HUSSMANN®

NSF®

RFLNS, RFMNS & RFLTM Freedom Line

Low or Medium Temperature
Compressor Ready
Tall or Narrow Footprint
Reach-in
Merchandisers

Installation & Operation Manual

Shipped With Case Data Sheets

P/N 0539221_P
August 2018

Spanish P/N 0541249
French P/N 0541252

IMPORTANT

Keep in store for future reference!

MANUAL- I/O FREEDOM REACH-IN

TABLE OF CONTENTS

IMPORTANT
KEEP IN STORE FOR FUTURE REFERENCE
Quality that sets industry standards!

REVISION HISTORY

REVISION P - August 2018
Updated Steps and table, Page 2-4-2-6; Updated California Warning

REVISION N - September 2017
Revised for new Controller

REVISION M - February 2017
Updated Page 4-1

REVISION L - Update for Team Center

REVISION K - January 2017
Added new model - RFLTM throughout manual
Updated Page 1-1 UL Listing; Federal Regulations and DOE 2017
Updated Page 2-4 to 2-6; Quick Connect Couplings;
Page 2-13 updated low temp Settings; Note on Page 4-2;
Updated Page 6-2

REVISION J - August 2015
Revised checklist GFCI, Page 4-3
Revised Connect lines and Refrigerant Lines, Page 2-5

REVISION H — WIND CHILL

REVISION G – March 2015
Removed references on page 3-3 and 5-3

REVISION F – February 2015
Clearance, Page 1-1

REVISION E – October 2014
Added California Warning Page 1-2;
Installing Air Flow Baffle Page 3-3.
Revised fork life pockets, Page 1-3
End photos and text, Page 1-6
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text, Page 2-7 Photo removed Page 3-1, 3-2, changed page 3-4, New Optional Drip Pipe Section 7

REVISION D – July 2014
Updated Cover Photo

REVISION C – July 2014
Original Issue

* *

ANSI Z535.5 DEFINITIONS

- **DANGER** – Indicate[s] a hazardous situation which, if not avoided, will result in death or serious injury.

- **WARNING** – Indicate[s] a hazardous situation which, if not avoided, could result in death or serious injury.

- **CAUTION** – Indicate[s] a hazardous situation which, if not avoided, could result in minor or moderate injury.

- **NOTICE** – Not related to personal injury – Indicates[s] situations, which if not avoided, could result in damage to equipment.

INSTALLATION

UL LISTING

These merchandisers are manufactured to meet ANSI/ UL 471 standard requirements for safety. Proper installation is required to maintain the listing.

FEDERAL / STATE REGULATION

These merchandisers at the time they are manufactured, meet all federal and state/provincial regulations. Proper installation is required to ensure these standards are maintained. Near the serial plate, each merchandiser carries a label identifying the environment for which the merchandiser was designed for use.

In compliance with DOE 2017, standard low temp Reach In cases with Innovator I Doors are equipped with an anti-sweat controller that maintains the door heat at a level that meets DOE energy limits. Any factory or field-installed anti-sweat controller applied to a low temp Reach In case with Innovator I Doors must be programmed to cycle the heaters at no more than 50% run time at design conditions of 75 degrees, 55% RH for frozen food operating condition.

ANSI/NSF-7 Type I – Display Refrigerator / Freezer Intended for 75°F / 55%RH Ambient Application

ANSI/NSF-7 Type II – Display Refrigerator / Freezer Intended for 80°F / 55%RH Ambient Application

ANSI/NSF-7 – Display Refrigerator Intended for Bulk Produce

FREEDOM LINE DESCRIPTION

The Freedom Line RFLTM, RFLNS and RFMNS cases are designed to be ready for remote installation of a top-mounted air-cooled condensing unit, such as Hussmann's TCLSA through TCMSD series of condensing units. They are controlled by an electronic control. The case temperature is controlled by cycling the compressor based on the discharge air temperature input.

The sensor for this input is located above the discharge air honeycomb. A defrost termination sensor is located on the bottom, center evaporator coil return bends.

The controller is pre-programmed for low or medium temperature operation and may be adjusted to desired operating temperature by the control keypad.

Cases running on individual condensing units may be installed as stand-alone cases with ends, or as a part of a lineup.

> ⚠ **CAUTION**
>
> Excessive ambient conditions may cause condensation and therefore sweating of doors. Facility operators should monitor doors and floor conditions to ensure safety of persons.

LOCATION

These merchandisers are designed for displaying products in air conditioned stores where temperature is maintained at or below the ANSI/NSF-7 specified level and relative humidity is maintained at or below 55%. Placing refrigerated merchandisers in direct sunlight, near hot tables or near other heat sources could impair their efficiency. Like other merchandisers, these are sensitive to air disturbances. Air currents passing around merchandisers will seriously impair their operation. Do NOT allow air conditioning, electric fans, open doors or windows, etc. to create air currents around the merchandisers. To prevent sweating on the exterior surfaces of merchandisers, there must be A MINIMUM CLEARANCE OF 4 INCHES (102 MM) between the merchandisers and other fixtures or walls. **A 5.5 inch (140 mm) space is required between facade top and the ceiling. A louvered Facade Panel kit is available that will allow for a top spacing minimum clearance of 3 inches (76 mm).**

Product should always be maintained at proper temperature. This means that from the time the product is received, through storage, preparation and display, the temperature of the product must be controlled to maximize the life of the product. Condensing units installed on top of the merchandiser require air circulation to operate properly. Blocking or restricting air flow will adversely affect performance and may damage the refrigeration system.

When installed in a lineup, Hussmann recommends that partitions be installed between individual cases to prevent frost buildup and other issues that might result from different defrost schedules and operating temperatures. *These partitions may be acrylic or insulated, depending on case's operating temperature.*

If the ceiling and/or walls are built up around the merchandiser, allow for a sufficient gap above or behind the merchandiser to provide adequate air circulation. When merchandisers are installed in a lineup, case must be taken to ensure that warm condenser air is not blown from one unit into the condenser of the adjacent unit.

⚠ **CAUTION**

**Do not store items or flammable materials atop the unit.
Do not walk on case.**

SHIPPING DAMAGE

All equipment should be thoroughly examined for shipping damage before and during unloading. This equipment has been carefully inspected at our factory. Any claim for loss or damage must be made to the carrier. The carrier will provide any necessary inspection reports and/or claim forms.

Apparent Loss Or Damage
If there is an obvious loss or damage, it must be noted on the freight bill or express receipt and signed by the carrier's agent; otherwise, carrier may refuse claim. The carrier will supply necessary forms.

Concealed Loss Or Damage
When loss or damage is not apparent until after equipment is uncrated, a claim for concealed damage is made. Upon discovering damage, make request in writing to carrier for inspection within 15 days and retain all packing. The carrier will supply inspection report and required claim forms.

FOR CALIFORNIA INSTALLATIONS ONLY:

⚠ **WARNING:**

Cancer and Reproductive Harm
www.P65Warnings.ca.gov

August 31, 2018   3069575

This warning does not mean that Hussmann products will cause cancer or reproductive harm, or is in violation of any product-safety standards or requirements. As clarified by the California State government, Proposition 65 can be considered more of a 'right to know' law than a pure product safety law. When used as designed, Hussmann believes that our products are not harmful. We provide the Proposition 65 warning to stay in compliance with California State law. It is your responsibility to provide accurate Proposition 65 warning labels to your customers when necessary. For more information on Proposition 65, please visit the California State government website.

EXTERIOR LOADING

Do NOT walk on top of merchandisers or damage to the merchandisers and serious personal injury could occur. **THEY ARE NOT STRUCTURALLY DESIGNED TO SUPPORT EXCESSIVE EXTERNAL LOADING** such as the weight of a person. Do not store items or flammable materials atop the case.

MOVING MERCHANDISER THROUGH NARROW STORE ENTRANCES

Door handles may be disassembled for transit access through small doors or passage ways. The minimum door opening for RFLNS & RFMNS cases is 36 in. x 80 in. The minimum door opening for RFLTM cases is 44 in. x 87.5 in.

The door handles can be removed for narrow store entrances.

MERCHANDISERS SHIPPED WITH END INSTALLED (not for RFLTM)

If the case was shipped with the end installed, two long bolts were used to hold the shipping brace to the end. If the shipping bolts are reinserted after removing the brace, they will extend into the product area and may damage the coil. **THEREFORE, BE SURE TO REPLACE THESE BOLTS WITH THE SHORTER BOLTS PROVIDED.**

Be careful not to damage the factory-installed end while moving the merchandiser. Make sure that tools are positioned past the end and beneath the merchandiser's support bar.

Remove Screws from Door Handle

OPTIONAL FORKLIFT POCKETS
(not for RFLTM)

Underneath the case there are pockets where the forks of a forklift can be inserted to move the case into the store. Ensure forks are inserted through all four pockets prior to moving the merchandiser. These shipping pockets (if ordered with the case(s)) can be used to bring the merchandiser into the store and place it to its final location.

> ⚠ **WARNING**
>
> Ensure the forks are inserted all the way through all four pockets before lifting the case. Case tipping could cause personal injury and / or damage to the equipment.

Optional Fork Lift Pockets
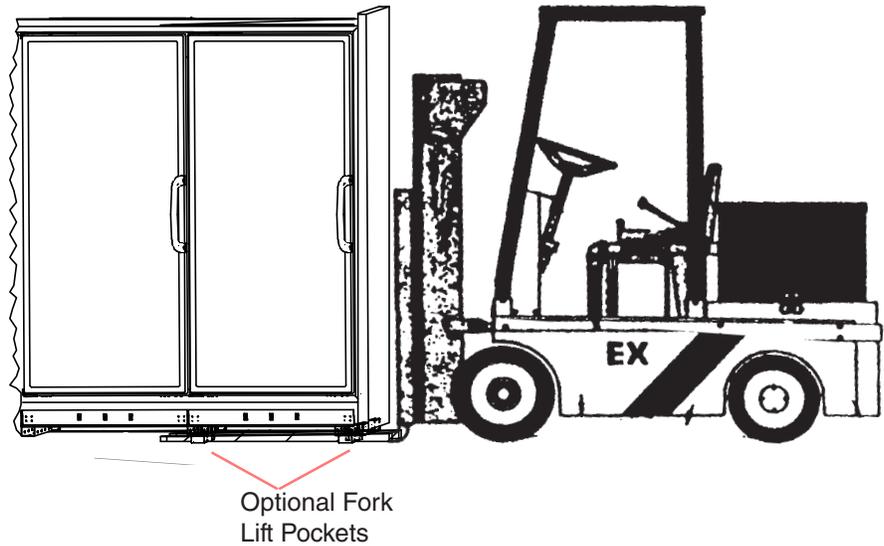
SHIPPING BRACES

Move the merchandiser as close as possible to its permanent location and then remove all packaging. Check for damage before discarding packaging. Remove all separately packed accessories such as kits and shelves.

Locate the shipping block in the center of the heat exchanger (see illustration), and remove it before piping the merchandiser. This block was installed to minimize shipping vibration. Remove the bottom display pans and air return grilles from the case(s).

Front Shipping Brace

Shipping Block   Heat Exchanger

Top View of Merchandiser
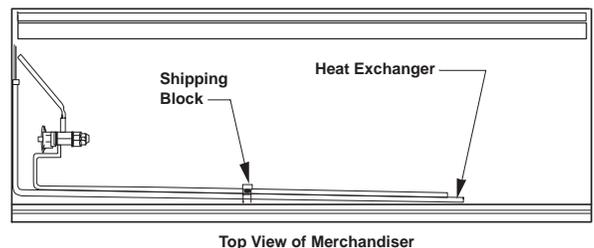
LEVELING

Merchandisers must be installed level to ensure proper operation of the refrigeration system and to ensure proper drainage of defrost water. When leveling merchandisers, use a carpenter's level as shown.

Metal leveling shims or wedges are provided with each merchandiser for use if needed.

NOTE: BEGIN LINEUP LEVELING FROM THE HIGHEST POINT OF THE STORE FLOOR.

Place shims under the rail and make sure that they are positioned at a base component (crossbar). This transfers the weight directly from the loaded case through to the floor.

See illustrations on next page.

Placing shims at other locations will cause uneven distribution of weight leading to piping leaks, as well as sagging or wracked doors.

Shim Case

Case Leveling

Excessive ambient conditions may cause condensation and therefore sweating of doors. Facility operators should monitor doors and floor conditions to ensure safety of persons.

