touch the event to view event details.
8. Observe the temperature at the time of the high temperature alarm event. Compare this to the alarm setpoint.

Cancel the test

1. Touch the **Cancel Test** icon to end the alarm test. *"Test Stopped"* is displayed in the Test Status section of the display.

Note

When cancelling an automatic test, the message indicating the test is in progress clears immediately. If a setpoint was reached before the test was cancelled, the alarm activates and clears as described earlier.

Manual Chamber Alarm Test

Notes

- Perform the low alarm test before the high alarm test to control the temperature more closely and complete the testing more quickly.
- Before testing alarms, protect items in freezer from extended exposure to adverse temperature.
- Temperature probes are fragile; handle with care.

Test the high alarm

1. Identify setting for high alarm setpoint.
2. Place the glass of product simulation solution in the freezer.
3. When the product simulation solution has stabilized at the chamber temperature, remove the solution from the freezer.
4. Remove the monitor probe from the probe bottle and insert into the product simulation solution.
5. Observe the temperature on the i.C³ display at which the high temperature alarm sounds.
6. Compare the temperature at which the alarm sounds to the high alarm setpoint.
7. Remove probe from product simulation solution.
8. Place monitor probe in probe bottle, immersing it at least 2" (50 mm).

Power Failure Alarm Test

Note

During a power failure, the power failure alarm sounds and the battery provides power to the monitoring system.

Test power failure alarm

1. Change Power Failure delay setting to 0 minutes by touching **Settings**, **Alarm Settings** then touching minus (-) or plus (+) on the Power Failure spin box to change the value to 0.
2. Switch AC ON/OFF switch OFF. Power failure alarm will activate immediately.
3. Switch AC ON/OFF switch ON. Power failure alarm will clear and audible alarm will cease.
4. Change Power Failure time delay to the original setting.

Door Open Alarm Test

Test door open alarm

1. Change Door Open (Time) delay setting to 0 minutes by touching **Home**, **Settings**, **Alarm Settings,** then touching minus (-) or plus (+) on the Door Open (Time) spin box to change the value to 0.
2. Open door. Alarm will activate immediately.
3. Close door. Alarm will clear and audible alarm will cease.
4. Change the Door Open (Time) setting to the original setting.

4.2 Upgrade System Firmware

Helmer may occasionally issue updates for the i.C³ firmware. Follow upgrade instructions included with the firmware update.

4.3 Test and Replace Back-up Batteries

i.C³ Monitoring System Back-up Battery

On all i.C³ screens, the Battery icon will appear in the header bar when the system is running on battery power and the screen brightness will automatically be reduced. The monitoring system will automatically disable some features to extend battery life.

Check the i.C³ Monitoring System back-up battery

1. Turn the AC On/OFF switch OFF. The screen should continue to display information with reduced brightness and the battery icon will appear on the screen.
2. If the display is blank, replace the battery.
3. Switch AC ON/OFF switch ON.

⚠

Use a battery which meets manufacturer's specifications.

Access Control Back-up Battery

During an AC power failure, the Access Control back-up battery provides back-up power to power the magnetic Access Control lock.

Test the Access Control back-up battery

1. Ensure monitoring system / Access Control battery key switch is switched ON.
2. Switch AC ON/OFF switch OFF.
3. Attempt to open the cabinet door.
4. If the door remains locked, the battery is functional.
5. If the door does not remain locked, replace the battery.
6. Switch AC ON/OFF switch ON.

Chart Recorder Back-up Battery (if included)

Refer to 360076-1 Temperature Chart Recorder Operation and Service Manual.

4.4 Check Probe Bottle

Remove the probe bottle from the bracket and inspect for cracks. Replace the bottle if necessary.

Ensure the probe bottle has approximately 4 oz. (120 mL) of product simulation solution at a 1:1 ratio of water to propylene glycol. The propylene glycol is used to create a solution which simulates the product stored in the freezer. The product simulation solution temperature reflects the product's temperature during normal operation. Failure to fill the bottle may prevent the chamber temperature from stabilizing that the temperature setpoint. The probe should be immersed at least 2" (50 mm).

4.5 Clean Freezer

Cabinet Exterior

Clean exterior surfaces with soft cotton cloth and non-abrasive liquid cleaner.

Cabinet Interior

Clean painted surfaces with mild detergent. Clean stainless steel surfaces with a general-purpose laboratory cleaner suitable for stainless steel.

Condenser Grill

Disconnect freezer from AC power when cleaning the condenser grill.

In environments where the freezer is exposed to excessive lint or dust, the condenser grill may require cleaning more frequently than stated in preventive maintenance schedule.

Clean the condenser grill using a soft brush and a vacuum cleaner.

Door Gaskets

Clean with soft cloth and mild soap and water solution.

Probe Bottles

Clean and refill probe bottles

1. Remove probe from bottle.
2. Remove bottle from bracket.
3. Clean bottle with water-bleach solution.
4. Fill bottle with 4 oz (120 mL) of product simulation solution.
5. Cap bottle tightly to minimize evaporation.
6. Place bottle in bracket.
7. Replace probe, immersing at least 2” (50 mm).

i.C³® Touchscreen

Clean touchscreen with a soft, dry cotton cloth.

5 Service

5.1 Refrigerant

NOTICE

- Review all safety instructions prior to recharging refrigerant. Refer to **Section 1.1** (Safety).
- Maintenance should only be performed by trained refrigeration technicians.

Notes

- Use only non-CFC R-404A refrigerant.
- Pressure readings may vary based on chamber temperature and ambient air temperature.
- Normal low side pressures are 5 psi to 7 psi when unit is functioning at standard operating temperatures and measured at the end of the compressor cycle.
- If a refrigerant leak is suspected, Helmer recommends finding and fixing the leak prior to recharging the unit.

Full initial refrigerant charge varies by model and power requirements, which can be found on the product specification label.

Table 10. Refrigerant Charge

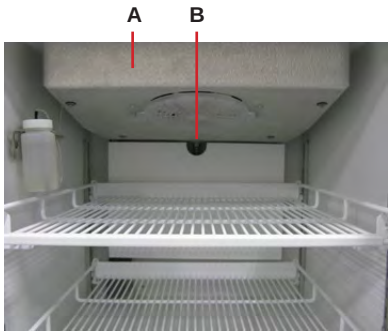
Model	Power Requirements	Refrigerant	Initial Charge
104 / 105	115 V	R404A	11.0 oz (312 g)
105	230 V (Embraco Compressor)	R404A	11.0 oz (312 g)
105	230 V (Tecumseh Compressor)	R404A	18.5 oz (524 g)

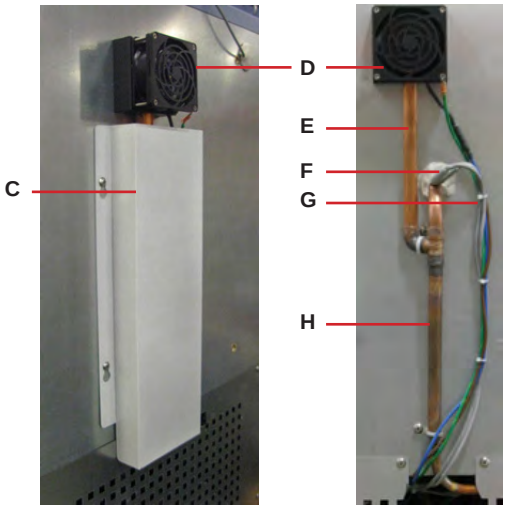
5.2 Remove / Replace Unit Cooler Cover

The unit cooler must be removed when servicing the control probe, fan motor(s) or coil.

NOTICE

If unit cooler cover is not removed as detailed in this procedure the drain port may be damaged. Improper drainage may result in excessive icing and freezer's inability to maintain temperature.





Label	Description
A	Unit cooler cover
B	Drain port
C	Protective cover
D	Drain fan
E	Fan tube
F	Heating element
G	Heater wires
H	Drain tube

Remove unit cooler cover

NOTICE

The condensate evaporator and water evaporation tray are hot.

1. Switch AC ON/OFF switch OFF. Switch battery switch OFF.
2. Remove top drawer, basket, or shelf from the cabinet.
3. Loosen the four screws attaching the drain tube cover to the rear of the unit. Slide the cover up to disengage from the keyhole openings and remove.
4. Cut the wire ties securing the drain line to the cabinet.
5. On the back of the unit, peel the putty back to expose the drain tube and drain heater.
6. Remove the wire ties securing the heater wires to the cabinet. Verify the heating element is cool.
7. Inside the cabinet, remove the putty around the drain tube.
8. From the rear of the unit, remove the drain heater from the drain tube.
9. Remove the drain tube in the back of the unit by pulling it downward. The external section of the drain tube should separate from the fan tube at the 90° elbow, leaving the fan tube attached to the fan.
10. Inside the cabinet, detach the section of the drain tube connected to the unit cooler drain spout by gently twisting to separate, then pivot the drain tube upward and remove.
11. Using a 5/16” socket wrench, remove the four screws securing the unit cooler cover to the top of the cabinet while supporting the cover with one hand to prevent it from dropping.
12. Carefully lower the unit cooler cover to avoid damage to the fan wiring.

Install unit cooler cover

1. Verify unit cooler wiring is connected and routed correctly. Wiring should be routed above the copper tube inside the unit cooler. Reconnect wires if they have separated.
2. Lift the unit cooler cover into place and attach using four screws. Tighten using a 5/16” socket wrench to secure.
3. From the rear of the unit, insert the drain tube through the opening into the cabinet. The drain tube should be aligned with the unit cooler drain spout inside the chamber and the connection to the fan tube at back of the unit.
4. Attach the drain tube to the unit cooler drain spout and the fan tube.
5. Insert the drain line heater in the drain tube at an upward angle. The black heating element should no longer be visible.
6. Replace putty around the drain tube inside the cabinet.
7. Reinstall top drawer, basket, or shelf if previously removed.
8. Reattach the drain line heater wires to the cabinet using wire ties.
9. On the back of the cabinet, press putty around the drain hose and partially into the hole.
10. Install the protective cover on the rear of the cabinet.
11. Switch AC ON/OFF switch ON. Switch battery switch ON.
12. Touch **Mute** to disable the high temperature alarm while freezer reaches operating temperature.

6 Troubleshooting

NOTICE

Review all safety instructions prior to troubleshooting. Refer to **Section 1.1**.

6.1 Accessing System

Problem	Possible Cause	Action
Door does not lock.	Lock mechanism is damaged or not aligned.	Inspect lock/latch, adjust strick plate or replace lock if needed.
Door does not lock. (Magnetic Access Control Option)	Magnetic door lock is not aligned to the strike plate.	Align lock/door to the match strike plate.
	Magnetic lock is not receiving power.	Trace voltage to the lock using the schematic, replace lock if needed.

6.2 Alarm Activation Problems

Problem	Possible Cause	Action
Battery alarms	The battery switch is in the off “o” position.	Turn the key to the on “-” position.
	The battery is low due to a power failure.	Allow the battery to recharge.
	Faulty battery or wiring connection.	Check wiring and replace battery if needed.
Probe failure alarms	Faulty probe or wiring connection.	Check corresponding probe connection. Test resistance of probe (86 Ω to 110 Ω) Replace probe if needed.
Power failure alarm	Power was interrupted to refrigerator.	Restore facility power.
	Power switch is in the off “o” position.	Turn power switch to the on “-” position.
	Power cord is loose.	Check both ends of the power cord at the wall outlet and the refrigerator.
	GFI/GFCI Outlet has tripped.	Move to standard outlet. Helmer does not recommend operating this unit on a GFI outlet.
Door alarm	Door is open.	Close door.
	Door alarm delay is set to 0 min.	Check door alarm delay (3 min default setting).
	Faulty door switch or wiring connections.	Check wiring and continuity of switch contacts. Replace switch if needed.
Compressor alarm	Condenser fins are dirty.	Clean condenser coil.
	Condenser probe is out of calibration.	Calibrate probe.
	Condenser probe is faulty.	Check corresponding probe connection. Test resistance of probe (86 Ω to 110 Ω) Replace probe if needed.
	Ambient conditions are outside of specifications.	Ensure ambinet conditions are within specifications.
Communication alarms	Communication between circuit boards is lost.	Reboot/power cycle the refrigerator. Turn off both main power and battery power, then turn power back on.