Approximately Centered

Rear of Reach-In

Base Component

Base Component

Shim Here

Shim Here
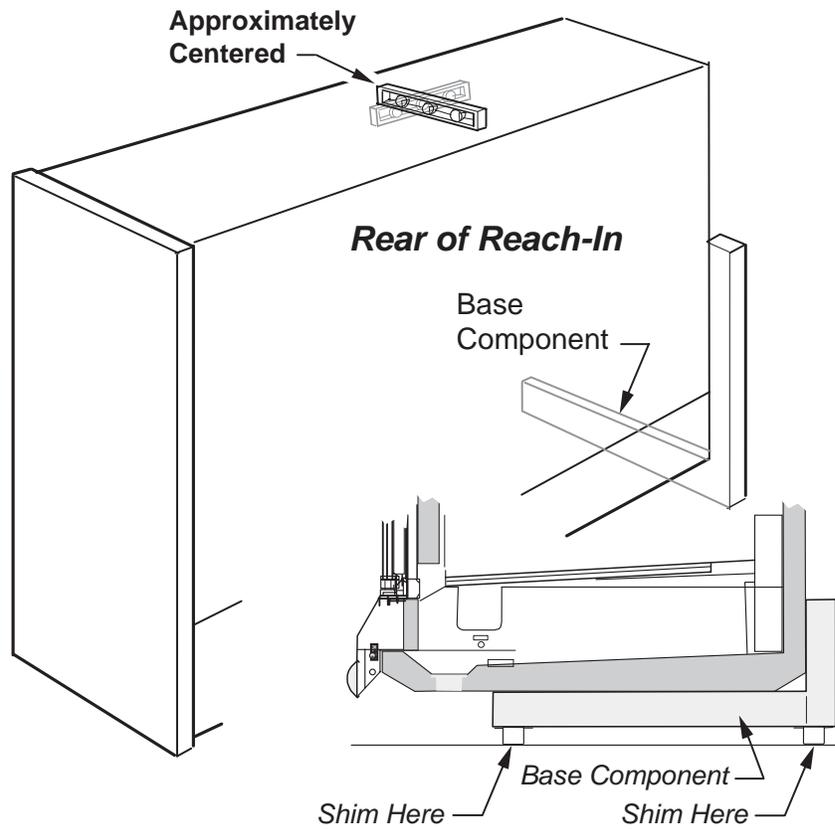
If any of the Earthquake Shoes are not in contact with the floor, these Earthquake shoe locations must be shimmed, using provided shims

Shim Locations

4-Door Merchandiser Shown

No Gap between earthquake shoe and the floor

Skid External Base

Earthquake Shoe
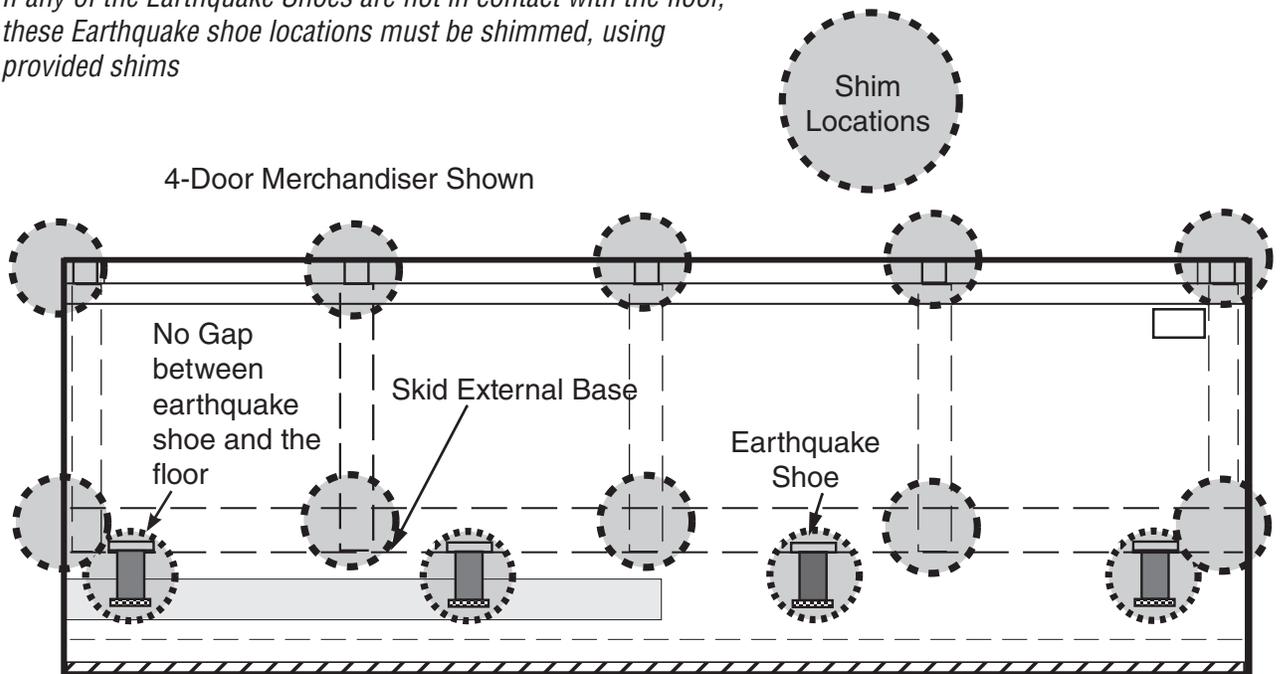
Correct Shim Location is Critical

DOOR ADJUSTMENT

After leveling and joining the merchandisers, adjust and level doors according to manufacturer's instructions shipped with each product. Factory settings may be lost due to vibration during shipment.

JOINING

Sectional construction means that two or more merchandisers may be joined in line yielding one long continuous display requiring only one pair of ends. **Joining kits and instructions are shipped with each merchandiser.**

To join merchandisers with independent ends, a joining kit is required.

The painted caps for the end assembly bolt holes may be kept with this manual. Insert two insulating plugs into each bolt hole of the ends to be joined. After leveling and aligning the top edge of the ends, install the two case-to-case brackets on to the top with sheet metal screws as shown below.

To join unlike fixtures, or like fixtures operating at different temperatures, a 2 inch (51 mm) partition kit is required. To join same temperature merchandisers on different defrost cycles, a plexiglass partition kit is required. Install 'J' trim between cases.

Use J-Bar to Align Cases for Joining

Remove Top Panel

Case End Cap Bolt Hole Locations

This bolt location not present for RFLTM

ALL JOINTS MUST BE AIR-TIGHT TO PREVENT FORMATION OF ICE OR CONDENSATION.
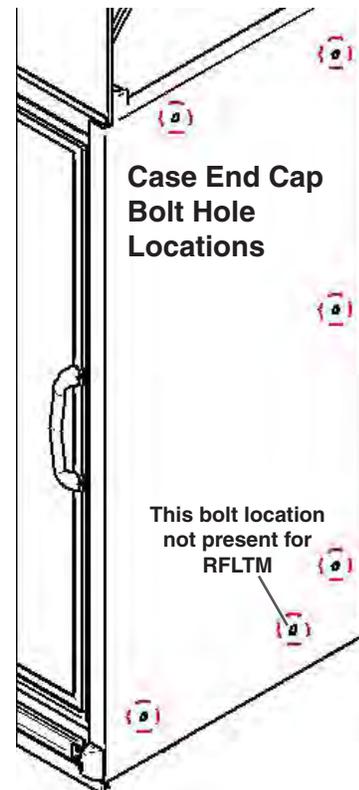
REFRIGERATION / ELECTRICAL / CONTROLLER

REFRIGERANT

The correct type of refrigerant will be stamped on each merchandiser's serial plate. The serial plate is located on the left-hand end of the interior top liner.

⚠ **CAUTION**

When brazing pipes be sure to use the insulation blanket shipped with the merchandiser to prevent damage to the plastic case bottom.

⚠ **WARNING**

Refrigeration lines are under pressure. Depressurize and recover refrigerant before attempting any connection or repair.

Refrigerant vapor is hazardous to your health and can cause death. Avoid breathing refrigerant and lubrication vapor or mist. Exposure may irritate eyes, nose and throat. If accidental system discharge occurs, ventilate work area before resuming service.

Always wear safety goggles and protective gloves when working with refrigerants. Contact with refrigerant may cause injury. Disconnect hoses with extreme caution! All hoses may contain liquid refrigerant under pressure.

Be sure that any room where you are working is thoroughly ventilated, especially if a leak is suspected.

Read all safety information regarding the safe handling of refrigerant and refrigerant oil, including the Material Safety Data Sheet. MSDS sheets can be obtained from your refrigerant supplier.

FIELD INSTALLATION OF CONDENSING UNIT

A mounting plate is provided on top of the case with pilot holes that provide specific attachment points for the condensing unit base. The mounting plate is located above the next to last door on the right.

The condensate pan, if selected by the end user, is packed inside the case and must also be installed and leveled on top of the case, then plugged into the 120V GFCI outlet provided.
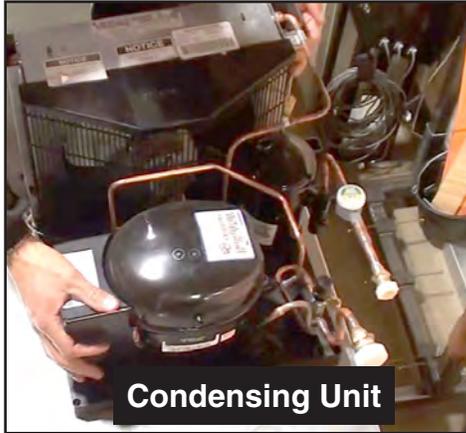
Exact component location is not critical; however, the components should be mounted in the general locations shown below to ensure that electrical connections reach, and the condensate pan has adequate air flow from the condenser.

Condensing Unit

Insulation Sponge 5/8 inch x 3/4 inch wall insulation to cover entire length from Condenser Unit connection to end of copper tubing, where it enters at top of case, including quick connects

Orient the Condenser Unit as shown on top of the case. Line up mounting holes on base of condenser unit with holes on mounting plate and secure using (4) 12-14 x 2 1/4 inch screws and flat washers

Facades

Apply Rubber Gasket along base edges that contact mounting plate (8) places (2 each side) as shown

Rear Bracket used on 4 & 5 Door Cases Only. Sound Panel Kits Use Similar Bracket For 3 Door Cases. Rear bracket not necessary for RFLTM.

Right side of case looking from the front

Connect quick connects on flexible liquid & suction lines from condensing unit to quick connects on pipes exiting top right of case

5-Door Case & Condenser Unit Shown

The wiring connection for the condensing unit is provided with 5-ft leads. The conduit must be connected to the condensing unit electrical box, and the leads are connected to the condensing unit input terminals. The heated condensate pan, if provided, is plugged into the 120V GFCI receptacle at the top of the case.

⚠ WARNING

— LOCK OUT / TAG OUT —
To avoid serious injury or death from electrical shock, always disconnect the electrical power at the main disconnect when servicing or replacing any electrical component. This includes, but is not limited to, such items as doors, lights, fans, heaters, and thermostats.

⚠ CAUTION

Blocked drain lines will cause water to back up in the case and spill onto the floor, causing a slip hazard.

Detail A

Condensate Pan Installation and Location

Position heated condensate pan to Dimensions shown and install (4) SM Self-Drill Screws into Top Foam Panel Liner

A

17 inches (432 mm)

(approximate location)

9 inches (229 mm)

9.00 APPRO.
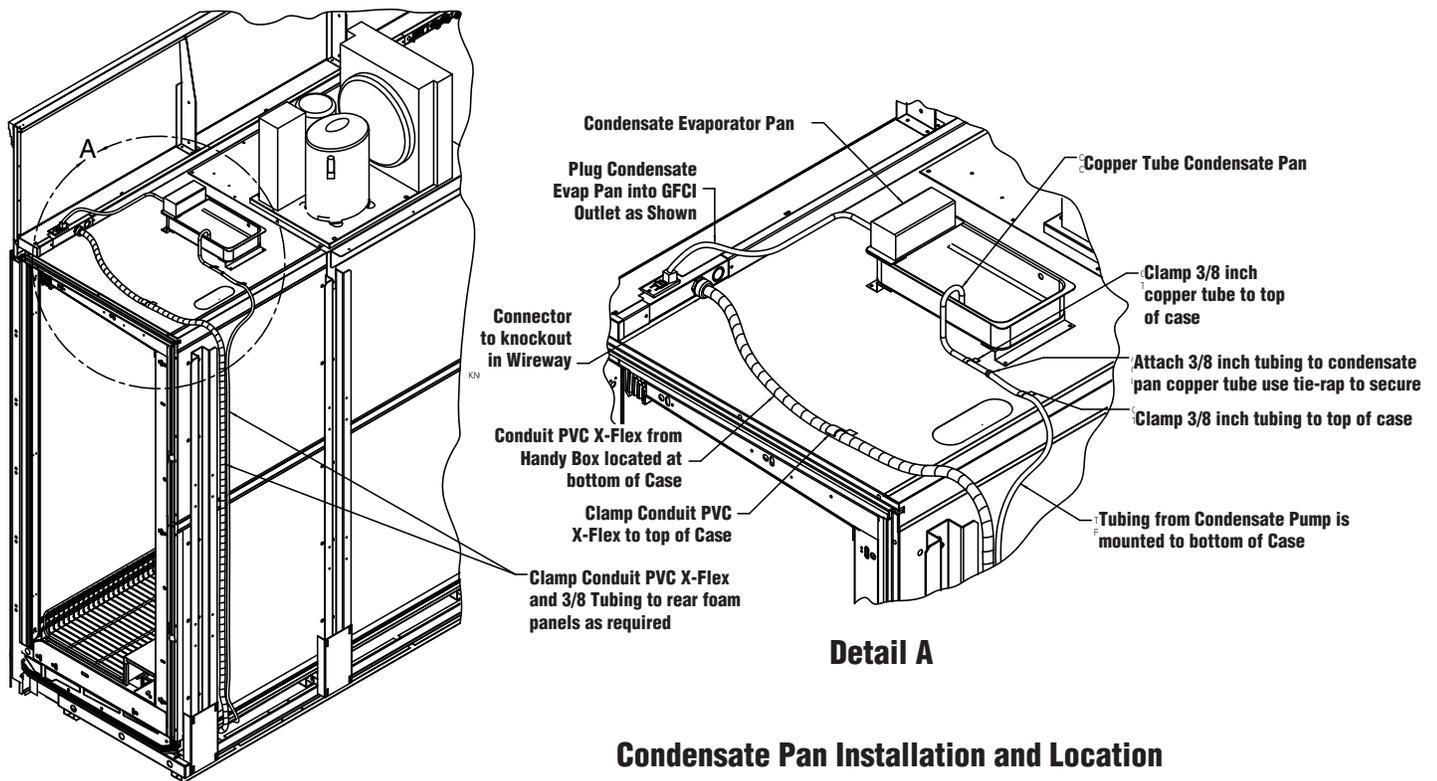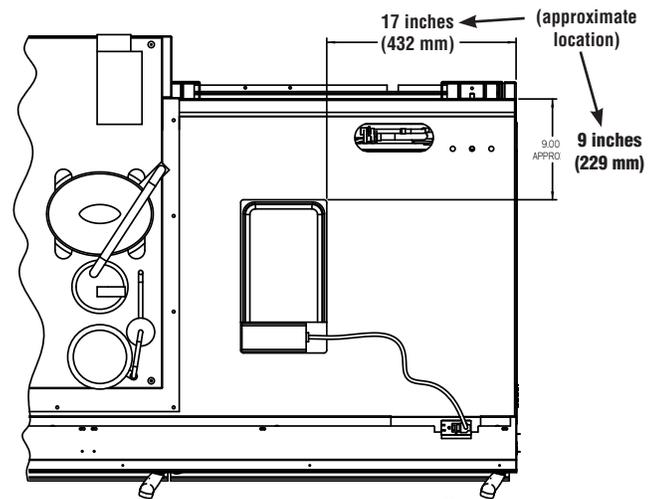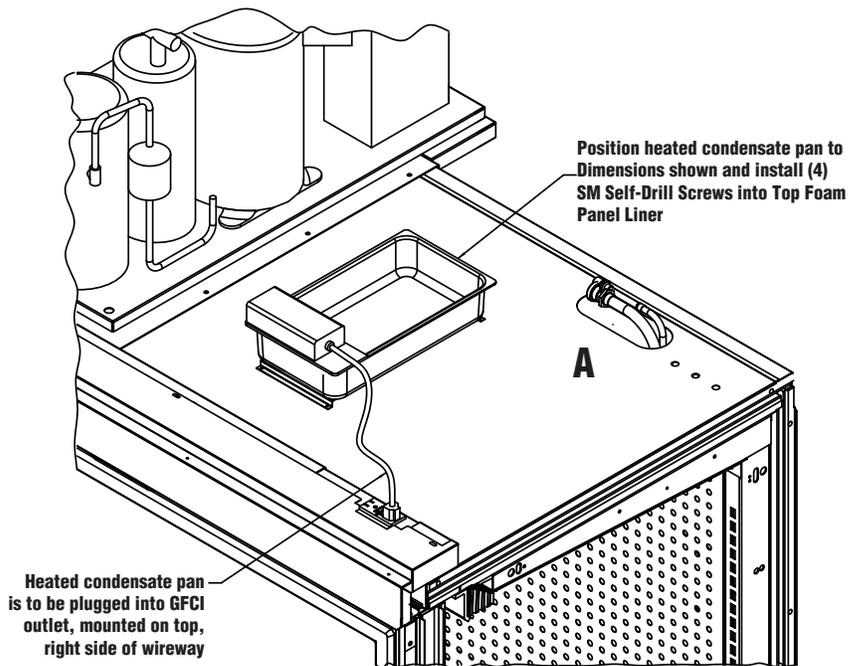
View is looking at top of case, right side

Heated condensate pan is to be plugged into GFCI outlet, mounted on top, right side of wireway

Foam Seal must be in place, sealant must be applied around the copper lines after connecting the condensing unit.
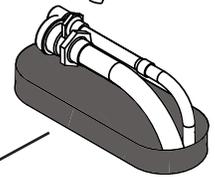
Detail A

Condensate Pan Installation, Location and Electrical

ABOUT QUICK CONNECT COUPLINGS

Quick Connect fittings are provided on both the case inlet and outlet lines, and on Hussmann's TCL and TCM series of condensing units. The case and condensing unit are pre-charged with the correct amount of R404A refrigerant, and the lines are sealed. Connecting the Quick Connects together breaks the seals to connect the refrigeration lines of the unit to the case. The Quick Connects must be properly torqued to avoid refrigerant leaks.

CONNECT LINES

Mount the suction line and liquid line to the condensing unit. When ready to connect, remove protector caps and plugs from the Quick Connect Couplings.

If necessary, carefully wipe coupling seats and threaded surfaces with a clean cloth to prevent the inclusion of dirt or any foreign material in the system.

Step 1:

Apply refrigerant oil to the entire surface of diaphragm, o-ring and threaded area of male coupling assembly. The amount of lubricant used must cover all designated surfaces sufficiently. Ideal application is a small applicator brush saturated with lubricant and applied liberally.

Step 2:

Ensure that the coupling halves are held in proper alignment with each other prior to starting the threads of the female coupling nut onto the male half.

The coupling end faces should be parallel with each other and visually in line with each other, this allows the female coupling nut to easily be threaded on by hand for the initial 2-3 rotations of the union nut. These initial rotations will bring the diaphragm in contact and a sharp increase in torque will be felt when they come into contact and start to pierce the diaphragms on each coupling half.

If the nut will not start by hand, adjust the position of the line set to ensure proper coupling alignment and eliminate/minimize all side load force on the coupling during assembly.

Step 3:

Using appropriate size wrenches, reference table below for the female coupling body and female union nut, tighten the female union nut, according to the torque specs below, while preventing rotation of the female body with respect to the male half. The nut should be tightened until a definite increase in resistance, metal to metal contact occurs, is felt (at this point, the nut will have covered most of the threads on the male body). It is important to ensure the male and female coupling bodies DO NOT ROTATE during any portion of the wrench installation.

Coupling	Hex Wrench Size
$3/8$ in. Male	$3/4$ in.
$3/8$ in. Female	$13/16$ in.
$5/8$ in. Male	$1\ 1/16$ in.
$5/8$ in. Female	$1\ 5/16$ in.

Coupling Size	Foot Pounds (Ft. Lbs.)
$3/8$ in.	10-12
$5/8$ in.	35-45

Step 4:

Using a permanent marker or scribe, mark a line lengthwise from the female coupling union nut to either the bulkhead or female coupling body. Then tighten an additional one (1) wrench flat (60°); refer to the marking on the union nut to confirm the rotation has occurred The final rotation is necessary to ensure the formation of the leak-proof seal, between the male and female couplings.

CORRECTLY TIGHTENED COUPLING

The swivel nut end contains one diaphragm in the center post. The male fitting contains the knife blades and its own diaphragm.

Coupling Assembly Details

Correctly Tightened

Fully Open   **Fully Open**

INSULATE REFRIGERANT LINES

Suction lines are insulated to prevent condensation; extra insulation is provided to cover the field connected tubing sections. These exposed sections must be covered with insulation. Check that all suction lines are adequately covered with insulation from case penetration to compressor; including suction service valves as some insulation may have been dislodged during shipping and installation. Do not locate the tubing above the electrical box in order to prevent condensation from dripping onto electrical components.
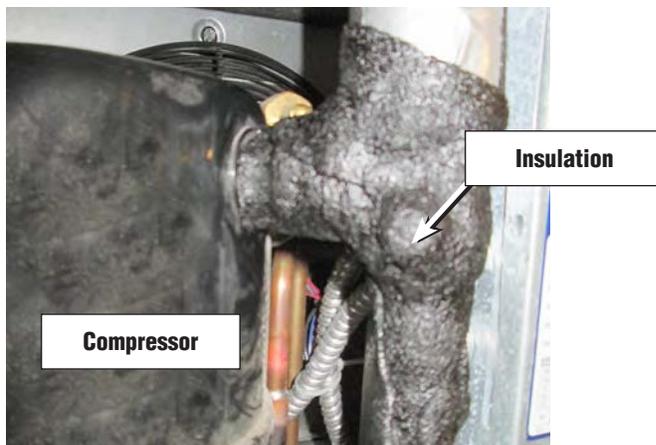
FIELD WIRING

All wiring must be in compliance with NEC and local codes. Field wiring must be sized for component amperes stamped on the serial plate. Actual ampere draw may be less than specified. A conduit whip is provided on the RFLNS & RFMNS cases for the power input (field connection) of the 120V single phase and 208/230V single phase power supply. The terminal blocks are located inside the wireway on top of the case. The wiring diagram and circuit requirements are provided on the Technical Data Sheets provided with the case and condensing unit. The disconnect switch that turns off power to all case components and the condensing unit is on top of the case, on the rear of the wireway. When this switch is off, some electrical terminals in the case wireway may be energized.

Insulation

Compressor

Condensate Reservoir

Factory Installed

Conduit and Tubing to top of Case

51.83

60.50

Pump Mounting Bracket
(Factory Installed)

Conduit PVC X-Flex and
3/8 Inch Tubing
(Factory Installed)

Bottom RH View of Case 4 Door

Dimensions In Inches

.62

1.25

Handy Box Bracket
(Factory Installed)

7.75

.75

Bottom RH View of Case 5 Door

All Dimensions in Inches

Condensate Reservoir

Pump Mounting Bracket
(Factory Installed)

Handy Box Bracket
(Factory Installed)

Conduit and Tubing
at top of Case
(Factory Installed)

Factory Installed

.75

1.25

.62

6.50

8.32

31.42

25.19

CONTROLLER OPERATION

Follow the tables to use the commands. The keypad display is located on the front of the merchandiser.

All cases manufactured after August 2017, use the XR75 Controller. For cases manufactured before this date, refer to the Safe-NET III user instructions in Section 8 of this manual.

Symbol	Function
⏻	Switches the device ON and OFF, if **onF** = **oFF**
☀	Switches the light ON and OFF, if **oA1** = **Lig**
▲ + ▽	Locks/Unlocks the keyboard
SET + ▽	To enter programming mode
SET + ▲	Returns to room temperature display
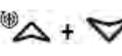
Key	Function
SET	Press to display target setpoint, to select a parameter in programming mode, or to confirm an operation
❄	Starts a manual defrost
▲	Press the UP arrow to see the MAX temperature, to browse the parameter codes in programming mode, or to increase the currently displayed temperature value.
▽	Press the DOWN arrow to see the MIN temperature, to browse the parameter codes in programming mode, or to decrease the currently displayed temperature value.

Follow the LED commands to operate and control the case's lighting.

LED	Mode	Function
❄	ON	Compressor enabled
❄	Flashing	Anti-short cycle delay enabled
❄	ON	Defrost enabled
❄	Flashing	Drip time in progress
✿	ON	Fans enabled
✿	Flashing	Fans delay after defrost in progress.
📶	ON	An alarm is occurring

How to see the setpoint
1. Push and immediately release the SET key. The display will show the setpoint value.
2. Push and immediately release the SET key or wait for 5 seconds to display the present value again.

How to change the setpoint:
The controller is shipped from the factory with Frozen Food settings. To modify the temperature for Ice Cream application, follow these instructions:

1. Push and hold the SET key for more than 2 seconds to change the setpoint value.
2. The value of the setpoint will be displayed and the °C or °F LED starts blinking.
3. To change the setpoint value push the UP or DOWN arrows within 10 seconds.
4. To memorize the new setpoint value, push the SET key again or wait 10 seconds.

How to start a manual defrost:
Push and hold the DEF key for more than 2 seconds and a manual defrost will start.

How to lock the keyboard:
1. Keep the UP + DOWN arrow keys pressed for more than 3 seconds.
2. The **PoF** message will be displayed and the keyboard will be locked. At this point it will be possible to see the setpoint of the MAX or Min temperature stored only.
3. If a key is pressed for more than 3 seconds the **PoF** message will be displayed.

Controller Location

How to unlock the keyboard:
Press the UP and DOWN arrow keys together for more than 3 seconds until the Pon message displays.
Alarms:

P1 Discharge temperature probe failure
P2 Defrost termination probe failure
HA Max temperature alarm
LA Min temperature alarm

How to set defrost start time
The defrost will occur 24 hours after the controller is first powered up, then every 24 hours after that.

A

controller sensor location

Controller

Detail A

Discharge Air Temp Control
Sensor with Tie Strap
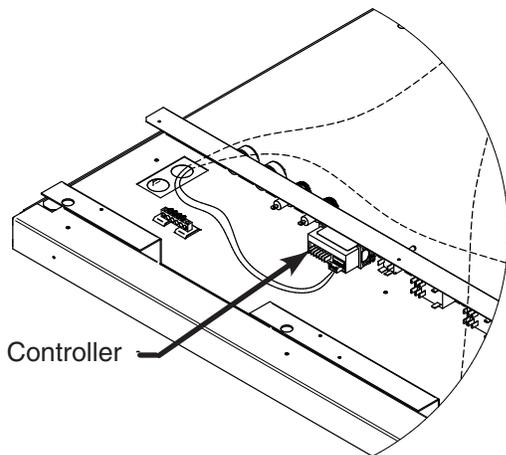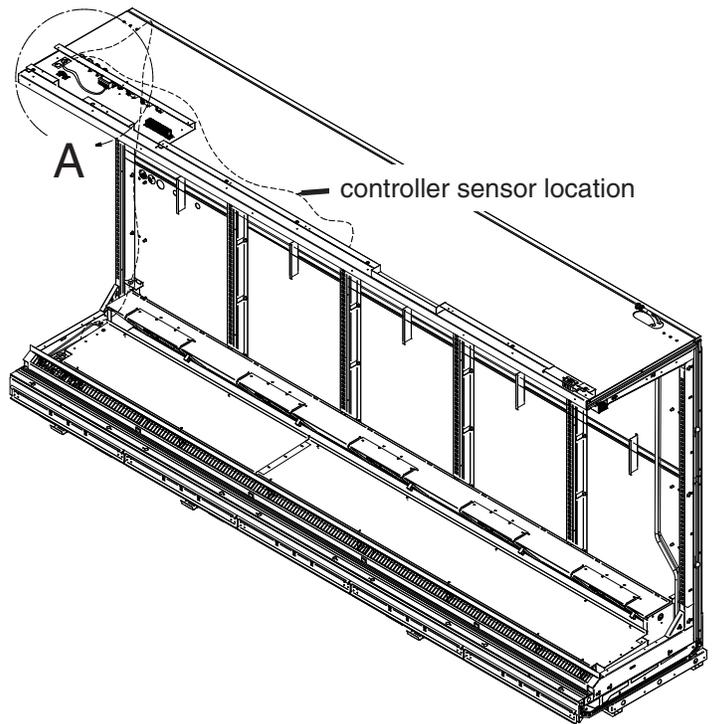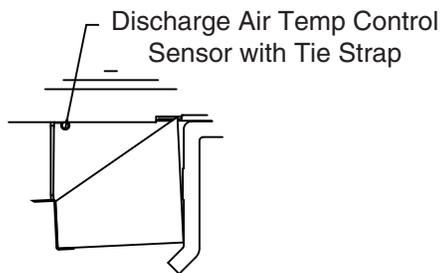
Detail B

Defrost Termination Sensor
located on the bottom row
return bend closest to the
center of the coil.

NOTE: Do NOT load product until AFTER merchandiser operates for 24 hours and reaches desired operating temperature.

⚠ WARNING
Product will be degraded and may spoil if allowed to sit in a non-refrigerated area.

⚠ WARNING
The OFF Position does not disconnect line voltage to the input terminal blocks.

ALWAYS CHECK THE SERIAL PLATE FOR COMPONENT AMPERES.

Electric Defrost is standard for low temperature merchandisers and requires temperature termination. Off Time Defrost is standard for medium temperature merchandisers and is time terminated.

MERCHANDISER ELECTRICAL DATA

Merchandiser data sheets for specific models are shipped with this manual. The data sheets provide merchandiser electrical data, standard electrical schematics, parts lists and performance data. *Refer to the merchandiser data sheets and merchandiser serial plate for electrical information. Refer to the separate wiring diagrams shipped with the case for specific information about the merchandiser and any optional wiring kits that may have been applied.*

ELECTRICAL CONNECTIONS

All wiring must be in compliance with NEC and local codes.