6.3 Chamber Temperature Problems

Problem	Possible Cause	Action
Temperature display does not match actual temperature.	Display temperature needs to be calibrated.	Follow temperature calibration process.
	Probe bottle is empty, or probe is out of bottle or ballast.	Check level of solution in bottle and or insert probe into bottle or ballast.
Chamber temperature is too high/low.	Probe bottle is empty, or probe is out of bottle or ballast.	Check level of solution in bottle and or insert probe into bottle or ballast.
	Display temperature needs to be calibrated.	Follow temperature calibration process.
	Door was recently opened or opened for an extended time.	Close door and allow temperature to stabilize.
	Condenser coil is dirty.	Clean the condenser coil regularly, removing all dust build up.
	Lack of air flow around unit/high ambient condition.	Check for proper spacing around unit, any foreign objects blocking airflow, and that ambient temperature is within specification.
	Lack of air flow inside of chamber.	Verify product placement and move products if they block air flow around evaporator fan, or product hanging over the shelves against back wall.
	Temperature setpoint was adjusted.	Check temperature setpoint and temperature settings. Change to default settings or desired setpoint.
	Control probe is reading too high/low.	Check control offset setting, adjust if needed.
	Unit cooler fan motor (inside chamber) is not running.	Check voltage to the fan motor using schematic, replace fan motor if needed.
	Condenser fan motor (exterior) is not running.	Check voltage to the fan motor using schematic, replace fan motor if needed.
	Compressor is not running.	Check voltage to the compressor using schematic, replace compressor start components if needed.
	Ice build up in unit cooler.	See entry in **Section 6.4**

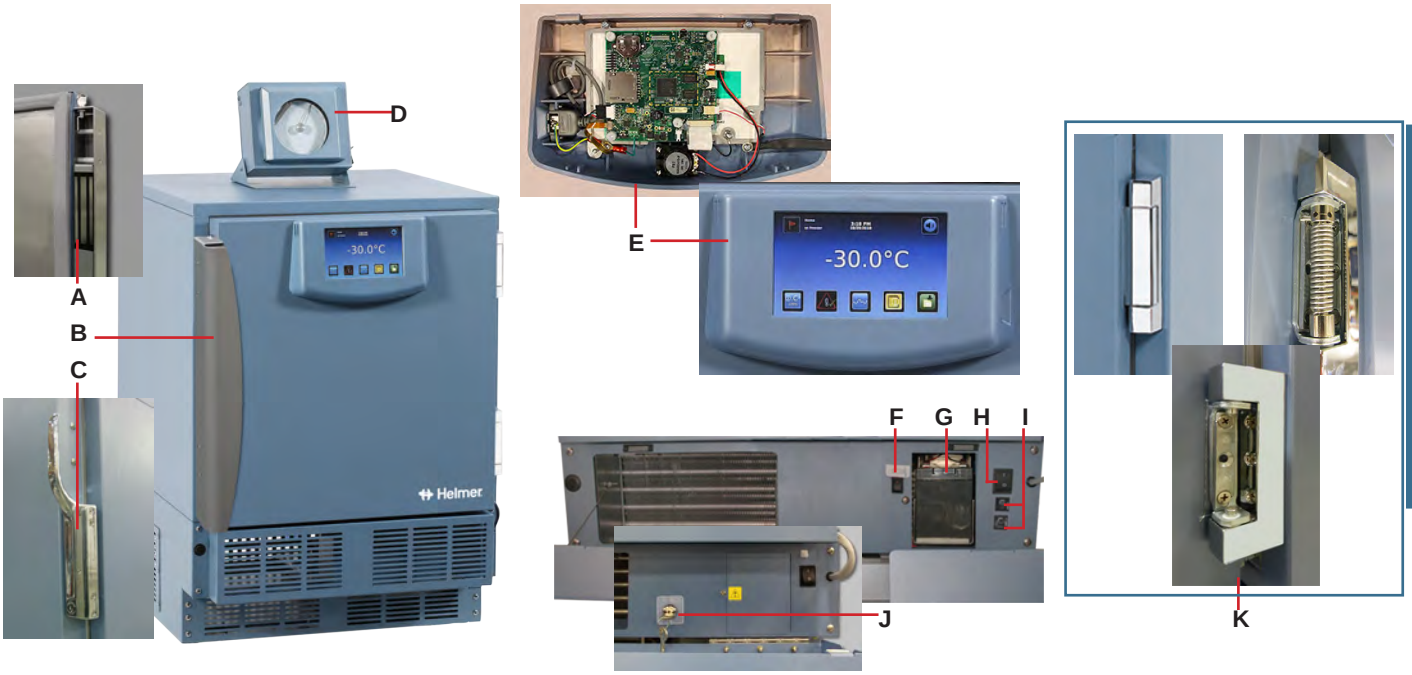
6.4 Condensation and Icing Problems

Problem	Possible Cause	Action
Excess frost/ice in chamber.	Some frost/ice within the freezer chamber is normal.	No action needed. Defrost the chamber if needed by turning the freezer off and leaving the door open until thawed, dry interior with cloth.
	Frequent or extended door openings.	Close the door and defrost chamber if needed.
	Chamber is not sealed.	Inspect door seal for damage, replace if needed. Check for wires routed through the door seal, reroute wires to the availble though hole if needed. Check through holes and ensure they are sealed, reseal if needed.
	Automatic defrost cycle is not working.	Check defrost settings and test defrost cycle to determine issue.

7 i.Series® Parts

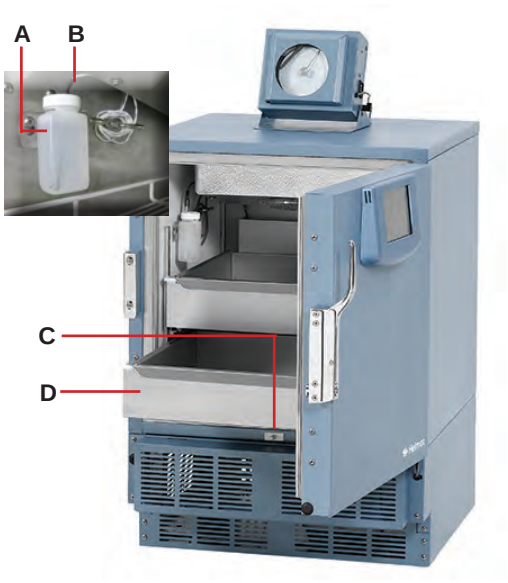
Notes

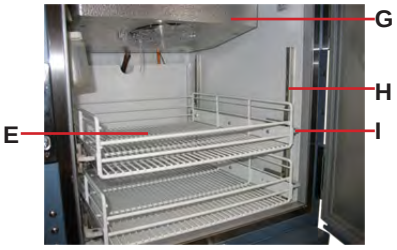
- Before replacing parts, protect items in freezer from extended exposure to adverse temperature.
- Allow freezer temperature to stabilize at setpoint after replacing parts or after extended door opening.
- Circuit boards are sensitive to static electricity and can be damaged by electrostatic discharge. Use proper ESD precautions when handling the display assembly.

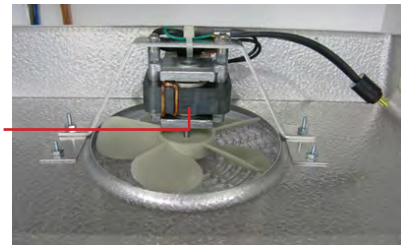


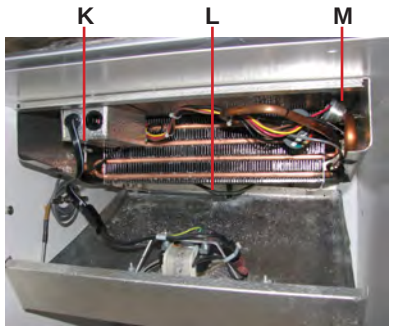
Letter	Description	Model	Part Number
A	Magnetic lock (optional Access Control) *= right hinged **= left hinged	105	800139-1*
		105	800286-1**
		104	800141-1*
		104	800287-1**
B	Door handle (optional Access Control)	105	322000-1
		104	322021-1
C	Door handle (magnetic offset latch with key lock)	-	220426
Not shown	Door gasket	104	321647-1
		105	321200-1
	Caster - swivel with brake	-	220380
	Casters (includes 4 casters and hardware)	-	400819-2
D	Temperature chart recorder	-	500613-1

Letter	Description	Part Number	Volts	Hz
Not shown	Chart paper (52 sheets)	220419	-	-
	Chart recorder battery	120218	-	-
E	Display assembly	800041-1	-	-
Not shown	USB / Power cable for i.Center display	800010-1	-	-
F	Back-up battery switch	120202	-	-
G	Monitoring system/Access Control back-up battery	120628	-	-
H	Main power switch	120478	-	-
I	Circuit breakers	120272	230	50
		120288	230	60
J	Battery key switch (optional Access Control)	401220-1	-	-
K	Hinge assembly	220506	-	-





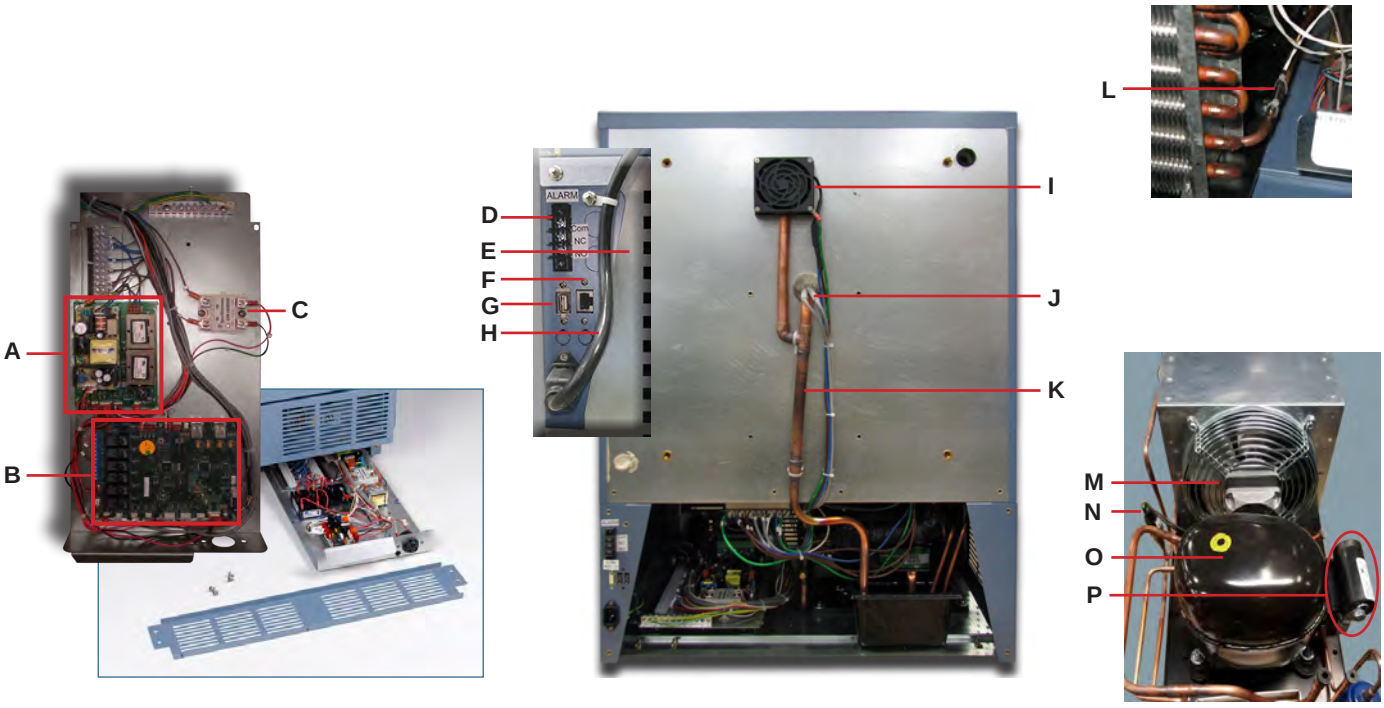




Letter	Description	Model	Part Number	Volts
A	Probe bottle and propylene glycol kit	-	400922-2	-
B	Primary monitor probe	-	800038-1	-
Not Shown	Chart recorder probe	-	800024-1	-
	Mullion heater (behind strike plate)	105	800081-1	115
		105	800106-1	230
		104	800133-1	-
C	Door switch	-	120380	-
D	Drawer assembly (plasma storage)	105	400854-3	-
		104	400584-1	-
E	Roll out basket assembly (optional)	105	400890-3	-
		104	401136-1	-
F	Full shelf (laboratory)	-	400814-1	-

Letter	Description	Model	Part Number	Volts
G	Unit cooler assembly	104	800131-1	115
		105	801069-1	115
		105	800096-1	230
H	Standard (shelf, drawer, basket)	-	321173-1	-
I	Slide assembly (drawer, basket)	-	400753-2	-
J	Unit cooler fan motor	104	120807	115
		105	120540	115
		105	120808	230
K	Control probe	-	800048-1	-
L	Defrost heater	-	120633	115
			120659	230
M	Defrost heater limit thermostat	-	800014-1	-

Disconnect the freezer from AC power before accessing the electrical tray.

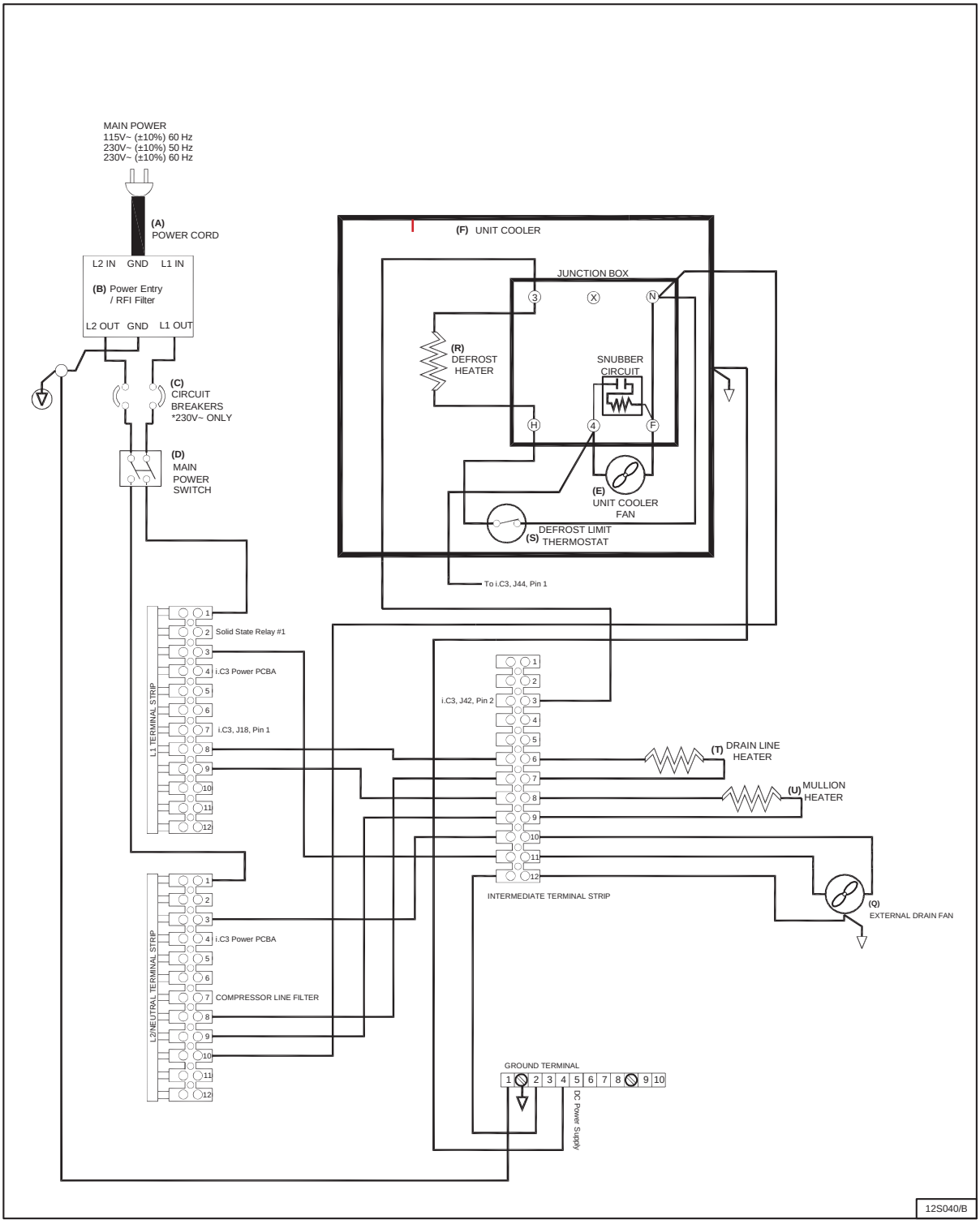


Letter	Description	Model	Part Number	Volts
A	Power supply board	-	800035-1	-
B	i.C³ control board	-	800034-1	-
C	Solid state relay	-	800920-1	-
D	Remote alarm contacts	-	-	-
E	Rear cover	-	321184-1	-
F	RJ-45 Ethernet port	-	800008-2	-
G	USB port	-	120638	-
H	Power cable (with connector)	-	120630	115
		-	120631	230
	Power cable (European models)	-	120156	230
	Power cable (Chinese models)	-	120547	230
	Power cable (Saudi Arabian models)	-	120641	230
I	Drain line fan	-	400909-1	115
		-	400909-2	230
J	Drain line heater	-	800278-1	115
		-	800279-1	230
K	Drain line assembly	104	401144-1	-
		105	400910-1	-
L	Condenser probe	-	800039-1	-

Letter	Description	Part Number	Volts	Hz
M	Condenser fan assembly (Embraco)	800898-1	115	60
		800903-1	230	50
	Condenser fan assembly (Danfoss)	120608	115	60
	Condenser fan assembly (Tecumseh)	120660	230	50
		120661	230	60
N	Pressure switch	800899-1	-	-
O	Compressor (Embraco)	800134-1	115	60
		800104-1	230	50
	Compressor (Tecumseh)	800105-1	230	60
P	Compressor relay, start capacitor and OLP (Embraco only)	800897-1	115	60
		800902-1	230	50
		800900-1	230	60
Not Shown	Compressor relay (Danfoss)	120675	115	60
	Start capacitor (Danfoss)	120676	115	60
	Compressor relay (Tecumseh)	120669	230	50
	Start capacitor (Tecumseh)	120668	230	50
	Compressor relay (Tecumseh)	120671	230	60
	Start capacitor (Tecumseh)	120670	230	60

8 Schematics

8.1 iPF and iLF Models; 104 and 105 Configuration



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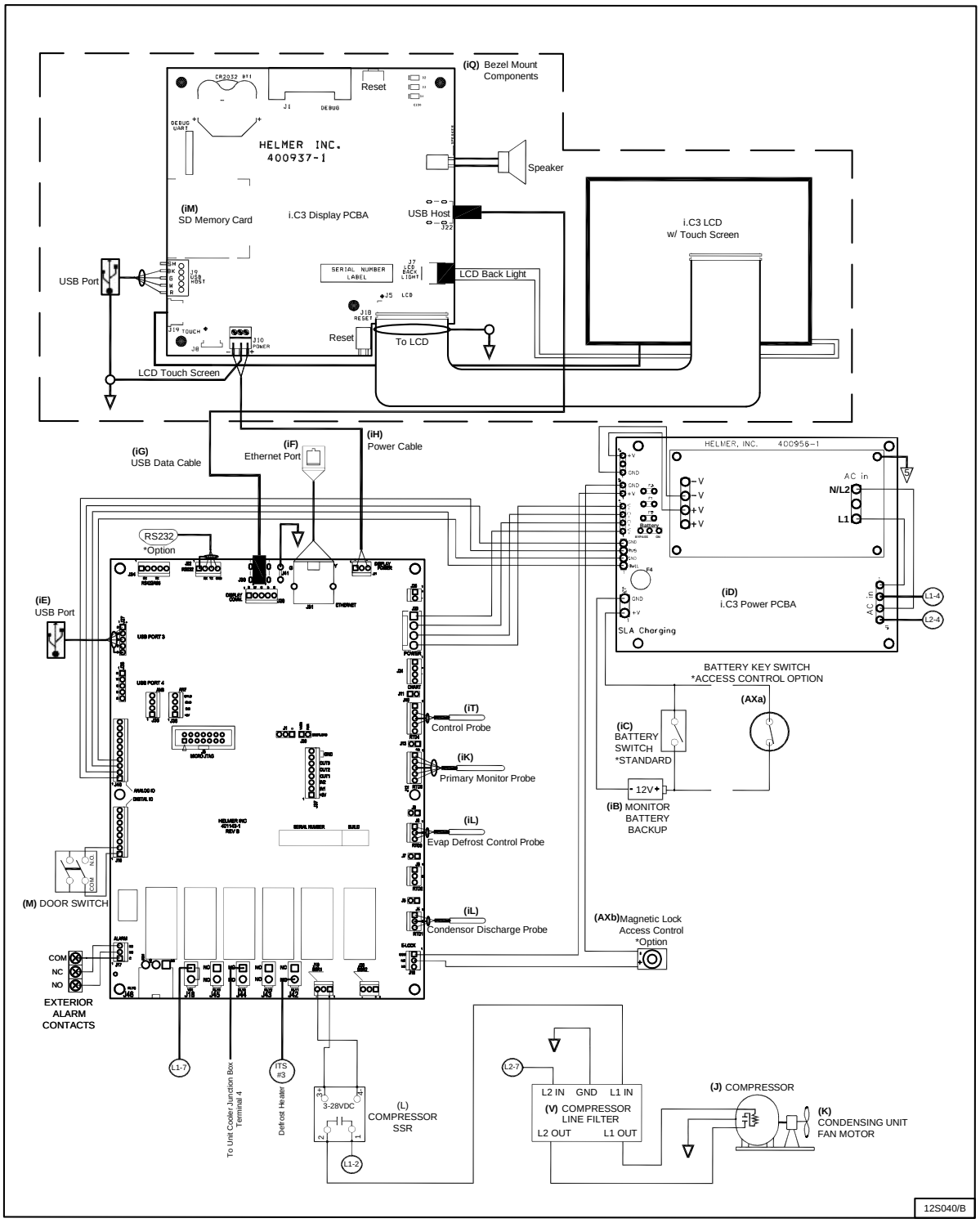
8.2 iPF and iLF Models; 104 and 105 Configuration



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Horizon Series™ Information

9 Installation and Configuration

9.1 Location Requirements

- Grounded outlet meeting the electrical requirements listed on the product specification label.
- Clear of direct sunlight, high temperature sources, and heating and air conditioning vents.
- Minimum 3”(76 mm) of space behind unit.
- Meets limits specified for ambient temperature (15 °C to 32 °C) and relative humidity.

9.2 Placement and Leveling

NOTICE

- To prevent tipping, ensure the casters (if installed) are unlocked and the door is closed before moving the freezer.
- Do not sit, lean, push or place heavy objects on top surface.

1. Move freezer into place. Lock casters if installed.
2. Ensure freezer is level.

Note

Helmer recommends the use of leveling feet and wall and floor brackets (PN 400472-2) for stabilization. Contact Helmer Technical Service for parts and instruction.

9.3 Stacked Undercounter Units

NOTICE

- For stacked configuration, both units must have leveling feet installed.
- Back brace bars and front stabilizing brackets must be installed (Blue - PN 400821-1; Stainless Steel - PN 400821-2).
- When stacking units, place the heavier unit on the bottom.
- Do not open multiple loaded drawers or baskets at the same time.

Contact Helmer or your distributor for more information regarding the stacking kit and methods to secure both units to the wall and/or floor.

9.4 Connect Back-Up Power

The monitoring system and chart recorder each have a back-up battery system enabling a period of continuous operation if power is lost.

Battery life varies by manufacturer as well as voltage level remaining. Providing full power is available and no battery-related alarms are active, back-up power for the monitoring system is available, back-up power for the optional Access Control system is available for up to 2.5 hours.

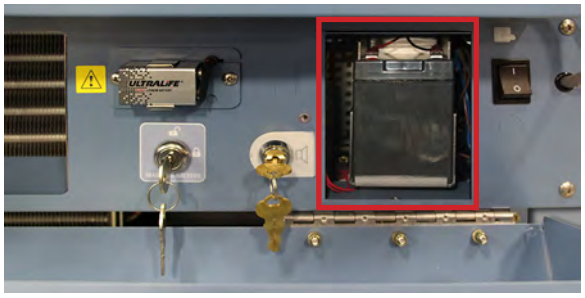
Before installing or replacing batteries, switch AC power and back-up battery switch OFF. Disconnect freezer from AC power.

Notes

- The optional Access Control system uses an independent battery for back-up power.
- The monitoring system will start on back-up battery power alone. If the freezer was not previously connected to AC power and the back-up battery is switched on, the monitoring system will begin running on back-up power.
- If AC power is lost, the monitoring system will automatically disable some features to prolong back-up battery power. Data collection will continue until back-up power is depleted.

The monitoring system and optional Access Control back-up batteries are located below the chamber, behind the front cover. A panel cover must be removed to access the batteries.

Monitoring System back-up battery.



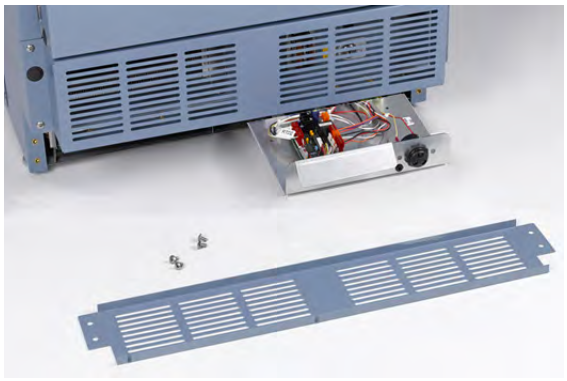
Optional Access Control back-up battery.

9.5 Defrost Events

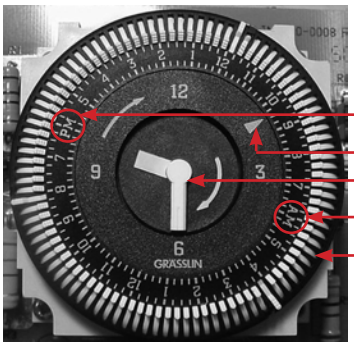
The number of defrost events is dependent on environmental conditions and the frequency of usage. The factory default settings for defrost events are 12:15 AM, 8:00 AM and 4:00 PM. Defrost events should take place when the freezer door is opened infrequently.

The number of defrost events executed daily, as well as the time(s) at which to initiate each event can be scheduled manually. The defrost controller features two time indicators and a time adjustment ring. The hour and minute hands show the current time in hours and minutes. The outer ring shows the current time including AM or PM, to the nearest 15-minute interval.

Access to the defrost controller is available from the front of the freezer by removing the kickplate and pulling out the electrical tray.



Electrical tray



Defrost timer with default settings

Notes

- Three defrost cycles are recommended for consistent freezer operation.
- Defrost events can be scheduled for any time of day (in 15 minute intervals).
- A defrost cycle lasts 15 to 30 minutes.
- Defrost events must be at least one hour apart.

Schedule Defrost Events

Set Current Time

1. Switch the AC ON/OFF switch OFF. Turn the Alarm Disable key switch OFF.
2. Remove the kick plate and pull out the electrical tray.
3. Rotate the time adjustment ring clockwise until the current time indicators show the current time.
4. Push the electrical tray in and replace the kick plate.
5. Switch the AC ON/OFF switch ON. Turn the Alarm Disable key switch ON.
6. Press the **Mute** button to disable the high temperature alarm while freezer reaches operating temperature.

Schedule a Defrost Event

1. Switch the AC ON/OFF switch OFF. Turn the Alarm Disable key switch OFF.
2. Remove the kick plate and pull out the electrical tray.
3. Add a defrost event by positioning the switch ON (toward the outer ring) at the appropriate time mark.
4. Remove a defrost event by positioning the switch OFF (toward the inside ring) at the appropriate time mark.
5. Push the electrical tray in and replace the kick plate.
6. Switch the AC ON/OFF switch ON. Turn the Alarm Disable key switch ON.
7. Press the **Mute** button to disable the high temperature alarm while freezer reaches operating temperature.

9.6 Prepare for Monitoring

The monitoring system back-up battery is taped next to the battery holder. Install and connect the battery to provide the monitoring system with back-up power in the event of AC power failure. If included, switch the Access Control back-up battery ON to provide the optional Access Control system with back-up power in the event of an AC power failure.