> ⚠ **WARNING**
>
> **Terminal block NOT for case-to-case wire connection.**

IDENTIFICATION OF WIRING

Leads for all electrical circuits are identified by colored plastic bands. These bands correspond to the color code sticker (shown below) located inside the merchandiser wireway.

> **…ATTENTION INSTALLER**
>
> **It is the contractor's responsibility to install merchandiser(s) in accordance with all local building and health codes.**

WIRING COLOR CODE

Leads for all electrical circuits are identified by a colored plastic band: neutral wire for each circuit has either White insulation or a White plastic sleeve in addition to the color band.

PINK .... REFRIG. THERMOSTAT LOW TEMP.	ORANGE OR
LIGHT BLUE . REFRIG. THERMOSTAT NORM TEMP.	TAN.......... LIGHTS
DARK BLUE . DEFROST TERM. THERMOSTAT	MAROON... RECEPTACLES
PURPLE .... ANTI-SWEAT HEATERS	YELLOW* .. DEFROST HEATERS, 120V
BROWN .... FAN MOTORS	RED* .... DEFROST HEATERS, 208V
GREEN* .... GROUND	

*EITHER COLORED SLEEVE OR COLORED INSULATION
ELECTRICIAN NOTE: Use copper conductor wire only.
CASE MUST BE GROUNDED

THESE ARE MARKER COLORS WIRES MAY VARY.

CONTROLS and ADJUSTMENTS

	Refrigeration Controls		Defrost Controls			
Model	Product Application	Discharge Air Temperature	Defrost Frequency (per day)	Type of Defrost	Termination Temperature	Failsafe Time (Minutes)
RFLNS	Frozen Food	-5° F	1	Electric	48°F	45
RFLNS	Ice Cream	-12° F	1	Electric	48°F	45
RFMNS	Medium Temp. (Dairy, Deli)	32° F	1	Off Time	NA	60
RFLTM	Frozen Food	-5° F	1	Electric	48°F	45

1. The controller controls refrigeration temperature. This is factory installed in the control panel. Adjust this control keypad to maintain the discharge air temperature shown. Measure discharge air temperatures at the center of the honeycomb.

For low temperature models, defrosts are time initiated and temperature terminated. The defrost setting is factory set as shown.

To ensure a thorough defrost, the defrost must be terminated by the temperature termination setting — not by time.

For medium temperature models, defrost is time initiated and time terminated.

NOTES:

FACADE, SPLASHGUARD AND BUMPERS

INSTALL FACADE

Position facade supports and fasten to top of case using predrilled holes.

See illustrations on next page.

Install Facade Supports using holes provided

Fasten end facade to front facade as shown where seamless options apply.

Screw Support
onto Wireway
Cover

Facade Bracket

Detail C

3 Door Facade Shown
(2, 4 & 5 Door)

Facade
Bracket

Line up brackets with holes
in wireway cover as shown.
Fasten #8 x 1/2 in HX HD
screws, 4 places each bracket

C

Wireway Cover

Use 2 inch Facade Trim for Case
Lineups, fasten into top of case

3 Door Facade Shown
(2, 4 & 5 Door Similar)

A

B

Top of Facade to
insert into top part of
Facade Bracket as
shown

Bottom of Facade Panel
to sit into support located
on top of Wireway Cover

AIR FLOW BAFFLE

Air flow baffles are required to be installed
between cases to ensure proper air flow
circulation of the refrigeration systems. The
air flow baffle should be positioned as shown
and are fastened at the top of the merchandiser
using sheet metal screws.

Position air flow baffle between
cases in lineups and install (4)
SM self-drill screws into top foam
panel liner.
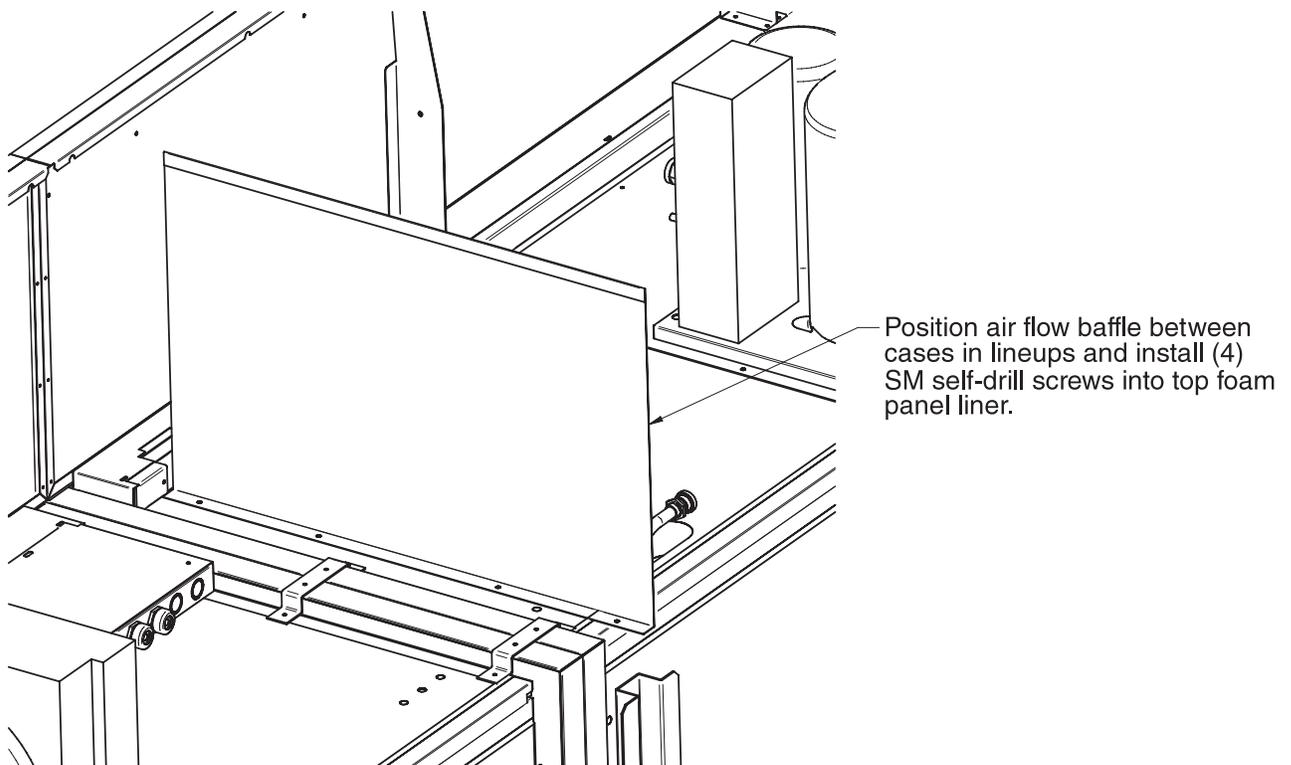
Air Flow Baffle Installation and Location

INSTALLING SPLASHGUARDS AND BRACKETS

The splashguard is shipped inside each merchandiser. AFTER merchandisers have been leveled and joined, and all drip piping, electrical and refrigeration work has been completed, re-install the splashguards.

Splashguards are joined with a galvanized metal splice connector that comes with the joint kit. Join the splashguards before installing on case. The leveling brackets have a maximum extension of one (1) inch (25 mm) for uneven floors.

To install splashguards and brackets:

①. Slide the splashguard support bracket's small flange into base rail slots. Next, slide the splashguard retainer assembly under the case as shown.

②. Rotate the retainer assembly clockwise (from right hand side) while pulling towards the front of the case, until the forward most flange sits flush with the back of the color panel.

③. Align the retainer assembly with and attach to the support bracket using #10 screws. Then install a #8 screw through the color panel into the top retainer flange.

DO NOT PLACE SHIMS UNDER SPLASHGUARD BRACKETS.
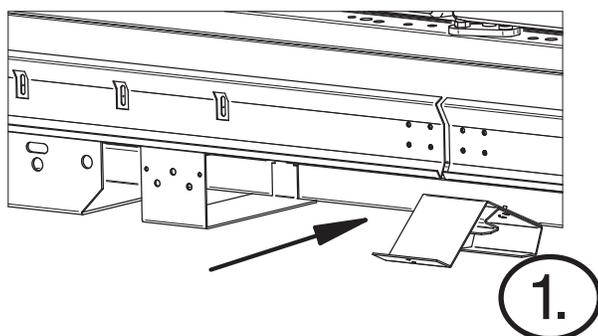
Splashguards Installation

Splashguard   Side Detail

Splice Connector

②.

①.

③.
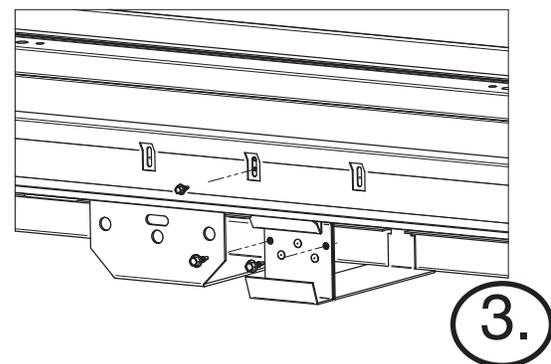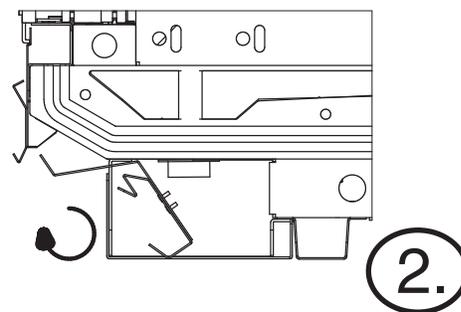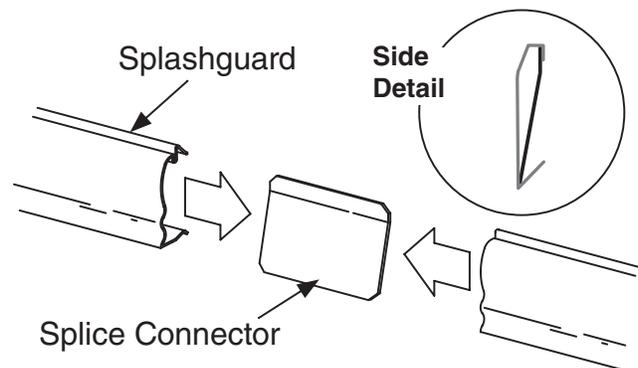
SEALING SPLASHGUARD TO FLOOR

IF REQUIRED by local sanitation codes, or if desired by the customer, plastic splashguards may be sealed to the floor using silicone type sealer. The amount needed will depend on how much the floor is out of level.

• Remove all dirt, wax and grease from the area of the splashguard where adhesion will be necessary. This is to ensure a good, secure installation.

• Apply a good silicone type sealer along the bottom of the splashguard. Sealant must be removed and replaced when servicing.
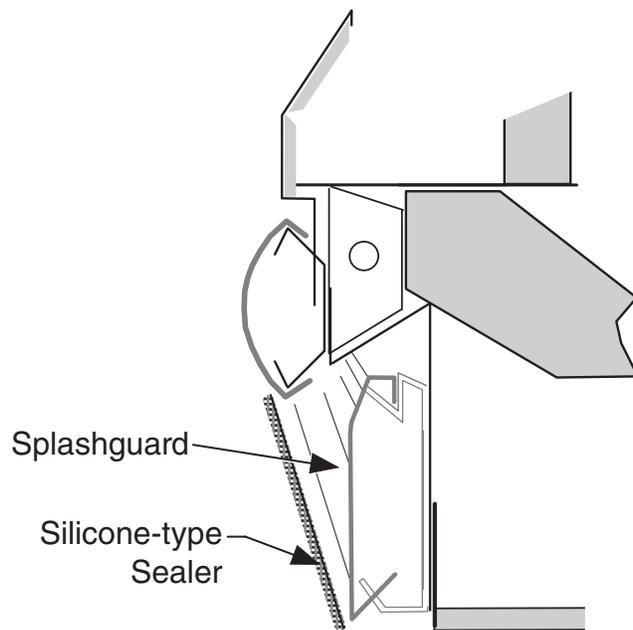
OPTIONAL stainless steel splashguards may be sealed to the floor using a vinyl cove base trim. The size of trim needed will depend on how much the floor is out of level.

To install the trim to the splashguard:
• Remove all dirt, wax and grease from the area of the splashguard where adhesion will be necessary. This is to ensure a good and secure installation.

• Apply a good contact cement to the cove trim and allow proper drying time according to the directions supplied with the cement.

• Install the trim to the splashguard so that it is lying flush with the floor. DO NOT SEAL THE TRIM TO THE FLOOR.

• **If required by local health codes** Cove Trim may be sealed to the floor using a silicone type sealer. Sealant must be removed and replaced when servicing.

Splashguard

Silicone-type Sealer

Splashguard

Cement

Cove Trim
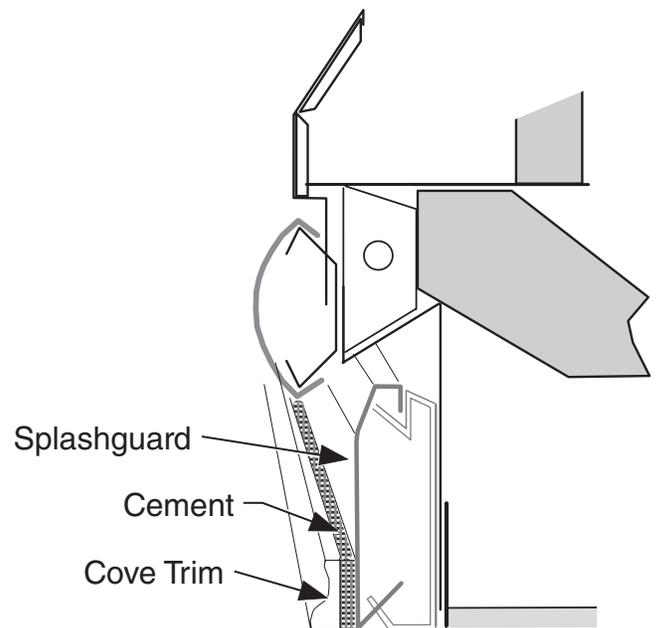
INSTALLING BUMPERS

Offsetting the bumpers and top rails helps to disguise the joint locations, giving the lineup a smoother look.

Begin at the left end of the line-up. A starter bumper is factory-installed with end kits. Insert the internal joint trim, then add the full-length bumper.

Align each bumper section with its retainer and push into place, working from the end of the lineup. Install full length bumpers and internal joint trims offset across joints. Make sure that no gaps exist between sections. Continue installing bumpers the length of the line up.

Do NOT install the last bumper sections at this time. These sections will be installed in the last step.

Once all except the last section of bumper have been installed, refrigerate the case line-up for at least six (6) hours. The last sections of bumper should be kept inside a refrigerated case or cooler during this time to allow the bumpers to contract.

Before installing the last full-length section, measure the remaining space. Use a miter box and fine-tooth saw to cut last bumper to length. Install the last section.

Merchandiser Joint

Merchandiser Joint

Internal Joint Trims

Full Length Bumpers

Starter Bumper

Bumper

Miter Box
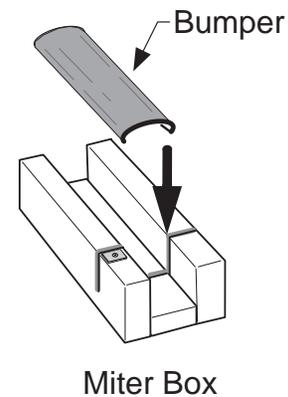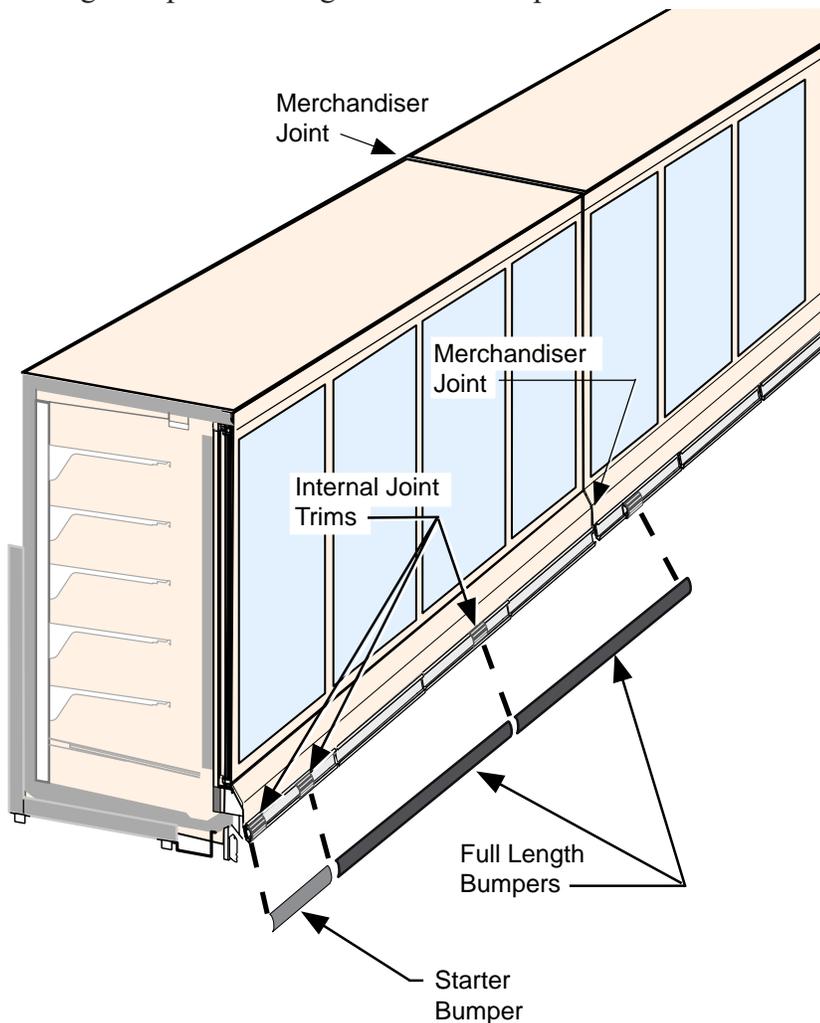
Remove protective film from bumpers once installation is complete.

Optional end bumpers are factory-installed.

START UP / OPERATION

EXPANSION VALVE ADJUSTMENT

Expansion valves must be adjusted to fully feed the evaporator. Before attempting to adjust valves, make sure the evaporator is either clear or only lightly covered with frost, and that the merchandiser is within 10 deg F (6.5 deg C) of its expected operating temperature. Adjust valves as follows:

Method 1 (recommended): Attach a sensing probe (either thermocouple of thermistor) to the evaporator outlet, under the clamp holding the expansion valve bulb. Attach a pressure probe to the access valve on the suction line. Measure superheat by subtracting the saturation temperature at the measured pressure from the measured outlet temperature. Method 2: Attach two sensing probes.

Note:
When using high glide refrigerants (e.g., R-407A, R-448A), use the evaporator pressure and subtract the dew point from the coil outlet refrigerant temperature to measure the superheat level.

Attach two sensing probes (either thermocouple or thermistor) to the evaporator. Position one under the clamp holding the expansion valve bulb; securely tape the other to the coil inlet line.

Some "hunting" of the expansion valve is normal. The valve should be adjusted so that during the hunting THE GREATEST DIFFERENCE BETWEEN THE TWO PROBES IS 3–5 deg F (1.7–2.8 deg C). With this adjustment, during a portion of the hunting the temperature difference between the probes will be less than 3 deg F (1.7 deg C) and at times 0.

Make adjustments of no more than $1/4$ turn for Balanced Port TEV and $1/2$ turn at a time for other valve models. Wait at least 15 minutes before rechecking the probe temperature or making further adjustments.

Check Valve

Optional Gas Bypass

Heat Exchanger body

Expansion Valve

Expansion Valve Bulb

Component Location in RL / RM / RLN / RLNI Models

Manifold

Thermostat
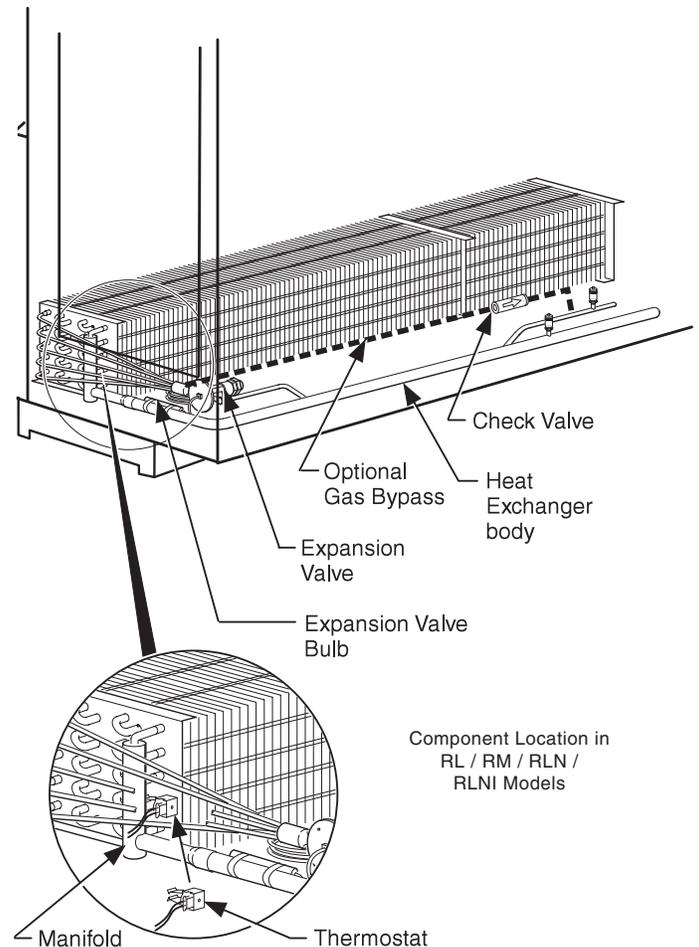
⚠ **WARNING**

Start up should be performed
only by a qualified technician.

PRIOR TO START UP CHECKLIST

• Is the case connected to a power supply as
specified on the nameplate?

• Is the power on at the breaker panel?

• Are the doors properly torqued? Are they
self closing? Check each door from a fully
open position and from about a 1-inch open
positions.

• Are the evaporator fans plugged in? Do they
rotate freely? (The fans can be inspected by
lifting the deck pans in the bottom of the
cases. Manually rotate each fan to confirm
it is free and visually inspect to confirm that
each fan is plugged into its receptacle.)

• Verify that refrigeration line shutoff valves
are in the back-seated (open) position.

START UP CHECKLIST

• Once the case is considered ready for start up,
move the main switch.
This main switch is located at the rear of the
wireway on the top, left side of the case.
This toggle switch turns on the power to
the condensing unit, and all case electrical
components, including anti-sweat heaters,
lights and fans.

• Check the reading on the display; it should
be displaying the case temperature. The
display is located in the center of the front
of the facade above the doors. The displayed
temperature will show the merchandiser's
discharge air temperature.

• Listen for any unusual sounds or events. For
example: evaporator fan blade interference,
compressor trip on overload, or high head
due to excessive ambient temperature, circuit
breaker trip, etc.

• Check the fan at each door to ensure all
fans are running. The discharge air output
at the top inside front of the case should be
relatively even across the length of the case
(honeycomb area).

**Excessive ambient conditions may cause
condensation and therefore sweating of doors.**

**Facility operators should monitor doors and floor
conditions to ensure safety of persons.**

DEFROST

Defrost will occur 24 hours after switching the disconnect switch to the ON position, then back on again 24 hours before the desired defrost time. Defrost can be set to any time desired by switching the unit off, then back on again, 24 hours before the desired defrost time. "Df" is displayed on the display during defrost. It will show the discharge air temperature when the evaporator coil has returned back to stabilized operating temperature.

During defrost, the condensate pump will pump defrost water to the condensate pan located at the top of the merchandiser. On low temperature cases, the fans shut off during defrost, and electric defrost heaters energize to melt the frost off the evaporator coil. Defrost terminates when the evaporator coil reaches approximately 48 °F. On medium temperature cases, the fans runs continuously, there are no defrost heaters, and defrost is time-terminated after 60 minutes.

CONTROL SETTINGS AND OPERATION

These instructions are written for normal frozen food, ice cream, or medium temperature application, and provide optimum settings for normal store conditions. There is also a chart that shows low temp. and medium temp. Freedom settings.

CHECKLIST AFTER 12 HOUR RUN TIME

• Check case temperature.

• Verify that the fans are running. (The fans will be off if the case is in a defrost cycle. They will come back on after the completion of this cycle.)

• Initiate a defrost cycle and ensure the heaters are working properly. See the controller instructions for how to force a defrost cycle. Check the amp draw at the terminal block, located in the front electrical raceway, just below the right most door of the case.

• Check the door operation again, to ensure they close properly once the case is down to operating temperature.

• Are all inspection plates and covers properly replaced?

• Inspect for any water accumulation resulting from incorrect or unsealed penetrations where electrical or other lines pass through the case insulated walls.

• Check that the lights come on when the light switch is in the *on* position.

• Check that the condensate pump and condensate fan turns on. Condensate pump pumps water to the condensate pan during defrost Check to ensure there are no leaks. The pump will be on for only a few seconds. If pump or condensing pan does not energize, GFCI may need to be reset.

• See the merchandiser's Data Sheet Set for refrigerant settings and defrost requirements. Bring merchandisers down to the operating temperatures listed on the data sheet.

LOAD LIMITS

Shelf life of perishables will be short if load limit is violated. **AT NO TIME SHOULD MERCHANDISERS BE STOCKED BEYOND THE LOAD LIMITS INDICATED.**

CASE LOAD LIMIT

Do not stock product past load limits.
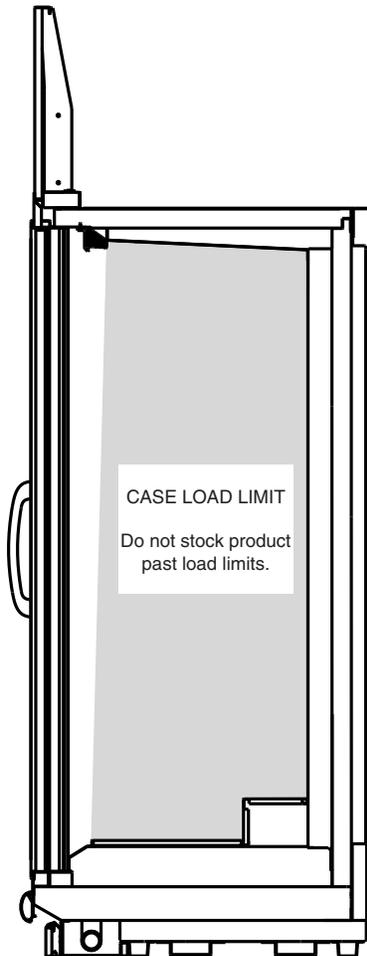
⚠ **CAUTION**

**Do not store items or flammable materials atop the unit.
Do not walk on case.**

STOCKING

Product should NOT be placed in merchandisers until all refrigeration controls have been adjusted and merchandisers are at proper operating temperature.

All shelves and the lower deck are intended to display product. Shelf height is adjustable in one inch increments. Spacing of 12 inches is recommended for most applications. Maximum load per shelf is 170 pounds. Merchandisers may be ordered with optional "L" shaped wire shelves. Proper rotation of product during stocking is necessary to prevent product loss. Always bring the oldest product to the front and set the newest to the back.

AIR DISCHARGE AND RETURN FLUES MUST REMAIN OPEN AND FREE OF OBSTRUCTION AT ALL TIMES to provide proper refrigeration and air curtain performance. Do not allow product, packages, signs, etc. to block these grilles. Do not use non-approved shelving, baskets, display racks, or any accessory that could hamper air curtain performance.

Do not prop doors open while stocking. And keep the doors closed as much as possible to prevent coil frosting and high merchandiser temperature.