Temperature Probes

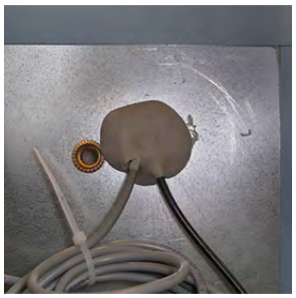
Notes

- Temperature probes are fragile; handle with care.
- Remote probes may also be introduced through the existing rear port and immersed in existing probe bottle.

The probe bottle along with a container of propylene glycol have been provided with this unit. The propylene glycol is mixed with water to create a solution which simulates the product stored in the freezer. The product simulation solution temperature reflects the product's temperature during normal operation.

The probe bottle should contain 4 oz. (120 mL) of product simulation solution at a 1:1 ratio of water to propylene glycol.

Left: Probe bottle with temperature probe



Right: Rear access port

Fill Probe Bottle

1. Remove all probes from bottle and remove bottle from bracket.
2. Remove cap and fill with 4 oz (120 mL) of product simulation solution.
3. Install cap and place bottle in bracket.
4. Replace probes, immersing at least 2" (50 mm) in solution.

Install Additional Probe Through Rear Port

1. Peel back putty to expose port.
2. Insert probe through port into chamber.
3. Insert probe into bottle.
4. Replace putty, ensuring a tight seal.

Chart Recorder (if included)

Notes

- If chart recorder has been operating on battery power, the battery should be replaced to ensure the back-up source has proper charge.
- For complete information, refer to the Temperature Chart Recorder Operation and Service Manual included with the unit.

The chart recorder has a back-up battery system, enabling a period of continuous operation if power is lost. Battery life varies by manufacturer as well as voltage level remaining. Providing full power is available, back-up power for the temperature chart recorder is available for up to 14 hours.

Prior to use:

Route the chart recorder probe through the rear access port and place in bottle with primary monitor probe.

Set Up and Operation

Access chart recorder by pulling the door open.

Install Battery

Connect the leads to the battery to provide back-up power to the chart recorder.

Install/Replace Chart Paper

Notes

- For accurate temperature reading, ensure the current time is aligned with the time line groove when chart knob is tightened.
- Contact Helmer Customer Service to reorder chart paper; part number 220366 (52 sheets).

Chart recorder stylus and time line groove

1. Press and hold **C** button. When stylus begins to move left, release button. The LED flashes to indicate current temperature range.
2. When stylus stops moving, remove chart knob then move knob up and away.
3. Place chart paper on chart recorder.
4. Gently lift stylus and rotate paper so current time line corresponds to time line groove.
5. Hold chart paper and reinstall chart knob is fully tightened. *(Failure to fully tighten the knob can result in paper slipping and losing time.)*
6. Press and hold **C** button. When stylus begins to move right, release button.
7. Confirm stylus is marking on paper and stops at the correct temperature.
8. Calibrate chart recorder to match primary temperature if needed and close recorder door.

External Monitoring Devices

The remote alarm interface is a relay switch with three terminals:

- Common (COM)
- Normally Open (NO)
- Normally Closed (NC)

Terminals are dry contacts and do not supply voltage. Interface circuit is either normally open or normally closed, depending on terminals used.

Requirements for your alarm system determine which alarm wires must connect to terminals.

- The interface on the remote alarm monitoring system is intended for connection to the end user's central alarm system(s) that uses normally open or normally closed dry contracts.
- If an external power supply exceeding 33 V (RMS) or 70 V (DC) is connected to the remote alarm monitoring system's circuit, the remote alarm will not function properly and may cause damage to the control board or result in injury to the user.

The terminals on the remote alarm interface have the following maximum load capacity:

- 0.5 A at 125 V (AC)
- 1 A at 250 V (DC)

Connect to Remote Alarm Interface

1. On the electrical box, locate the remote alarm terminals.
2. Connect remote alarm wires to appropriate terminals, according to requirements for your alarm system.
3. Use a cable tie to relieve strain on alarm wires (as necessary).

9.7 Configure Storage

Notes

- Before moving storage components, protect stored items in freezer from extended exposure to adverse temperature.
- Before moving drawers, ensure they are completely empty for safe lifting.
- Maximum basket, drawer, or shelf load is 100 lbs (46 kg).

Product Loading Guidelines

When loading your freezer, take care to observe the following guidelines:

- Never load freezer beyond capacity.
- Always store items within shelves, drawers or baskets.
- Temperature uniformity is maintained by air circulation, which could be impeded if unit is overfilled, particularly at the top or back. Ensure proper clearance is provided below the fan.

Note

Products stacked against back wall may obstruct air flow and affect performance of unit.

Drawers and Baskets

Remove a Drawer or Basket

1. Pull drawer or basket out until it stops.
2. Tilt the front of the drawer or basket upward.
3. Pull drawer or basket free of the slides.

Install a Drawer or Basket

1. Align end guides on drawer or basket with the slides.
2. Gently push drawer or basket into chamber until it stops.
3. Pull drawer or basket out until it stops; check for smooth operation.

Move Drawer Slides

1. Using a screwdriver, remove front bracket retainers.
2. Tap front brackets upward to disengage standards.
3. Remove slides from standards.
4. Insert slides into standard at appropriate height.
5. Tap front brackets downward to engage standards.
6. Using a screwdriver, install front bracket retainers.

Shelves

Remove a Shelf

1. With one hand, lift front edge of the shelf from the front brackets.
2. With the other hand, reach under the shelf and bump rear edge of the shelf upward to disengage rear brackets.

Install a Shelf

1. Insert shelf into chamber, placing it on brackets.
2. Gently bump rear edge of the shelf downward to engage brackets.
3. Pulling shelf forward gently; shelf should not disengage from rear brackets.

Move Shelf Brackets

1. Using a screwdriver, remove front bracket retainers.
2. Tap front brackets upward to disengage standards.
3. Remove front brackets from standards.
4. Insert front brackets into standard at appropriate height.
5. Tap front brackets downward to engage standards.
6. Using a screwdriver, install front bracket retainers.

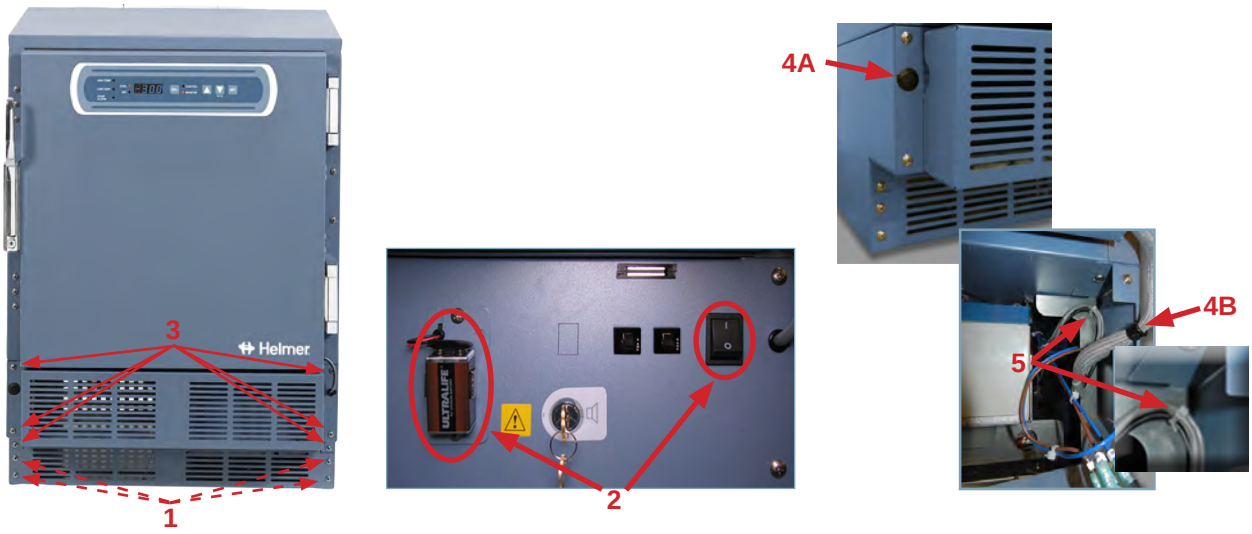
9.8 Optional Adapter Kits for Medication Dispensing Locks

Contact Helmer Technical Service or your distributor for service documentation pertaining to medication dispensing lock adapter kits.

9.9 Reverse Door Hinges and Handle

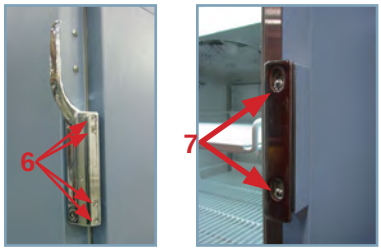
Notes

- The following instructions apply to reversing a right-hinged door to a left-hinged door. Some steps will need to be reversed if changing from left-hinged to right-hinged.
- Before reversing door hinge and handle, protect stored items in freezer from extended exposure to adverse temperature.
- The door hinge and handle cannot be reversed on freezers equipped with Access Control.
- Unit must be on floor or an elevated work surface with adequate space to place door face-down in front of unit.
- To prevent personal injury and/or damage to the door, Helmer recommends two people for this procedure.

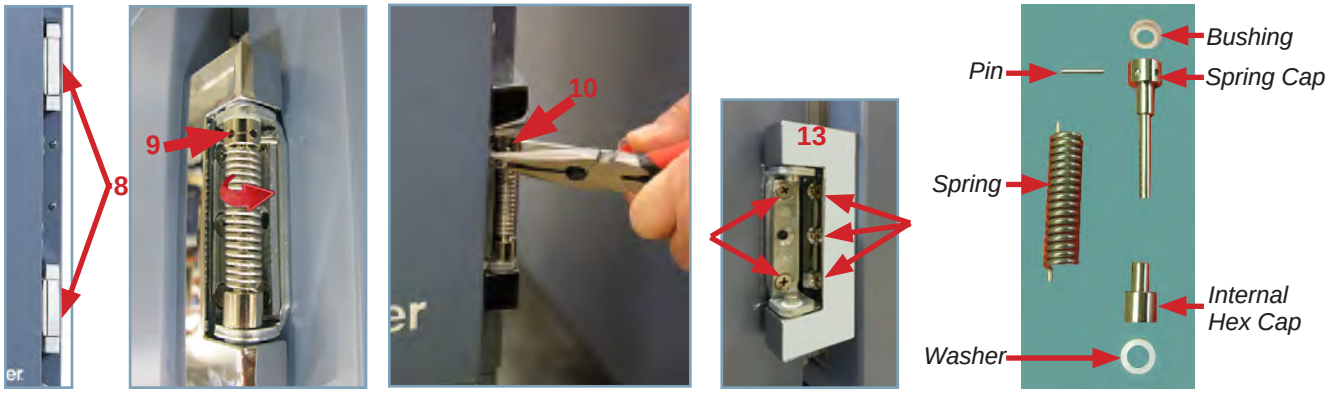


Remove Door and Hinges

1. With access panel cover closed, remove four screws securing kick plate to unit. Set kick plate and screws aside.
2. Open front access panel and switch main power switch to OFF; disconnect back-up battery; disconnect AC power cord from power receptacle.
3. Remove six screws securing access panel and cover to unit and carefully place them in front of unit ensuring there is no strain on the wiring.
4. Remove plug from access panel on handle-side of unit. Remove grommet from hole on hinged-side of unit and slide braided sleeve out of slot.
5. Cut zip tie holding power cable inside the unit.



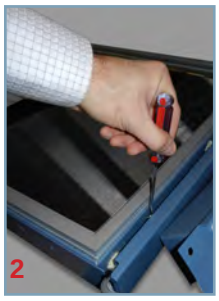
6. Remove four screws securing door handle assembly to door and set assembly aside.
7. Remove two screws attaching strike plate and spacer to unit and set aside.



8. With door shut, remove cover plate from both hinges.
9. Remove lower hinge spring assembly using a punch or J-hook tool to engage left-most hole in spring cap and rotate spring cap from left to right and hold.
10. Using needle-nose pliers, remove pin from spring cap and slowly release spring back to left.
11. Using a punch or J-hook tool to engage any hole in spring cap, compress spring downward.

12. Remove spring assembly from lower hinge and set aside.
13. Supporting door, remove five screws attaching lower hinge to door and unit, and noting the size and location of each screw. Set hinge aside.
14. Remove five screws attaching upper hinge to door and unit, and noting size and location of each screw. Set hinge aside.

Reroute Communication Cables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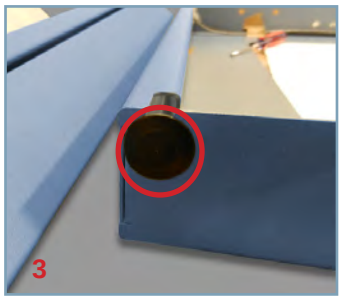
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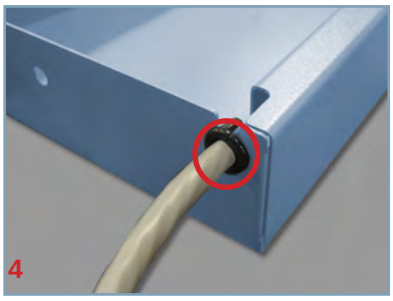
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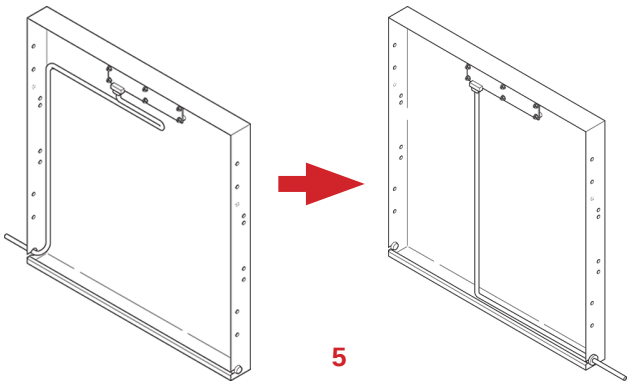
1. Carefully place door face-down in front of unit ensuring there is no strain on cables running from cabinet to door.
2. Remove remaining screws from door assembly. Using a punch or J-hook tool along bottom edge, lift inner door frame out of outer door frame.
3. Remove plug from the door on handle-side and set aside.
4. Pull grommet out of hole in door on hinged-side and slide the braided sleeve out of slot.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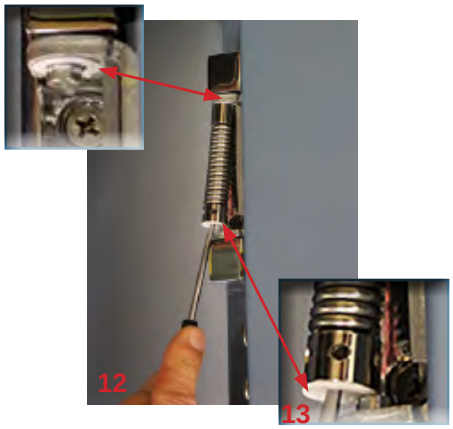
5. Reroute data cable inside door and out through slot in corner opposite from where cable had previously exited door. Cable should follow the bottom edge of the door frame.
6. Tape cable to inside of door ensuring any excess cable is on outside of door.
7. Cut zip ties securing braided sleeve and slide sleeve and grommets along cables toward door.
8. Slip cable through slot in door and insert door-side grommet into hole in door.