INSTALLING FDA/NSF REQUIRED THERMOMETER

The following pages provide the same information that ships with the thermometer. This requirement does not apply to display refrigerators intended for bulk produce (refer to Page 1-1).

Please note that the tape cannot be exposed after installation.

This is an NSF-7 & US FDA Food Code Required Thermometer
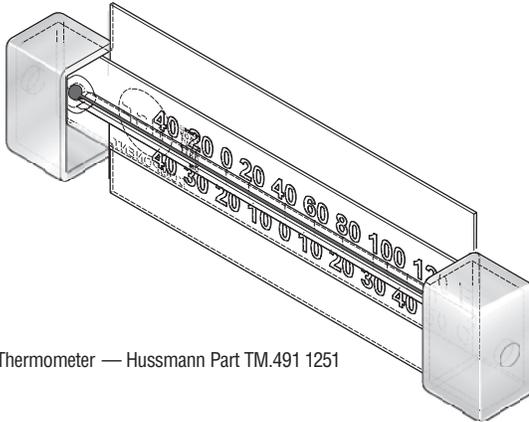
Thermometer — Hussmann Part TM.491 1251

Hussmann Corporation • 12999 St. Charles Rock Road • Bridgeton, MO 63044-2483
U.S. & Canada 1-800-922-1919 • Mexico 1-800-890-2900 • www.hussmann.com
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Suggested Mounting Locations in Single Deck Glass Front Merchandisers

— Acrylic Package Guard, Facing Out

Double Stick Tape
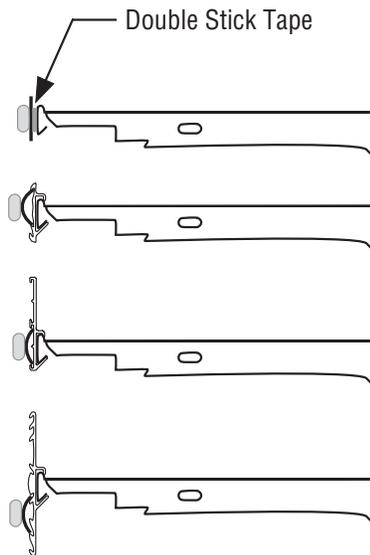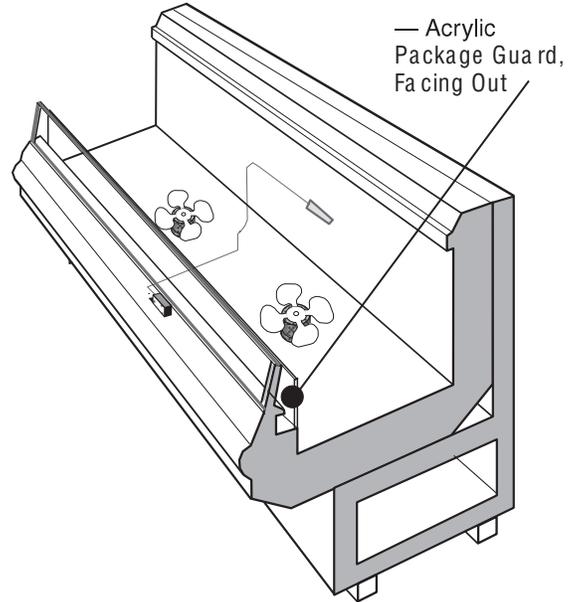
Flexible Plastic Fits in Price Tag Moldings

Hussmann   P/N 0429971_C   10/2007

— Inside End Panel

— Shelf Price Tag Molding

— Return Air Grille
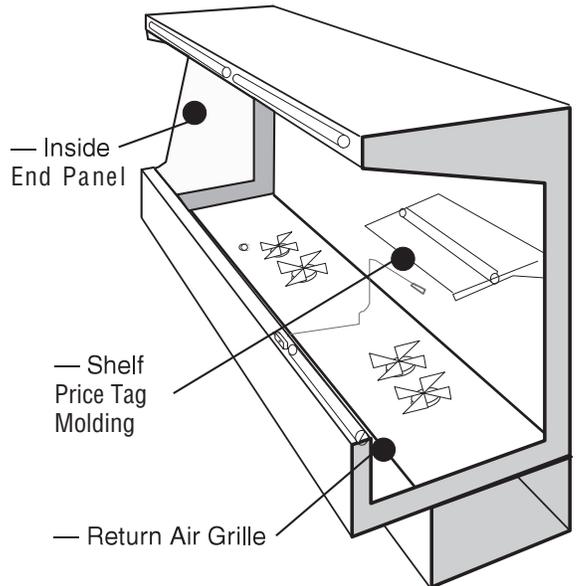
Suggested Mounting Locations in Multi-deck Merchandisers

Important – Please read!

**This thermometer is provided in response to United States
Food and Drug Administration (US FDA) Food Code [http://www.fda.gov/]
and
National Sanitation Foundation (NSF / ANSI) Standard 7 [http://www.nsf.org/]**

Each installation will be different depending on how the unit is stocked, shopping patterns in the department and ambient conditions of the store. The suggested locations provided herein are possible locations. It is the responsibility of the purchaser / user to determine the location with the food storage area of the unit that best meets the code requirements above.

The thermometer may need to be moved several times to find the warmest location. Mounting options include flexible plastic for price tag molding application, magnet applied to back of flexible plastic for steel end wall, and double stick tape. Tape must not be exposed after installation.

Questions about either code should be addressed to local agencies or other appropriate officials.

Keep with merchandiser
or give to store manager.

DO NOT DESTROY.

MAINTENANCE

CARE AND CLEANING

Long life and satisfactory performance of any equipment is dependent upon the care it receives. To ensure long life, proper sanitation and minimum maintenance costs, these merchandisers should be thoroughly cleaned, all debris removed and the interiors washed down, weekly.

Always*Clear™ Glass
Wipe inside of glass with isopropyl alcohol and a soft cloth. Allow surface to dry before closing door. Use of other cleaners or abrasives may damage the Always*Clear surface, and/or void the warranty. Refer to manual that ships with doors.

Exterior Surfaces
The exterior surfaces should be cleaned with a mild detergent and warm water to protect and maintain their attractive finish. NEVER USE ABRASIVE CLEANSERS OR SCOURING PADS.

Interior Surfaces
The interior surfaces may be cleaned with most domestic detergents, ammonia based cleaners and sanitizing solutions with no harm to the surface.

DO NOT USE:

• Abrasive cleansers and scouring pads, as these will mar the finish.
• Solvent, oil or acidic based cleaners on any interior surfaces.
• Ammonia based cleaners on acrylic surfaces.

⚠ **WARNING**

Do NOT allow cleaning agent or cloth to contact food product. Product will be degraded and may spoil if allowed to sit in a non-refrigerated area.

Do:
• Remove the product and all loose debris to avoid clogging the waste outlet.

• Store product in a refrigerated area such as a freezer. Remove only as much product as can be taken to the freezer in a timely manner.

• **First turn off refrigeration, then disconnect electrical power.**

• Thoroughly clean all surfaces with soap and hot water. DO NOT USE STEAM OR HIGH WATER PRESSURE HOSES TO WASH THE INTERIOR. THESE WILL DESTROY THE MERCHANDISERS' SEALING CAUSING LEAKS AND POOR PERFORMANCE.

• Remove screws and lift hinged fan plenum for cleaning. BE SURE TO REPOSITION THE FAN PLENUM AFTER CLEANING MERCHANDISER.

• Take care to minimize direct contact between fan motors and cleaning or rinse water.

• Allow merchandisers to dry before resuming operation.

• After cleaning is completed, turn on power and refrigerant to the merchandiser.

• Verify that merchandiser is working properly.

⚠ **WARNING**

Do NOT use HOT water on COLD glass surfaces. This can cause the glass to shatter and could result in personal injury. Allow glass doors to warm before applying hot water.

Fan Plenum

To facilitate cleaning, the fan plenum is hinged and also fastened with screws at each end. After cleaning be sure the plenum is properly lowered into position and that screws are reinstalled OR PRODUCT LOSS WILL RESULT due to improper refrigeration.

SHUT FANS OFF DURING CLEANING PROCESS.

CLEANING CONDENSATE PAN FLOAT SWITCH

Shut off power. Remove the condensate pan cover. Remove the bracket that holds the float switch in place. Remove the float switch cover. Pull out the screen to clean. Also clean inside of float switch with warm water. Use warm water to clean the screen.

DRAIN TEE REF
BUSHING-REDUCER 1 1/4 X 1 IN
FITTING-1" MALE THREADED BARBED TUBE ADAPTER
TUBING-PVC CLEAR FLEX ID .750 X 1.000 OD
CLIP JIFFY FOR 3/4 OD
CLAMP HOSE

CONDENSATE RESERVOIR COVER
NOT SHOWN FOR CLARITY

PLUG INTO DATA PORT ON THE PUMP
PAN-CONDENSATE RESERVOIR

SUMP-UNIT DETECTION POSITION AS SHOWN WITH VENT STUB THROUGH THE HOLE IN BRACKET
BRACKET-SUMP
CONNECT SUMP UNIT TO PUMP USING PROVIDED 0551020 TUBING
SECURE PUMP TO BRACKET USING 0551228 SCREW
INSTALL PUMP GUARD WITH THE PUMP
SEE DETAIL B
SECURE 0543836 TUBING TO THE OUTPUT OF PUMP USING CLAMP-HOSE 1/4 TO 5/8 0529081000

DETAIL A

PUMP-MAXI ORANGE

BRACKET-HANDY BOX PLACEMENT ON BACK OF HANDY BOX DEPENDENT ON WHICH SIDE PVC CONNECTOR IS MOUNTED

CONNECTOR PVC ST .375 SNAP (5 DOOR ONLY)
CONNECTOR PVC 90 .375 SNAP (3 & 4 DOOR)

CABLE-ASPEN POWER 0551019
COVER-HANDY BOX
BOX-HANDY

CONDUIT PVC X-FLEX .375 ROUTED ALONG BOTTOM FOAM ASSY AND UP THE REAR FOAM PANELS TO TOP OF CASE AND INTO

RACEWAY

CLEANING CONDENSATE PUMP AND HEATED EVAPORATION PANS

ALWAYS DISCONNECT POWER AT THE MAIN CASE DISCONNECT BEFORE SERVICING THE EQUIPMENT.

•   The condensate water outlet for the Freedom case models empties into a limited capacity evaporation pan.

•   Clean product spills immediately. If a product spill enters the Condensate Pump or Heated Evaporation Pans, a maintenance technician may be required to clean both the pump and heated pans.

•   Clean case interior with a sponge or soft cloth, wetted with mild soap and water. Do not pour water from a bucket or hose into case drain. Water introduced during cleaning will cause the evaporation pan to overflow.

•   Sediment and debris will clog the Condensate Pump and plastic tubing for water delivery to the Heated Evaporation Pans.

•   The Condensate Pump and the Heated Evaporation Pans require regular monthly inspection. The Condensate Pump is located below the case bottom. The Heated Evaporation Pans are located on the case top. Evidence of excess water or odor is an indication that immediate service is required.

•   Recommended cleaning the Condensate Pump reservoir and Heated Evaporation Pans is with mild soap and water. Disconnect power before cleaning. Empty pump sump and heater pans of water before reapplying power.

•   If using the optional Defrost Synchronization controls, the Master Sync Switch needs to be reset by the maintenance technician after re-applying electrical power to case.

⚠ **WARNING**

— LOCK OUT / TAG OUT —
To avoid serious injury or death from electrical shock, always disconnect the electrical power at the main disconnect when servicing or replacing any electrical component. This includes, but is not limited to, such items as doors, lights, fans, heaters, and thermostats.

⚠ **WARNING**

Evaporation Pan is Hot!
and poses risk of bodily injury — Always wear gloves and protective eye wear when servicing condensate pump and heated evaporation pans. Turn off evaporation pan heater, and allow pan to cool before servicing.

CLEANING HONEYCOMB ASSEMBLIES

Honeycombs should be cleaned every six months. Dirty honeycombs will cause merchandisers to perform poorly. The honeycombs may be cleaned with a vacuum cleaner. Soap and water may be used if all water is removed from the honeycomb cells before reassembling. Be careful not to damage the honeycombs.

1. Remove the sheet metal screws located in the front metal retainer which holds the honeycomb assembly in place.
2. Lift the honeycomb assembly out of the L-bracket to remove it.
3. Clean and dry the honeycomb.
4. After cleaning, reassemble in reverse order of removal.

CLEANING STAINLESS STEEL SURFACES

Use non-abrasive cleaning materials, and always polish with grain of the steel. Use warm water or add a mild detergent to the water and apply with a cloth. Always wipe rails dry after wetting.

Use alkaline chlorinated or non-chlorine containing cleaners such as window cleaners and mild detergents. Do not use cleaners containing salts as this may cause pitting and rusting of the stainless steel finish. Do not use bleach.

Clean frequently to avoid build-up of hard, stubborn stains. A stainless steel cleaning solution may be used periodically to minimize scratching and remove stains. Rinse and wipe dry immediately after cleaning. Never use hydrochloric acid (muriatic acid) on stainless steel.

CLEANING COILS

NEVER USE SHARP OBJECTS AROUND COILS. **Use a soft brush or vacuum brush to clean debris from coils.** *Do not puncture coils!* Do not bend fins. Contact an authorized service technician if a coil is punctured, cracked, or otherwise damaged.

ICE in or on the coil indicates the refrigeration and defrost cycle is not operating properly. Contact an authorized service technician to determine the cause of icing, and to make adjustments as necessary. To maintain product integrity, move all product to a cooler until the unit has returned to normal operating temperatures.

CLEANING UNDER MERCHANDISERS

Remove splashguards not sealed to floor. Use a vacuum with a long wand attachment to remove accumulated dust and debris from under the merchandiser. Excessive ambient conditions may cause condensation and therefore sweating of doors. Facility operators should monitor doors and floor conditions to ensure safety of persons.

REMOVING SCRATCHES FROM BUMPER

Most scratches and dings can be removed using the following procedure.