Reassemble door / Reverse hinges

1. Reinstall inner door panel and secure with screws in holes opposite original configuration.
2. Reinstall hinges onto opposite side of door frame by aligning holes in hinge plates with holes in door frame and hand-threading two long screws in each hinge (leave screws slightly loose).
3. Lift door to cabinet and align holes in hinge plates with corresponding holes in cabinet.
4. Hand-thread three short screws through hinge and into cabinet ensuring weight of door does not rest on hinges.
5. Level door and tighten all screws securing hinges to unit.
6. Reroute power and communication cables across front of unit behind access panel and secure with zip tie.
7. Slide braided sleeve through slot in access panel allowing approximately 3” (76 mm) of slack between door and cabinet so door can open and close without straining cables. Install grommet in access panel.
8. Attach door handle on opposite side of door with four screws.
9. Attach strike plate and spacer to opposite side of unit with two screws. Test locking mechanism to ensure proper functionality.
10. With door closed, configure hinge spring assembly for opposite side of door.



11. Orient bend in coil toward front of freezer and slide internal hex cap with washer onto upper hex bolt in lower hinge plate.
12. Compress spring upward using a punch or J-hook tool in spring cap.
13. Slide spring cap over lower hex bolt in lower hinge plate while compressing spring.
14. Use a punch or J-hook tool to engage right-most hole in spring cap and rotate spring cap from right to left, and hold.
15. Count four holes, beginning with and including hole closest to end of coil, and insert pin in fourth hole.
16. Replace hinge cover plates.
17. Reinstall access panel and cover securing with six screws.
18. Reinstall kick plate securing with four screws.
19. Plug power cord into power receptacle. Switch AC power switch ON. Switch back-up battery switch ON.
20. Verify door is level, hinges operate smoothly and door seals tightly.
21. Touch Mute to disable high temperature alarm while freezer reaches operating temperature.

10 Controls

Horizon Series models are equipped with a monitor and control system which allows users to view and change current settings.

10.1 Monitor and Control Interface

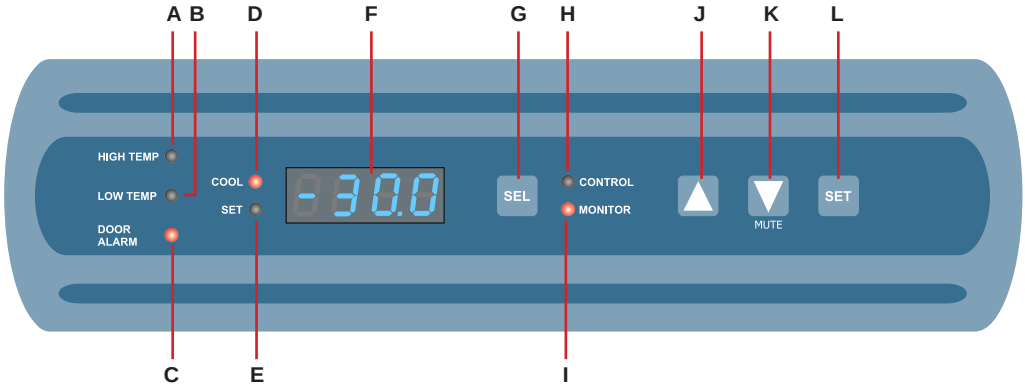


Table 11. Monitor and Control Indications

Label	Description	Function
A	HIGH TEMP lamp	Indicates when the freezer is in a high temperature alarm condition. Also indicates high alarm temperature setpoint is being changed.
B	LOW TEMP lamp	Indicates when the freezer is in a low temperature alarm condition. Also indicates low alarm temperature setpoint is being changed.
C	DOOR ALARM lamp	Indicates when the door is open.
D	COOL lamp	Indicates the compressor is running.
E	SET lamp	Indicates when temperature setpoint or alarm setpoint is being changed.
F	Display	Displays real-time temperature information, setpoints, and alarms.
G	SEL button	Toggles between alarm monitor and control modes.
H	CONTROL lamp	Indicates when the reading from the control probe is displayed.
I	MONITOR lamp	Indicates when the display is showing temperature readings from the monitor probe. Also indicates when alarm setpoints are being changed.
J	UP ARROW button	Increases a temperature setting.
K	DOWN ARROW / MUTE ALARM button	Decreases a temperature setting. Also mutes the audible alarm for five minutes.
L	SET button	Allows settings to be selected, prior to changing settings.

Note

The Alarm Disable key switch disables all audible alarms. This switch does not affect alarm lamps or signals sent through the remote alarm interface.

Display Minimum and Maximum Monitor Temperature Recordings

Notes

- This feature is standard on Horizon Series™ models with serial numbers of 2015494 or higher. Some exceptions may exist. For confirmation on your unit, please contact Helmer Technical Service.
- Units that do not include the minimum and maximum recording feature will not display .C or .F when entering the program mode. All temperature readings will appear in .C only.
- The following steps only apply to the primary monitor probe.

The minimum and maximum recording feature allows the user to view a minimum temperature occurrence and a maximum temperature occurrence within a given period of time. The timer provides a time reference in which those temperatures occurred.

View minimum temperature recording.

1. Press and hold the **Down Arrow** button for 1 second and listen for a single beep.
2. The display will alternate between **LO** and a valid temperature value five (5) times followed by a single beep to indicate exit back to the temperature display.

View maximum temperature recording.

1. Press and hold the **Up Arrow** button for 1 second and listen for a single beep.
2. The display will alternate between **HI** and a valid temperature value five (5) times followed by a single beep to indicate exit back to the temperature display.

View recorded temperature timer.

Notes

- The timer denotes the period of time that has elapsed. It does not display the time at which a minimum or maximum temperature occurred.
- The maximum period of time the timer can record is 99:59 (99 hours and 59 minutes).

1. Press and hold either the **Up** or **Down Arrow** button for 1 second. or
2. While the display is flashing the **HI** or **LO** value, press and hold the **SET** button for 1 second.
3. The display will alternate five (5) times between **CLr** and a value representing the number of hours and minutes that have elapsed since the last recording (example: 12:47 would represent 12 hours and 47 minutes). A single beep will follow to indicate exit back to temperature display.

Clear minimum and maximum temperature recordings.

1. Press and hold either the **Up** or **Down Arrow** button for 1 second. or
2. While the display is flashing the **HI** or **LO** value, press and hold the **SET** button for 1 second and listen for a single beep.
3. While the display is flashing the elapsed time since last reset, press and hold the **SET** button for 2 seconds. **CLr** will be displayed followed by a series of 3 beeps to indicate exit back to the temperature display.

Notes

The minimum and maximum temperature and timer will reset when:

- the unit is powered off and battery backup is not engaged, or
- after 99 hours and 59 minutes have elapsed.

10.2 Alarm Reference

If an alarm condition is met, an alarm activates. Some alarms are visual only; others are visual and audible. Some alarms are sent through the remote alarm interface.

The table indicates if an alarm is audible (A), visual (V), or sent through the remote alarm interface (R).

Table 12. Alarm Indications

Alarm	Alarm Type
High Temperature	A, V, R
Low Temperature	A, V, R
Door Open (Time)	A, V, R
Power Failure	A, V, R
Probe Failure	A, V, R

10.3 Settings

Temperature setpoint

The default setpoint for the freezer is -30.0 °C. This can be changed if your organization requires a chamber temperature other than -30.0 °C.

Change Setpoint

Note

The current temperature setpoint is typically higher than the chamber temperature.

1. On the monitoring system, press and release **SEL** to change to Control mode. The CONTROL lamp will illuminate.
2. Press and hold **SET** to display the current temperature setpoint.
3. Hold **SET** and press **Up Arrow** or **Down Arrow** to set the adjustment value.
4. Release **SET** button; the setpoint is changed.
5. Press and release **SEL** to return to Monitor mode. The MONITOR lamp will illuminate.

Temperature Settings

Temperature settings are factory pre-set. Settings can be viewed and changed through the Monitor and Control interface.

Table 13. Parameters, Indicators and Settings

Parameter	Visual Indicator	Range	Default
Celsius or Fahrenheit	None	.C, .F	.C
High Temperature	MONITOR Lamp & HIGH Lamp	-40.0 to 40.0 (°C) -40 to 104 (°F)	-20.0°C
Low Temperature	MONITOR Lamp & LOW Lamp	-40.0 to 40.0 (°C) -40 to 104 (°F)	-40.0°C
Monitor Offset	MONITOR Lamp	-10.0 to 10.0 (°C) -18 to 18 (°F)	Varies
Control Offset	CONTROL Lamp	-10.0 to 10.0 (°C) -18 to 18 (°F)	Varies
Hysteresis	COOL Lamp	0.5 to 2.5 (°C) 1 to 5 (°F)	2.0°C

View Settings and Offset Values

1. Press and hold the **Up** and **Down Arrows** simultaneously for 3 seconds to enter program mode.
2. The LED Display will show .C or .F to indicate Celsius or Fahrenheit.
3. Press and release **SEL** to scroll through the parameters and view settings.
4. Hold **Up** and **Down Arrows** simultaneously for 3 seconds to exit program mode.
5. The LED Display will show current monitor temperature.

Temperature Units

Note

If temperature units are changed, the temperature setpoints, offsets and alarm settings must be recalibrated.

Select Temperature Units

1. Press and hold the **Up** and **Down Arrows** simultaneously for 3 seconds to enter program mode.
2. The LED Display will show .C or .F to indicate Celsius or Fahrenheit.
3. Press and hold the **SET** button while pressing the **Up** or **Down Arrow** to select the desired temperature unit parameter.
4. Release **SET** button. The new setting is saved.
5. Press and hold **Up** and **Down Arrows** simultaneously for 3 seconds to exit program mode.

Alarm Settings

The high and low temperature alarm settings may be changed by the operator. Temperature alarm setpoints specify the temperature at which an alarm activates. The setpoint for temperature alarms may be changed.

High Temperature Alarm

Change the Alarm Setpoint

1. Press and hold the **Up** and **Down Arrows** simultaneously for 3 seconds to enter program mode.
2. The LED Display will show .C or .F to indicate Celsius or Fahrenheit.
3. Press **SEL** until HIGH TEMP and MONITOR lamps flash.
4. Hold **SET**, then press **Up** or **Down Arrow** to change the setpoint.
5. Release **SET** button. The new setting is saved.
6. Press and hold **Up** and **Down Arrows** simultaneously for 3 seconds to exit program mode.

Low Temperature Alarm

Change the Alarm Setpoint

1. Press and hold the **Up** and **Down Arrows** simultaneously for 3 seconds to enter program mode.
2. The LED Display will show .C or .F to indicate Celsius or Fahrenheit.
3. Press **SEL** until LOW TEMP and MONITOR lamps flash.
4. Hold **SET**, then press **Up** or **Down Arrow** to change the setpoint.
5. Release **SET** button. The new setting is saved.
6. Press and hold **Up** and **Down Arrows** simultaneously for 3 seconds to exit program mode.

Primary Monitor Probe

Verify the primary monitor probe is reading chamber temperature correctly by comparing primary monitor probe readings to the temperature measured by a calibrated reference thermometer. If the primary monitor probe is not reading correctly, change the monitor offset value displayed.

Calibrate Primary Monitor Probe

1. Remove the primary monitor probe from the probe bottle.
2. Unscrew the cap and remove.
3. Attach a calibrated independent reference thermometer traceable per national standards to the probe, and immerse at least 2” (50 mm) in probe bottle.
4. Close the door and allow the chamber temperature to stabilize for 10 minutes. Ensure both the display temperature and thermometer temperature has stabilized before proceeding.
5. Observe and note the temperature on the calibrated reference thermometer and compare to the chamber temperature displayed on the monitor. If the thermometer temperature corresponds to the displayed temperature, proceed to **Step 7**.
6. Adjust the monitor offset value higher or lower to reflect the difference between the chamber temperature displayed on the monitor and the temperature reading from the calibrated reference thermometer.
7. Remove reference thermometer from the probe.
8. Replace bottle cap, ensuring a tight fit.
9. Place probe in bottle, immersing at least 2” (50 mm).

Enter the New Offset Value

1. Press and hold the **Up** and **Down Arrows** simultaneously for 3 seconds to enter program mode.
2. The display will show .C or .F to indicate Celsius or Fahrenheit.
3. Press **SEL** until only the MONITOR lamp flashes.
4. Hold **SET**, then press **Up** or **Down Arrow** to change the monitor offset.
5. Release **SET** button. The new setting is saved.
6. Press and hold **Up** and **Down Arrows** simultaneously for 3 seconds to exit program mode.

Control Sensor

The temperature controller senses unit cooler temperature through the control probe in the unit cooler. The unit cooler temperature typically varies from the chamber temperature, so an offset value is used by the control system to compensate for the difference.

The temperature controller adjusts chamber temperature around the freezer setpoint by activating the compressor when the control probe registers above the setpoint based on the hysteresis value.

Determine Control Sensor Offset

Note

Control Sensor Offset is factory-preset and should not be changed. Contact Helmer Technical Service for instructions regarding changing the Control Sensor Offset.

1. View and record the Freezer Setpoint. (Reference **Section 10.3**)
2. Allow the unit to run with calibrated monitor temperature for several compressor cycles, and record the average monitor temperature .
3. View and record the current Control Offset value.
4. Subtract the Freezer Setpoint from the average monitor temperature and record the difference.
5. Add the current Control Offset value to the recorded difference determined in the previous step to establish the new Control Offset value.

EXAMPLE 1	EXAMPLE 2
Freezer Setpoint is -30.0	Freezer Setpoint is -30.0
Average monitor temperature is -29.2	Average monitor temperature is -31.2
Current Control Offset is 0.3	Current Control Offset is 0.3
Subtract: -29.2 - (-30.0) = 0.8 (difference between average temperature and setpoint)	Subtract: -31.2 - (-30.0) = -1.2 (difference between average temperature and setpoint)
Add 0.3 + 0.8 = 1.1; new Control Offset value	Add 0.3 + (-1.2) = -0.9; new Control Offset value

Enter new Offset Value

Notes

- Ensure Control Sensor Offset is being changed, and not Hysteresis.
- Control Sensor Offset and Hysteresis have the same visual indicator.

1. Press and hold the **Up** and **Down Arrows** simultaneously for 3 seconds to enter program mode.
2. The Display will show .C or .F to indicate Celsius or Fahrenheit.
3. Press **SEL** until only the CONTROL lamp flashes.
4. Hold **SET**, then press **Up** or **Down Arrow** to change the setpoint.
5. Release **SET** button. The new setting is saved.
6. Press and hold **Up** and **Down Arrows** simultaneously for 3 seconds to exit program mode.

Hysteresis

Hysteresis is the allowable temperature control variance on each side of the freezer setpoint.

Note

Hysteresis is factory-preset and should not be changed unless directed by Helmer Technical Service.

Non-Configurable Alarms

The Power Failure and Door Open alarms indicate operational conditions which may require the attention of the operator or a qualified service technician. The Power Failure alarm will activate immediately upon loss of power. The Door Open alarm will activate once the door has remained open for approximately three minutes. These settings are factory-preset and may not be changed.

11 Maintenance

Maintenance tasks should be completed according to the schedule below.

Notes

- The preventive maintenance schedule provides recommended minimum requirements. Regulations or physical conditions at your organization may require maintenance items to be performed more frequently, or only by designated service personnel.
- Before performing maintenance, protect items in freezer from extended exposure to adverse temperature.
- Allow freezer temperature to stabilize at setpoint after performing service or after extended door opening.

Table 14. Horizon Series Preventive Maintenance Schedule

Task	Frequency			
	Quarterly	1 year	2 years	As Needed
Test the high temperature alarm.	✓			
Test the power failure alarm (as required by your organization's protocols).	✓			
Test the door alarm (as required by your organization's protocols).				✓
Check the temperature calibration on the monitor and change it if necessary.		✓		
Replace the monitoring system back-up battery.		✓		
Check the level of the solution in the probe bottle. Refill or replace solution if necessary.				✓
Examine the probe bottle and clean or replace if necessary.		✓		
Clean the condenser grill.	✓			
Clean the door gaskets, interior, and exterior of the freezer.				✓
Electrical Compartment • Inspect electrical components and wiring terminals in the electrical box for discoloration. Contact Helmer Technical Service if any discoloration is found. • Inspect all wiring for terminal strips for secure connections. Tighten connections as necessary.	✓			
Models with Chart Recorders Check the back-up battery for the chart recorder after an extended power failure and change it if necessary, or change the battery if it has been in service for one year. Refer to the Temperature Chart Recorder Operation and Service Manual.				✓
Models with Access Control Test the Access Control battery.	✓			
Replace Access Control back-up battery			✓	

NOTICE

Clean the condenser grill on a quarterly basis.

Note

During a power failure the back-up battery provides power to the monitoring system, power failure alarm, and optional Access Control. If the back-up battery is not functioning, the power failure alarm will not be activated and the battery should be replaced.

11.1 Alarm Tests

Alarms should be tested to ensure they are working correctly. The freezer has alarms for chamber temperature, power failure, and door open (time).

Chamber Temperature Alarm Test

Note

- Before testing alarms, protect items in freezer from extended exposure to adverse temperature.
- Temperature probes are fragile; handle with care.

Test the High Alarm

1. Identify setting for high alarm setpoint.
2. Place the glass of product simulation solution in the freezer.
3. When the product simulation solution has stabilized at the chamber temperature, remove the solution from the freezer.
4. Remove the monitor probe from the probe bottle.
5. Place the probe in the product simulation solution, observe the temperature on the monitoring system display at which the high temperature alarm sounds.
6. Compare the temperature at which the alarm sounds to the high alarm setpoint.
7. Remove probe from product simulation solution.
8. Place monitor probe in probe bottle, immersing it at least 2” (50 mm).

Power Failure Alarm Test

Note

During a power failure, the battery should continue to provide power to the monitoring system.

1. Switch AC ON/OFF switch OFF. Audible power failure alarm will activate immediately and “PoFF” (power off) will appear on the display.
2. Switch AC ON/OFF switch ON. Audible power failure alarm will cease and “PoFF” will clear from the display.

Door Open Alarm Test

Note

Factory-set to three minutes and can not be changed.

1. Open freezer door and note the time.
2. After three minutes, audible alarm will activate and DOOR ALARM lamp will flash.
3. Close freezer door. Audible door open alarm will cease and DOOR ALARM lamp will stop flashing.

11.2 Test and Replace Back-up Batteries

Check Monitoring System Battery

The monitoring system does not indicate the charge level of the battery. Regularly test the battery and replace battery if the test fails or if the battery has been in use for one year.

Use a battery which meets manufacturer’s specifications.

Test the Battery

1. Switch the AC ON/OFF switch OFF.
2. Verify “PoFF” (power failure) message is displayed.
3. If the display is blank, replace battery.
4. Switch AC ON/OFF switch ON.

Check Optional Access Control System Battery

During an AC power failure, the Access Control back-up battery provides back-up power to power the magnetic Access Control lock. Test the Access Control back-up battery to ensure it is working properly.

Test the Battery

1. Ensure Access Control battery key switch is switched ON.
2. Switch AC ON/OFF switch OFF.
3. Verify “PoFF” (power failure) message is displayed.
4. Attempt to open the cabinet door, if the door remains locked, the battery is functional. If the door does not remain locked, replace the battery.
5. Switch AC ON/OFF switch ON.

Check Recorder Back-up Battery (if included)

Refer to 360076-1 Temperature Chart Recorder Operation and Service Manual.

11.3 Check Probe Bottle

Remove the probe bottle from the bracket and inspect for cracks. Replace the bottle if necessary.

Ensure the probe bottle has approximately 4 oz (120 mL) of product simulation solution (1:1 ratio of water to propylene glycol). The propylene glycol is mixed with water to create a solution which simulates the product stored in the freezer. The product simulation solution temperature reflects the product’s temperature during normal operation. Failure to fill the bottle may prevent the chamber temperature from stabilizing at the temperature setpoint. The probe should be immersed at least 2” (50 mm).

11.4 Clean the Freezer

Cabinet Exterior

Clean exterior surfaces with soft cotton cloth and non-abrasive liquid cleaner.

Cabinet Interior

Clean painted surfaces with mild detergent. Clean stainless steel surfaces with a general-purpose laboratory cleaner suitable for stainless steel.

Condenser Grill

Disconnect freezer from AC power when cleaning condenser grill.

In environments where freezer is exposed to excessive lint or dust, condenser grill may require cleaning more frequently than stated in preventive maintenance schedule.

Clean the condenser grill using a soft brush and a vacuum cleaner.

Probe Bottles

Clean and refill bottle:

1. Remove probe from bottle.
2. Remove bottle from bracket.
3. Clean bottle with water-bleach solution.
4. Fill bottle with 4 oz (120 mL) of product simulation solution.
5. Cap bottle tightly to minimize evaporation.
6. Place bottle in bracket.

7. Replace probe, immersing at least 2” (50 mm).

12 Service

12.1 Refrigerant

NOTICE

- Review all safety instructions prior to recharging refrigerant. Refer to **Section 1.1** (Safety).
- Maintenance should only be performed by trained refrigeration technicians.

Notes

- Use only non-CFC R-404A refrigerant.
- Pressure varies depending on ambient air temperature.
- Normal low side pressures are 5 psi to 7 psi when unit is functioning at standard operating temperatures and measured at the end of the compressor cycle.
- If a refrigerant leak is suspected, Helmer recommends finding and fixing the leak prior to recharging the unit.

Full initial refrigerant charge varies by model and power requirements, which can be found on the product specification label.

Table 15. Refrigerant Charge

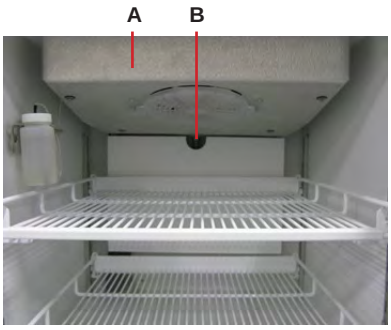
Model	Power Requirements	Refrigerant	Initial Charge
104 / 105	115 V	R404A	11.0 oz (312 g)
105	230 V; 50 Hz	R404A	11.0 oz (312 g)
105	230 V: 60 Hz	R404A	18.5 oz (524 g)

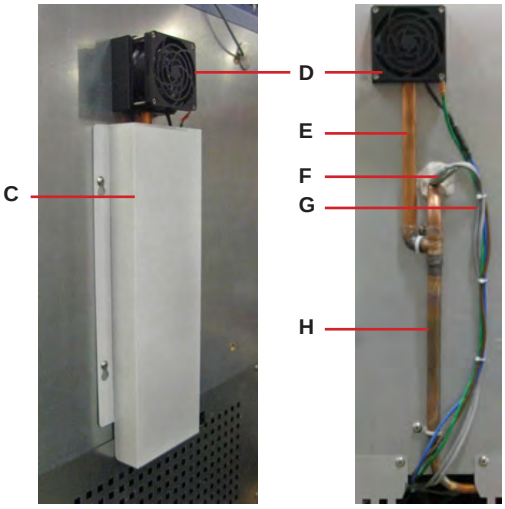
12.2 Remove / Replace Unit Cooler Cover

The unit cooler must be removed when servicing the control probe, fan motor(s) or coil.

NOTICE

If unit cooler cover is not removed as detailed in this procedure the drain port may be damaged. Improper drainage may result in excessive icing and freezer’s inability to maintain temperature.





Label	Description
A	Unit cooler cover
B	Drain port
C	Protective cover
D	Drain fan
E	Fan tube
F	Heating element
G	Heater wires
H	Drain tube

Remove Unit Cooler Cover

NOTICE

The condensate evaporator and water evaporation tray are hot.

1. Switch AC ON/OFF switch OFF. Switch battery switch OFF.
2. Remove top drawer, basket, or shelf from the cabinet.
3. Loosen the four screws attaching the drain tube cover to the rear of the unit. Slide the cover up to disengage from the keyhole openings and remove.
4. Cut the wire ties securing the drain line to the cabinet.
5. On the back of the unit, peel the putty back to expose the drain tube and drain heater.
6. Remove the wire ties securing the heater wires to the cabinet. Verify the heating element is cool.
7. Inside the cabinet, remove the putty around the drain tube.
8. From the rear of the unit, remove the drain heater from the drain tube.
9. Remove the drain tube in the back of the unit by pulling it downward. The external section of the drain tube should separate from the fan tube at the 90° elbow, leaving the fan tube attached to the fan.
10. Inside the cabinet, detach the section of the drain tube connected to the unit cooler drain spout by gently twisting to separate, then pivot the drain tube upward and remove.
11. Using a 5/16” socket wrench, remove the four screws securing the unit cooler cover to the top of the cabinet while supporting the cover with one hand to prevent it from dropping.
12. Carefully lower the unit cooler cover to avoid damage to the fan wiring.

Install Unit Cooler Cover

1. Verify unit cooler wiring is connected and routed correctly. Wiring should be routed above the copper tube inside the unit cooler. Reconnect wires if they have separated.
2. Lift the unit cooler cover into place and attach using four screws. Tighten using a 5/16” socket wrench to secure.
3. From the rear of the unit, insert the drain tube through the opening into the cabinet. The drain tube should be aligned with the unit cooler drain spout inside the chamber and the connection to the fan tube at back of the unit.
4. Attach the drain tube to the unit cooler drain spout and the fan tube.
5. Insert the drain line heater in the drain tube at an upward angle. The black heating element should no longer be visible.
6. Replace putty around the drain tube inside the cabinet.
7. Reinstall top drawer, basket, or shelf if previously removed.
8. Reattach the drain line heater wires to the cabinet using wire ties.
9. On the back of the cabinet, press putty around the drain hose and partially into the hole.
10. Install the protective cover on the rear of the cabinet.
11. Switch AC ON/OFF switch ON. Switch battery switch ON.
12. Touch **Mute** to disable the high temperature alarm while freezer reaches operating temperature.

13 Troubleshooting

NOTICE

Review all safety instructions prior to troubleshooting. Refer to **Section 1.1** (Safety).