1. Use steel wool to smooth out the surface area of the bumper or top rail.

2. Clean area.

3. Apply vinyl or car wax and polish surface for a smooth glossy finish.

Minimum Suggested Cleaning and Maintenance Frequency
with Separate TOP-MOUNTED Condensing Unit*

Case Component	Type of Scheduled Maintenance	Maintenance Frequency (Times / Year)*	Average Maintenance Duration (hours)*	Total Estimated Maintenance Time/Year (hours)
Evaporator Coil / Case Interior	Cleaning	1	2	2
Honeycomb	Cleaning	1	0.05	0.05
Return Air Grille	Cleaning	12	0.1	1.2
Drip Piping	Cleaning	6	0.1	0.6
Condenser Coil	Cleaning	4	0.1	0.4
Condensate Evaporation Pan	Cleaning	4	0.2	0.8
Condensate Evaporation Pan Heater	None	N/A	N/A	N/A
Condensate Pump	Cleaning	6	0.05	0.03
Compressor	None	N/A	N/A	N/A
Electromechanical Thermostats	Replacement	0.2	1	0.2
Compressor Power Relays	Replacement	0.2	1	0.2

*This table is provided for reference only. The suggested maintenance frequency is the minimum required to reduce unexpected equipment failure. Performance and efficiency may be enhanced with more frequent cleaning. Individual cleaning schedules must take into account local environment and usage, as well as all applicable health codes.

NOTES:

SERVICE

## REPLACING FAN MOTORS AND BLADES

For access to these fans:

1. Turn off power.

2. Remove bottom display pans.

3. Disconnect fan from wiring harness.

4. Remove fan blade.

5. Lift fan plenum and remove screws holding bottom of motor to fan basket.

6. Replace fan motor and blade.

7. Lower fan plenum.

8. Reconnect fan to wiring harness.

9. Turn on power.

10. Verify that motor is working and blade is turning in the correct direction.

11. Close large air gaps under fan plenum. Warmer air moving into refrigerated air reduces effective cooling. If the plenum does not rest against the case bottom without gaps, apply foam tape to the bottom of the fan plenum to reduce improper air movement, however defrost water should not be blocked by fan plenum. Do NOT seal fan plenum so that water can not drain.

12. Replace display pans. Bring merchandiser to operating temperature before restocking.

⚠ **WARNING**

Always disconnect the electrical power at the main disconnect when servicing or replacing any electrical component. This includes, but is not limited to, such items as fans, heaters, thermostats and lights.

Fan Assembly

⚠ **WARNING**

Product will be degraded and may spoil if allowed to sit in a non-refrigerated area.

Hussmann recommends against frame heater cycling with *Innovator* doors to prevent door seals from freezing to the frames and tearing.

⚠ WARNING
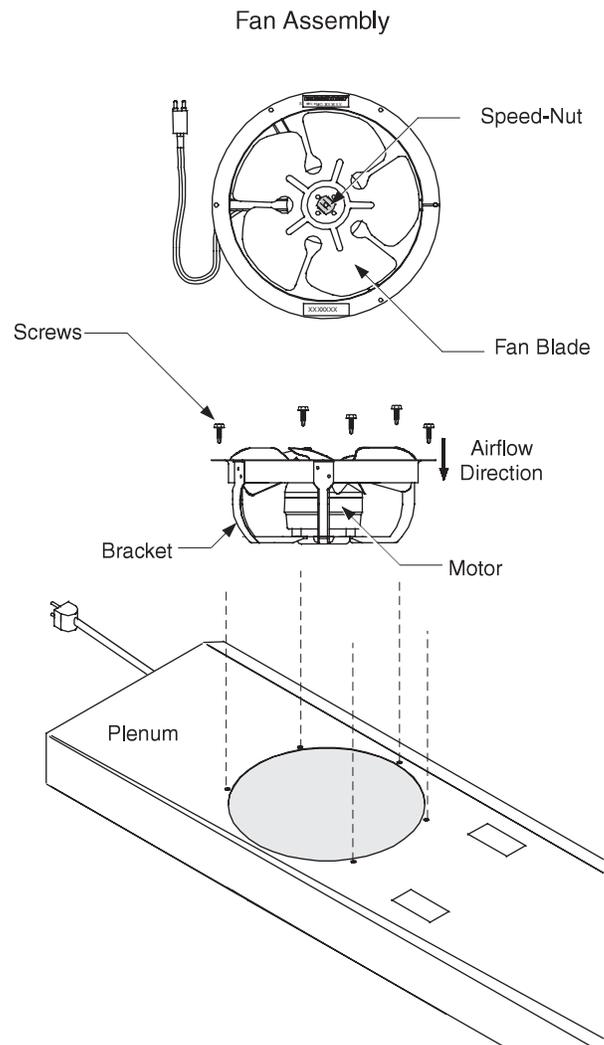
Product will be degraded and may spoil if allowed to sit in a non-refrigerated area.

REPLACING ELECTRIC DEFROST HEATERS

Electric defrost requires a heater on the front and rear of the coil as shown. The heaters are held in place by tabs in the coil brackets.

Defrost Heater

1. Disconnect power.

2. Remove deck pans.

3. Take out screws (qty 2) securing the side coil covers to coil baffles.

4. Slide the coil forward to gain access to rear heater.

5. Remove clips holding heater to coil tube.

6. Remove heater from slots in coil bracket.

7. Position new heater in slots and replace clips

8. Slide coil back to original position and replace the securing screws.

9. Turn on power.

10. Verify the heater is working correctly.

11. Replace display pans. Bring merchandiser to operating temperature before restocking.

Electric Defrost

Bend Tabs on Each Bracket to Release or Secure Heaters
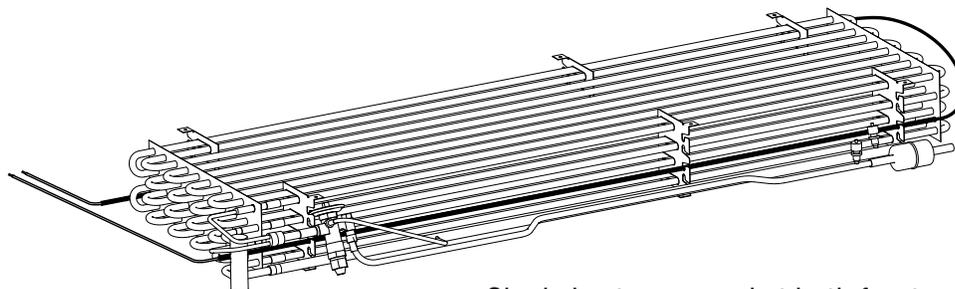
Single heater secured at both front and back of coil

REPLACING DRAIN PAN HEATER — ELECTRIC AND GAS DEFROST (Low Temperature Only)

The drain pan heater is located as shown below.

Remove Drain Pan Heater

1. Disconnect power.
2. Pull heater out from under retainer clips.
3. Position new heater under retainer clips. Be sure offset is properly positioned around the drain.
4. Reconnect power.
5. Verify that heater is working correctly.
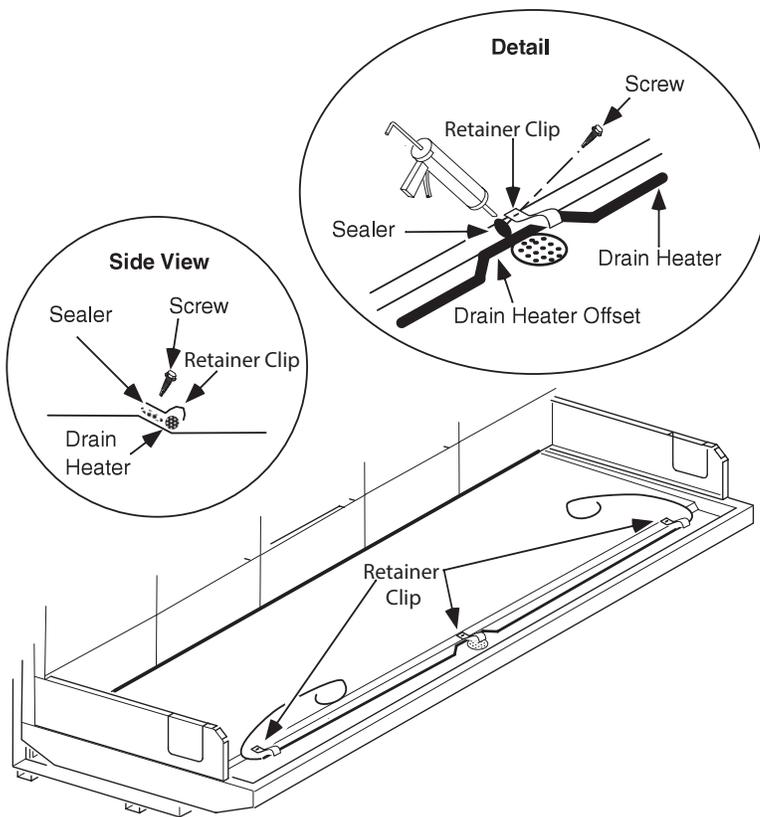
REPLACING DAMAGED DRAIN FITTING (OPTIONAL)

The following procedure is for the field repair of a broken drain fitting.

1. Use a drill with a $1\,^7/_8$-inch (48 mm) hole saw to drill out the bottom of the drain fitting. Be sure to drill completely through fitting and bottom liner.
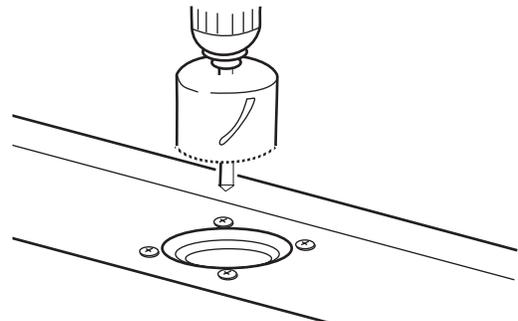
Drain Fitting Viewed from Inside Case

2. Insert adapter into drain fitting. **Do NOT use thread sealer on ABS drain fitting. If sealer is used the ABS drain fitting may crack or leak!** (Tee should be tightened no more than 4 turns.) Do not overtighten threads.
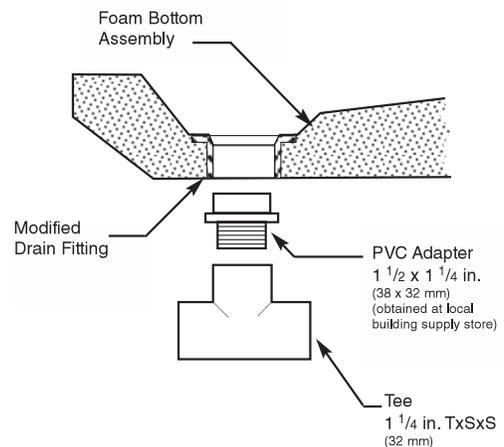
Do NOT use Thread Sealer on Drain Fitting!

End Section View

REPAIRING ALUMINUM COIL

The aluminum coils used in Hussmann merchandisers may be easily repaired in the field. Materials are available from local refrigeration wholesalers.

Hussmann recommends the following solders and technique:

Solders

    Aladdin Welding Products Inc.
        P.O. Box 7188
        1300 Burton St.
        Grand Rapids, MI 49507
            Phone: 1-800-645-3413
            Fax: 1-800-645-3414

    X-Ergon
        1570 E. Northgate
        P.O. Box 2102
        Irving, TX 75062
            Phone: 1-800-527-9916

NOTE:
Hussmann Aluminum melts at1125°F (607°C)

Aladdin 3-in-1 rod at   732°F (389°C)

X-Ergon Acid core at   455°F (235°C)

⚠ WARNING

Always disconnect the electrical power at the main disconnect when servicing or replacing any electrical component. This includes, but is not limited to, such items as fans, heaters, thermostats and lights.

Technique:

1. Locate Leak.

2. REMOVE ALL PRESSURE.

3. Brush area UNDER HEAT.

4. Use PRESTOLITE TORCH ONLY. Number 6 tip.

5. Maintain separate set of stainless steel brushes and USE ONLY ON ALUMINUM.

6. Tin surface around area.

7. Brush tinned surface UNDER HEAT, thoroughly filling the open pores around leak.

8. Repair leak. Let aluminum melt solder, NOT the torch.

9. Don't repair for looks. Go for thickness.

10. Perform a leak check.

11. Wash with water.

12. Cover with a good flexible sealant.

OPTIONAL DRIP PIPING

WASTE OUTLET AND WATER SEAL

Drip piping must be installed for cases without evaporation pans. Drip piping is located between the front merchandiser base and the splashguard fixture and runs parallel to the merchandiser (see Data Sheet for exact locations).

CAUTION

Splashguard *brackets* MUST be installed before piping merchandiser.

INSTALLING DRIP PIPING

Poorly or improperly installed drip pipes can seriously interfere with the merchandiser's operation and result in costly maintenance and product losses. Please follow the recommendations listed below when installing drip pipes to ensure proper installation.

*   Never use drip piping smaller than the nominal diameter of the pipe or water seal supplied with the merchandiser.

*   When connecting drip piping, the *water seal* must be used as part of the drip piping to prevent air leakage or insect entrance. Never use two water seals in series in any one drip pipe. **DOUBLE WATER SEALS IN SERIES WILL CAUSE AN AIR LOCK AND PREVENT DRAINING.**

*   Pitch the drip piping in the direction of flow. There should be a minimum pitch of 1/4 in. per ft (20 mm per 1 m).

*   Avoid long runs of drip piping. Long runs make it impossible to provide the pitch necessary for good drainage.

*   Provide a suitable air break between flood rim of the floor drain and outlet of drip pipe. To meet code on low base merchandisers, it may be necessary to install a field-supplied drip pipe reducer. An alternative is to cut the last section of drip pipe at an angle.

*   Prevent drip pipes from freezing sweating or freezing:

    A. Do NOT install drip pipes in contact with uninsulated suction lines. Suction lines should be insulated with a non-absorbent insulation material.

    B. Where drip pipes are located in dead air spaces, such as between merchandisers or between a merchandiser and a store wall, provide means to prevent drip pipe from sweating. External ventilation fans may be required to prevent sweating.