13.1 Accessing System

Problem	Possible Cause	Action
Door does not lock.	Lock mechanism is damaged or not aligned.	Inspect lock/latch, adjust strick plate or replace lock if needed.
Door does not lock. (Magnetic Access Control Option)	Magnetic door lock is not aligned to the strike plate.	Align lock/door to the match strike plate.
	Magnetic lock is not receiving power.	Trace voltage to the lock using the schematic, replace lock if needed.

13.2 Alarm Activation Problems

Problem	Possible Cause	Action
Probe failure alarms	Faulty probe or wiring connection.	Check corresponding probe connection. Test resistance of probe (86 Ω to 110 Ω) Replace probe if needed.
Power failure alarm	Power was interrupted to refrigerator.	Restore facility power.
	Power switch is in the off “o” position.	Turn power switch to the on “-” position.
	Power cord is loose.	Check both ends of the power cord at the wall outlet and the refrigerator.
	GFI/GFCI Outlet has tripped.	Move to standard outlet. Helmer does not recommend operating this unit on a GFI outlet.
Door alarm	Door is open.	Close door.
	Faulty door switch or wiring connections.	Check wiring and continuity of switch contacts. Replace switch if needed.
Alarm is active but there is no audible alarm.	Key switch is in the OFF position.	Turn key to ON position.

13.3 Chamber Temperature Problems

Problem	Possible Cause	Action
Temperature display does not match actual temperature.	Display temperature needs to be calibrated.	Follow temperature calibration process.
	Probe bottle is empty, or probe is out of bottle or ballast.	Check level of solution in bottle and or insert probe into bottle or ballast.
Chamber temperature is too high/low.	Probe bottle is empty, or probe is out of bottle or ballast.	Check level of solution in bottle and or insert probe into bottle or ballast.
	Display temperature needs to be calibrated.	Follow temperature calibration process.
	Door was recently opened or opened for an extended time.	Close door and allow temperature to stabilize.
	Condenser coil is dirty.	Clean the condenser coil regularly, removing all dust build up.
	Lack of air flow around unit/high ambient condition.	Check for proper spacing around unit, any foreign objects blocking airflow, and that ambient temperature is within specification.
	Lack of air flow inside of chamber.	Verify product placement and move products if they block air flow around evaporator fan, or product hanging over the shelves against back wall.
	Temperature setpoint was adjusted.	Check temperature setpoint and temperature settings. Change to default settings or desired setpoint.
	Control probe is reading too high/low.	Check control offset setting, adjust if needed.
	Unit cooler fan motor (inside chamber) is not running.	Check voltage to the fan motor using schematic, replace fan motor if needed.
	Condenser fan motor (exterior) is not running.	Check voltage to the fan motor using schematic, replace fan motor if needed.
	Compressor is not running.	Check voltage to the compressor using schematic, replace compressor start components if needed.
	Ice build up in unit cooler.	See entry in **Section 6.4**

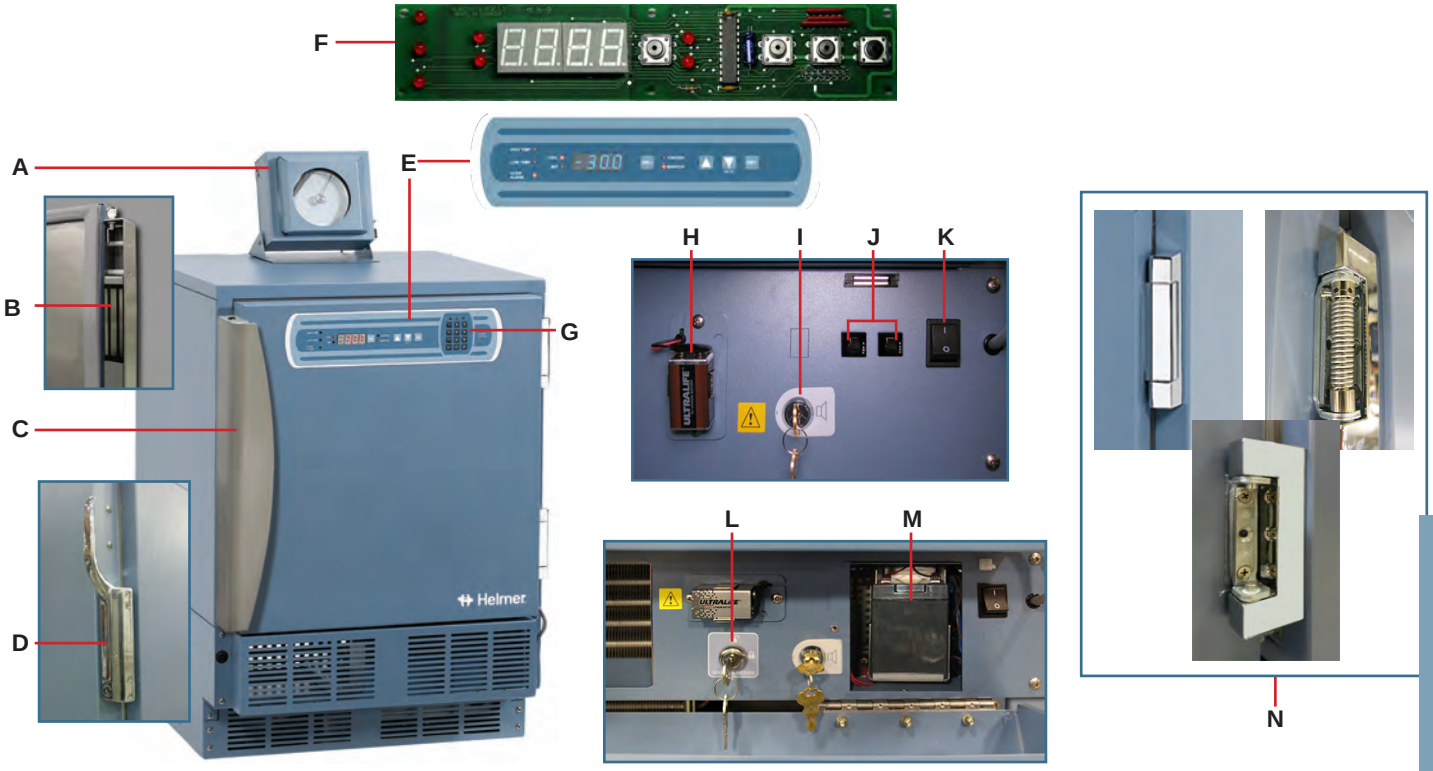
13.4 Condensation and Icing Problems

Problem	Possible Cause	Action
Excess frost/ice in chamber.	Some frost/ice within the freezer chamber is normal.	No action needed. Defrost the chamber if needed by turning the freezer off and leaving the door open until thawed, dry interior with cloth.
	Frequent or extended door openings.	Close the door and defrost chamber if needed.
	Chamber is not sealed.	Inspect door seal for damage, replace if needed. Check for wires routed through the door seal, reroute wires to the availble though hole if needed. Check through holes and ensure they are sealed, reseal if needed.
	Automatic defrost cycle is not working.	Check defrost settings and test defrost cycle to determine issue.

14 Horizon Parts

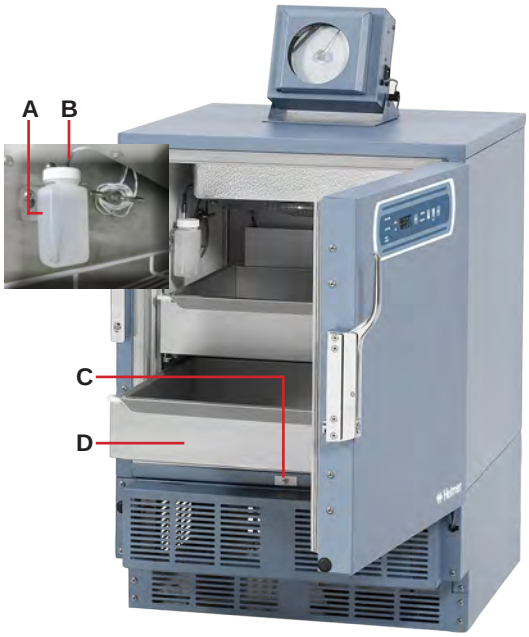
Notes

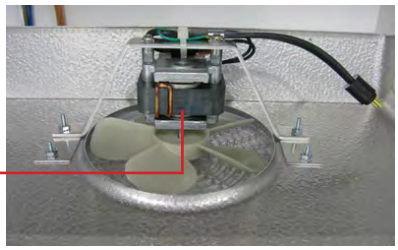
- Before replacing parts, protect items in freezer from extended exposure to adverse temperature.
- Allow freezer temperature to stabilize at setpoint after replacing parts or after extended door opening.
- Circuit boards are sensitive to static electricity and can be damaged by electrostatic discharge. Use proper ESD precautions when handling the board.

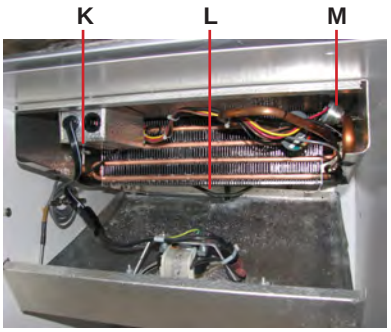


Letter	Description	Model	Part Number
A	Temperature chart recorder	-	500613-1
Not shown	Chart paper (52 sheets)	-	220419
	Chart recorder back-up battery	-	120218
B	Magnetic lock assembly (optional Access Control)	104	800141-1
		105	800139-1
C	Door handle	104	322021-1
		105	322000-1
D	Door handle (magnetic offset latch w/ key lock)	-	220426
E	Display board	-	800031-1
F	Touchpad membrane * = without Access Control ** = with Access Control	-	370106-1*
		-	370127-1**

Letter	Description	Part Number	Volts	Hz
Not shown	Control/monitor interface cable * = without Access Control ** = with Access Control	800032-1*	-	-
		800033-1**	-	-
G	Keypad (optional Access Control)	800007-1	-	-
H	Monitoring system back-up battery	120399	-	-
I	Alarm disable key switch	120227	-	-
J	Circuit breakers	120272	230	50
		120288	230	60
K	AC power switch	120478	-	-
L	Back-up battery key switch (optional Access Control)	401220-1	-	-
M	Back-up battery (optional Access Control)	120628	-	-
N	Hinge Assembly	220506	-	-







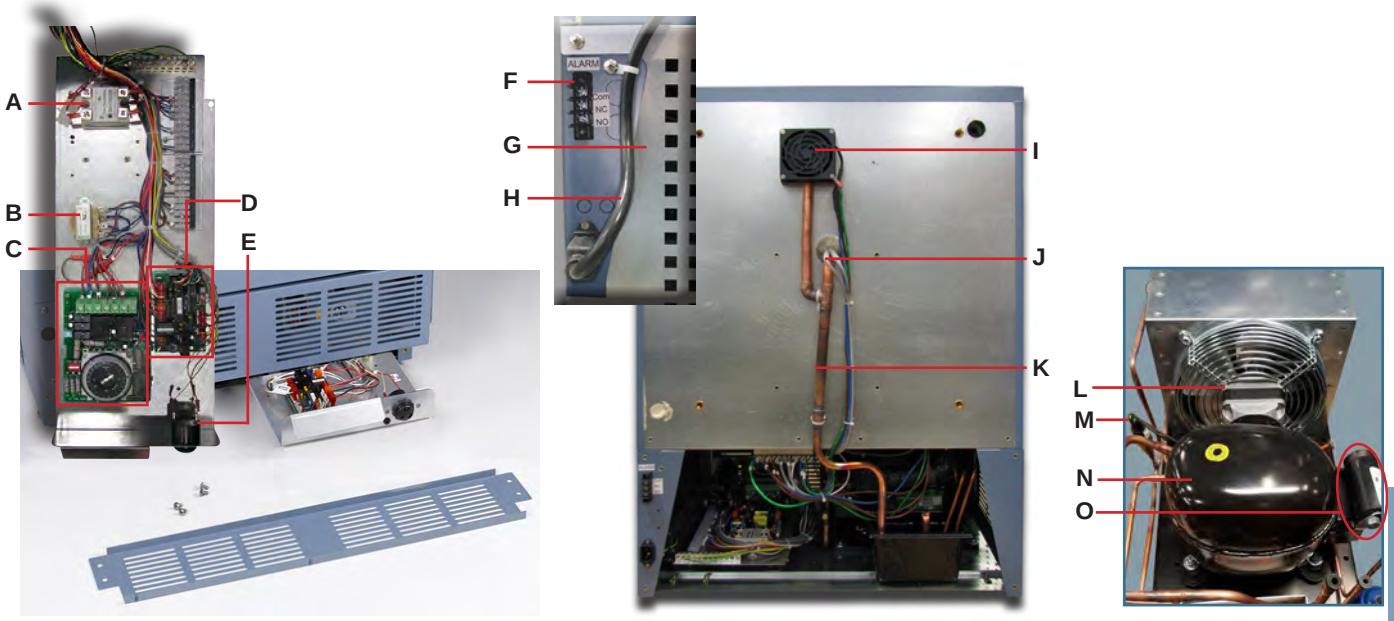
Letter	Description	Model	Part Number	Volts
A	Probe bottle and propylene glycol kit	-	400922-2	-
B	Primary monitor probe	-	800029-1	-
Not Shown	Chart recorder probe	-	800024-1	-
	Mullion heater (behind strike plate)	105	800081-1	115
		105	800106-1	230
		104	800133-1	-
	Door gasket	105	321200-1	-
		104	321647-1	
C	Door switch	-	120380	-
D	Drawer assembly (plasma storage)	105	400854-3	-
		104	400584-1	-
E	Roll out basket assembly (optional)	105	400890-3	-
		104	401136-1	-
F	Full shelf (laboratory)		400814-1	-

Letter	Description	Model	Part Number	Volts
G	Unit cooler assembly	104	800131-2	115
		105	801070-1	115
		105	800096-1	230
H	Slide assembly (drawer, basket)		400753-2	-
I	Standard (shelf, drawer, basket)		321173-1	-
J	Unit cooler fan motor	104	120807	115
		105	120540	115
		105	120808	230
K	Control probe		800028-1	-
L	Defrost heater	105	120633	115
		105	120659	230
M	Defrost heater limit thermostat		800014-1	-
Not Shown	Fan delay/defrost termination thermostat		800085-1	-

Disconnect the freezer from AC power before accessing the electrical tray.

Note

Circuit boards are sensitive to static electricity and can be damaged by electrostatic discharge. Use proper ESD precautions when handling these boards.

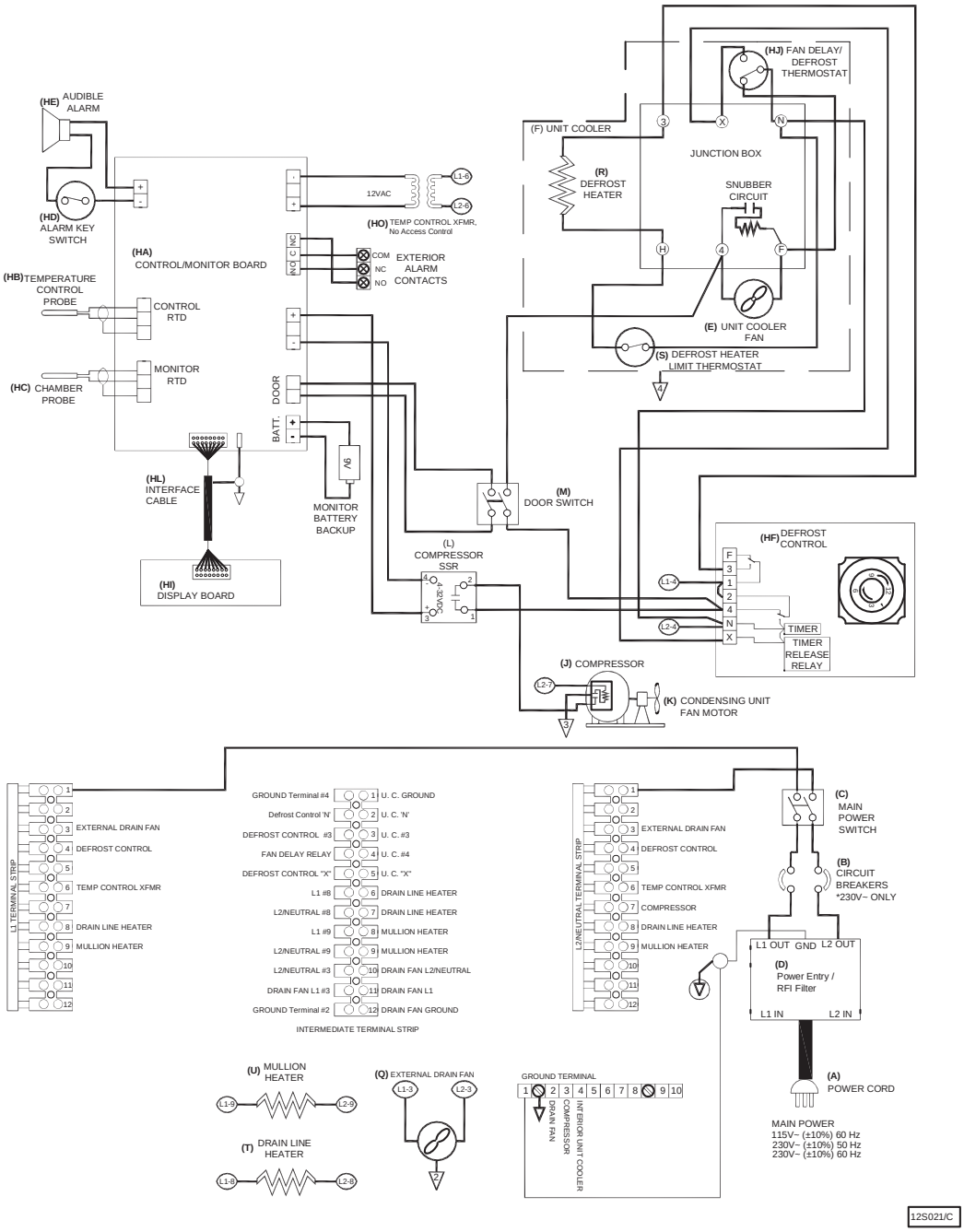


Letter	Description	Part Number	Volts	Hz
A	Solid state relay	800920--1	-	-
B	Temperature control transformer	401097-1	115	-
		401098-1	230	-
C	Defrost timer	800015-1	-	-
D	Control board	800277-1	-	-
E	Alarm buzzer	120160	-	-
Not shown	12 V DC power supply (optional Access Control)	800035-1	-	-
	Power line filter	120299	115	-
		120677	230	-
F	Remote alarm contacts	-	-	-
G	Rear cover	321184-1	-	-
H	Power cable (with connector)	120630	120	
		120631	230	-
	Power cable (European models)	120156	230	-
	Power cable (Chinese models)	120547	230	-
	Power cable (Saudi Arabian models)	120641	230	-
I	Drain line fan	400909-1	115	-
		400909-2	230	-
J	Drain line heater	800278-1	115	-
		800279-1	230	-

Letter	Description	Part Number	Volts	
K	Drain line assembly	400910-1	-	
L	Condenser fan assembly (Embraco)	800898-1	115	
		800903-1	230	
	Condenser fan assembly (Danfoss)	120608	115	60
	Condenser fan assembly (Tecumseh)	120660	230	50
		120661	230	60
M	Pressure switch	800899-1	-	-
N	Compressor (Embraco)	800134-1	115	60
		800104-1	230	50
	Compressor (Tecumseh)	800105-1	230	60
O	Compressor relay, start capacitor and OLP (Embraco only)	800897-1	115	60
		800902-1	230	50
		800900-1	230	60
Not Shown	Compressor relay (Danfoss)	120675	115	60
	Start capacitor (Danfoss)	120676	115	60
	Compressor relay (Tecumseh)	120669	230	50
	Start capacitor (Tecumseh)	120668	230	50
	Compressor relay (Tecumseh)	120671	230	60
	Start capacitor (Tecumseh)	120670	230	60

15 Schematics

15.1 HPF and HLF Models; 104 and 105 Configuration (without Access Control)



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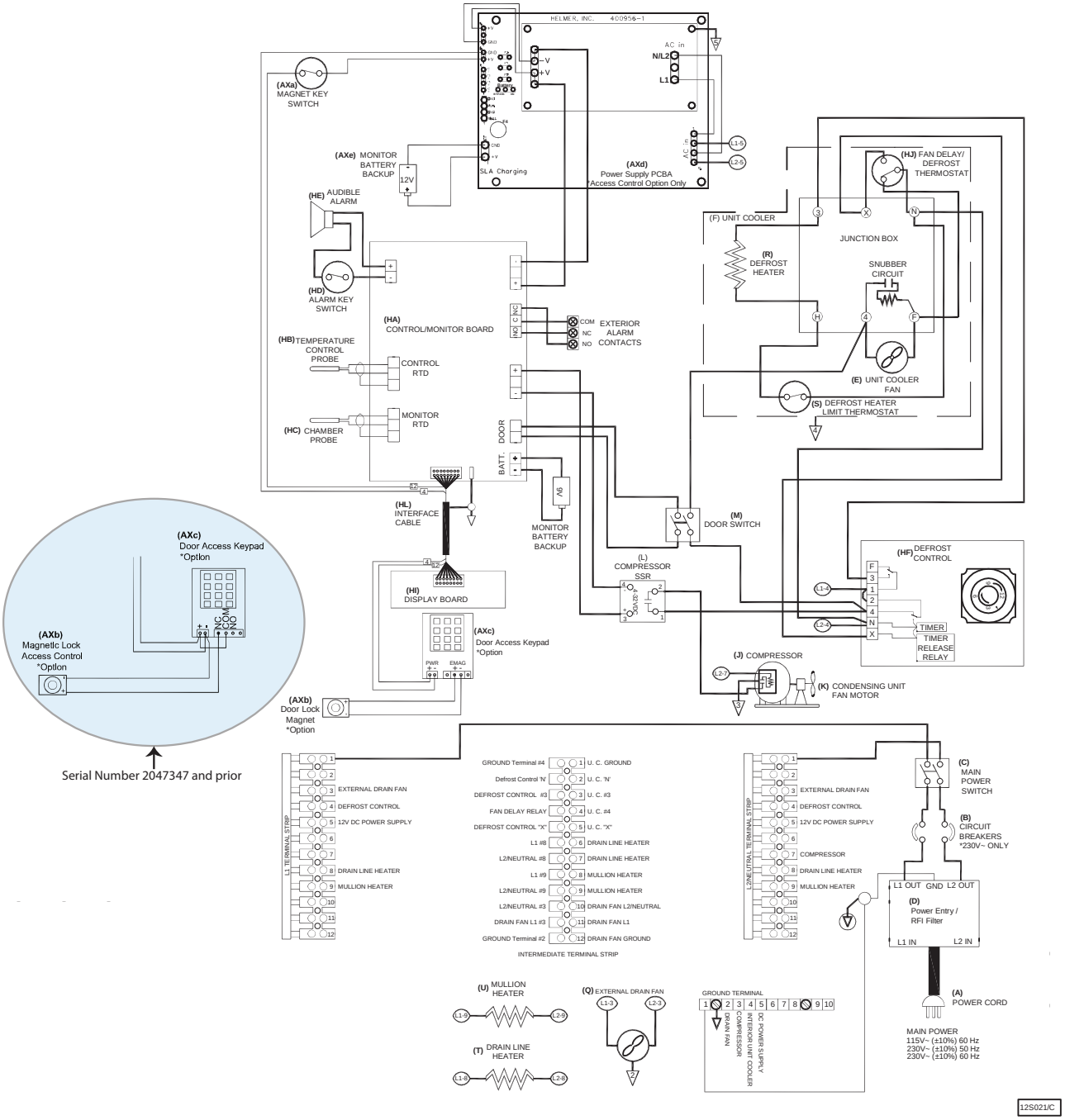
15.2 HPF and HLF Models; 104 and 105 Configuration (with Access Control)



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Appendix A: Warranty

Rel.i™ Product Warranty USA and Canada

For technical service needs, please contact Helmer at 800-743-5637 or www.helmerinc.com. Have the model and serial number available when calling.

Rapid Resolution

When a warranty issue arises it is our desire to respond quickly and appropriately. The service department at Helmer is there for you. Helmer will oversee the handling of your warranty service from start to finish. Therefore, Helmer must give advance authorization for all service calls and/or parts needs relating to a warranty issue. Any repeat service calls must also be authorized as well. This allows for proper diagnosis and action. Helmer will not be responsible for charges incurred for service calls made by third parties prior to authorization from Helmer. Helmer retains the right to replace any product in lieu of servicing it in the field.

Compressor

For the warranty period listed below, Helmer will supply the refrigeration compressor, if it is determined to be defective, at no charge, including freight. Helmer will not be liable for installation, refrigerant, or miscellaneous charges required to install the compressor beyond the first year of the warranty period.

- i.Series model compressor warranty period is five (5) years.
- Horizon Series model compressor warranty period is three (3) years.

Parts

For a period of two (2) years, Helmer will supply at no charge, including freight, any part that fails due to defects in material or workmanship under normal use, with the exception of expendable items. Expendable items such as glass, filters, light bulbs, and door gaskets are excluded from this warranty coverage. Inspection of defective parts by Helmer will be final in determining warranty status. Warranty procedures must be followed in all events.

Labor

For a period of one (1) year, Helmer will cover repair labor costs (including travel) and the cost of refrigerant and supplies necessary to perform authorized repairs. Repair service must be performed by an authorized Helmer service agency following the authorization process detailed above. Alternatively, your facility's staff may work with a Helmer technician to make repairs. Labor costs for repairs made by unauthorized service personnel, or without the assistance of a Helmer technician, will be the responsibility of the end user.

Additional Warranty Information

The time periods set forth above begin two (2) weeks after the original date of shipment from Helmer. Warranty procedures set forth above must be followed in all events.

THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE SHALL APPLY.

THE LIABILITY, IF ANY, OF HELMER FOR DIRECT DAMAGES WHETHER ARISING FROM A BREACH OF ANY SALES AGREEMENT, BREACH OF WARRANTY, NEGLIGENCE, OR INDEMNITY, STRICT LIABILITY OR OTHER TORT, OR OTHERWISE WITH RESPECT TO THE GOODS OR ANY SERVICES IS LIMITED TO AN AMOUNT NOT TO EXCEED THE PRICE OF THE PARTICULAR GOODS OR SERVICES GIVING RISE TO THE LIABILITY. IN NO EVENT SHALL HELMER BE LIABLE FOR ANY INDIRECT, INCIDENTAL, CONSEQUENTIAL, OR SPECIAL DAMAGES, INCLUDING WITHOUT LIMITATION DAMAGES RELATED TO LOST REVENUES OR PROFITS, OR LOSS OF PRODUCTS.

This warranty does not cover damages caused in transit, during installation by accident, misuse, fire, flood, or acts of God. Further, this warranty will not be valid if Helmer determines that the failure was caused by a lack of performing recommended equipment maintenance (per Helmer manual) or by using the product in a manner other than for its intended use. Installation and calibration are not covered under this warranty agreement.

Outside of USA and Canada

Consult your local distributor for warranty information.

END OF MANUAL

Helmer Scientific
14400 Bergen Boulevard, Noblesville, IN 46060 USA

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