Field-Installed Drip Piping

Merchandiser Bottom

Waste Outlet (Drain Fitting)

Factory Installed (four turns)

TEE-SIDE

Field-Installed Plug

Field-Installed Coupling

Field-Installed Water Seal

Approx. ¹/₂in. Clearance to Floor

Field-Installed Adapter

Factory-Installed Tee Fitting

Do NOT use Thread Sealer on Drain Fitting!
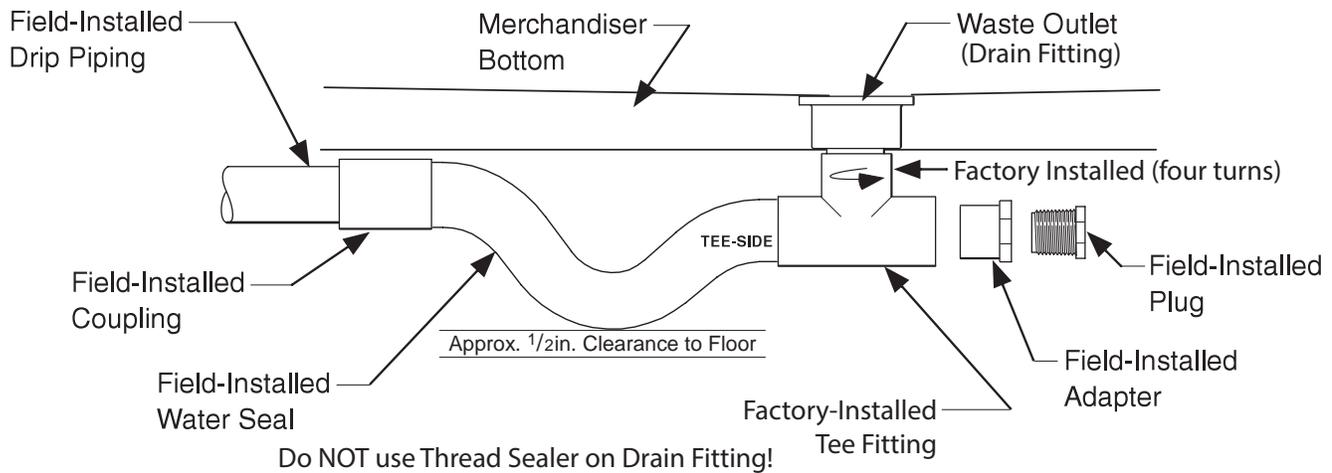
1. Tee is factory-installed. If adjustment is necessary, tighten factory-installed tee no more than **¼** turn. Do not overtighten threads, or the drain fitting or tee may become damaged.

2. **Do NOT use thread sealer on ABS drain fitting. If sealer is used the ABS drain fitting may crack or leak!** (If a tee needs to be installed it should be tightened no more than 4 turns.) Do not overtighten threads.

3. Dry fit the supplied water seal / trap to ensure approximately ¹/₂ in. of clearance from the bottom of the trap to the floor as shown.

NOTE: It may be necessary to rotate water seal (trap) inside the tee a few degrees to ensure clearance at two locations. There must be clearance 1) between the bottom of the water seal and the floor, and 2) between the top of the water seal outlet and the bottom of the merchandiser. Do not over-rotate or gravity seal may be compromised. Always rotate trap bottom toward merchandiser support rail.

Front of Merchandiser

Merchandiser Bottom

Waste Outlet

Maintain Clearance to Bottom of Case

Rotate Water Seal towards back of Merchandiser if required

Field-Installed Water Seal

Floor

1/2 in. Clearance to Floor
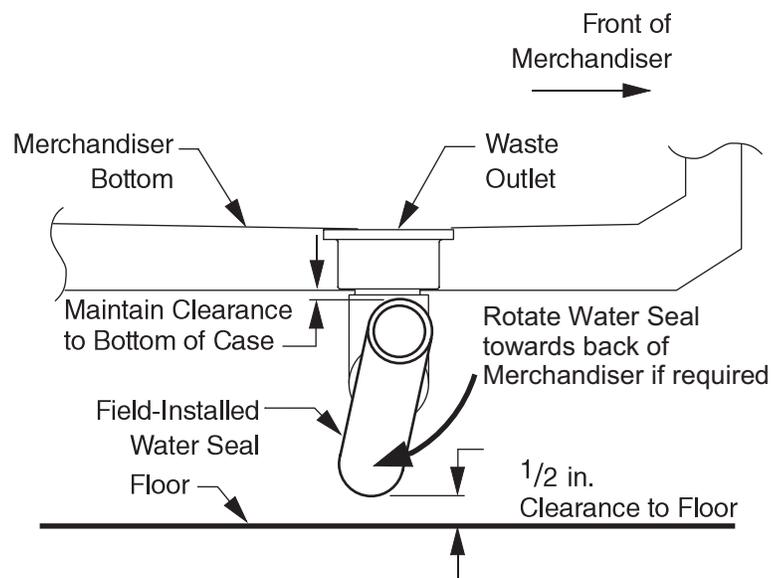
4. Install remaining PVC drain parts using recommended PVC cleaner, primer and cement per manufacturer's recommendations.

5. Thread plug into the adapter until snug but not to exceed four full rotations.

6. Installed drip piping may require additional support depending on the number and location of the hub floor drains. The installer should always provide adequate support to all drip piping arrangements to prevent excess stress on all drip piping components. The installer must provide additional support when "evac" type waste water systems are applied.

> **It is the installing contractor's responsibility to consult local agencies for local code requirements.**
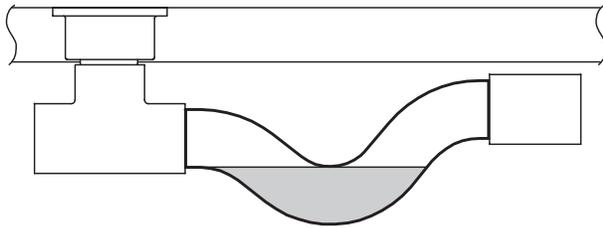
Water Seal
Correct
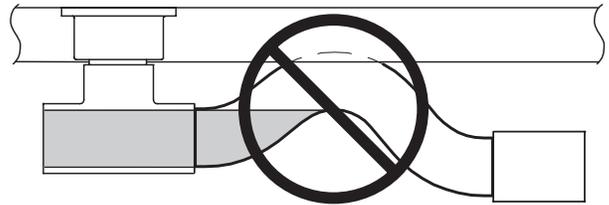
Water Seal
NOT Correct

Electronic Unit Controller

TABLE OF CONTENTS

Application Engineering

Copeland®
brand products

B U L L E T I N

EMERSON
Climate Technologies

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Safety Instructions

Copeland™ brand products are manufactured according to the latest U.S. and European Safety Standards. Particular emphasis has been placed on the user's safety. Safety icons are explained below and safety instructions applicable to the products in this bulletin are grouped on Page 3. These instructions should be retained throughout the lifetime of the compressor. **You are strongly advised to follow these safety instructions.**

Safety Icon Explanation

⚠ **DANGER**   DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ **WARNING**   WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ **CAUTION**   CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE   NOTICE is used to address practices not related to personal injury.

CAUTION   CAUTION, without the safety alert symbol, is used to address practices not related to personal injury.

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Instructions Pertaining to Risk of Electrical Shock, Fire, or Injury to Persons

⚠ WARNING	**ELECTRICAL SHOCK HAZARD** • Disconnect and lock out power before servicing. • Allow drive components to electrically discharge for a minimum of two minutes before servicing. • Use compressor with grounded system only. • Molded electrical plug must be used in all applications. • Refer to original equipment wiring diagrams. • Electrical connections must be made by qualified electrical personnel. • Failure to follow these warnings could result in serious personal injury.
⚠ WARNING	**PRESSURIZED SYSTEM HAZARD** • System contains refrigerant and oil under pressure. • Remove refrigerant from both the high and low compressor side before removing compressor. • Use appropriate backup wrenches on rotalock fittings when servicing. • Never install a system and leave it unattended when it has no charge, a holding charge, or with the service valves closed without electrically locking out the system. • Use only approved refrigerants and refrigeration oils. • Personal safety equipment must be used. • Failure to follow these warnings could result in serious personal injury.
⚠ WARNING	**BURN HAZARD** • Do not touch the compressor until it has cooled down. • Ensure that materials and wiring do not touch high temperature areas of the compressor. • Use caution when brazing system components. • Personal safety equipment must be used. • Failure to follow these warnings could result in serious personal injury or property damage.
⚠ CAUTION	**COMPRESSOR HANDLING** • Use the appropriate lifting devices to move compressors. • Personal safety equipment must be used. • Failure to follow these warnings could result in personal injury or property damage.

Safety Statements

• Refrigerant compressors must be employed only for their intended use.
• Only qualified and authorized HVAC or refrigeration personnel are permitted to install, commission and maintain this equipment.
• Electrical connections must be made by qualified electrical personnel.
• All valid standards and codes for installing, servicing, and maintaining electrical and refrigeration equipment must be observed.

1. Introduction and Features

Using the Electronic Unit Controller with Copeland™ brand condensing units will provide many benefits to the contractor and end-user. It has been designed specifically for demanding refrigeration applications to ensure precision in installation and operation. While the Electronic Unit Controller will replace existing adjustable low-pressure controls, fan cycle switches, and other relays, it also has additional features. These features include bump start (where applicable), data storage, and short cycling protection. This controller does NOT replace the fixed high-pressure control required by UL.

The Electronic Unit Controller can be used on any condensing unit application with the appropriate sensors and relays that will be factory installed on the condensing unit. This document will explain how Electronic Unit Controllers affect the installation process and how they can assist in troubleshooting.

Factory-installed controllers are pre-programmed with the proper settings, resulting in little to no setup time. The unit comes with an attached label showing how to adjust the low pressure cut-in and cut-out (See **Figure 1**).

There is a label on the inside of the enclosure which will list all of the factory default settings for the controller (including those not adjustable), a basic controller wiring schematic, basic button descriptions, the controller part number, the pre-loaded program part number, and contact information (See **Figure 2**). This information can be used if a service replacement controller is needed.
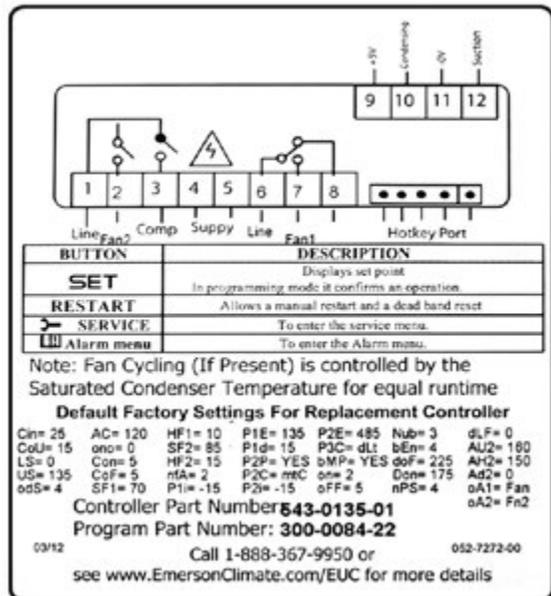

Figure 1

Figure 2 example

1.1 Technical Specifications

Mounting: Panel mounting in a 71x29mm panel cut-out

Controller IP Rating: IP20

Front Panel IP rating: IP65

Power supply: 208/230Vac ±10%, 50/60Hz
                       120Vac ±10%, 50/60Hz

Power absorption: 3VA max

Relay outputs:

    Compressor Relay: 250VAC, 16A FLA, 96A LRA

    Fan Relay 1: 250VAC, 4.9 FLA, 29.4 LRA

    Fan Relay 2: 250VAC, 1.9 FLA. 11.4 LRA

    SPECIAL NOTE: EUC FAN CYCLING RELAYS ARE NOT APPROVED FOR USE WITH ECM MOTORS

Data storage: Non-volatile memory (EEPROM).

Rated impulsive voltage: 2500V; Overvoltage Category: II

Factory Installed Operating Range: -40 – 120°F Ambient

Non-Factory Installed Operating Range: -4 to 120°F Ambient

1.2 Pressure Probe Error Bypass

In the event where suction pressure rises above the controller's maximum value of 135 PSIG (this frequently happens during cleaning cycles or other off-cycle conditions), the controller will enter a pressure probe bypass mode during startup to allow the system to stabilize pressures. The controller will flash "135" on the display and the compressor will run continuously unless stopped by a high-pressure or temperature control. If suction pressure remains above 135 PSIG for more than 15 minutes, the controller will flash "P1" on the display and cycle the compressor on and off according to the time set with the "Con" and "Cof" parameters. These are set to 5 minutes by default and can be adjusted in the Advanced Options Menu (See **Section 2.6**).

1.3 Bump Start

Bump start is an optional feature which provides additional flooded start protection. Bump start drives refrigerant out of the oil, preventing the refrigerant from circulating through the compressor as a liquid and washing the oil film off of the load-bearing surfaces.

When bump start is enabled, the compressor is turned on for 2 seconds, then turned off for 5 seconds. This occurs 3 times before the compressor runs normally. This allows refrigerant to exit the compressor without the oil being removed.

Bump start can be turned on in the Advanced Options Menu by changing "bNP" to "Y" (See **Section 2.6**).

2. Installation and Controller Operation Instructions

2.1 Condensing Unit Installation Instructions

Customer connections will not change, and in most cases, wiring to the unit will not change either. See **Section 6** for more information.

If the unit trips on low pressure during charging, the low pressure cut-out can be lowered to allow it to run. Be sure to adjust it back to the proper application setting after charging. See the appropriate Application Engineering Bulletin.

2.2 Controller Display

The controller display is shown in **Figure 4**, below. **Table 1** provides a description of each of the labeled lights. The controller is defaulted to display the current suction pressure to three significant digits in pounds per square inch gage (PSIG).

Figure 4 -– Controller Display

Table 1 – LED Descriptions

LED	Mode	Function
🛢	ON	Compressor on
🛢	Flashing	Anti-short cycle delay enabled
✻1	ON	Fan 1 on
✻2	ON	Fan 2 on
PSI	ON	Pressures displayed in PSIG
PSI	Flashing	Programming mode
⌐	ON	Browsing service menu
📖	Flashing	New alarm indication
📖	ON	Browsing alarm menu
((!))	ON	An alarm is occurring

2.3 Button Descriptions and Key Combinations

Table 2 lists the different buttons on the controller (See **Figure 4**) and their functions. **Table 3** lists the different key combinations and their functions.

Table 2 – Button Descriptions

Button	Description
SET	Displays set point. In programming mode, it confirms an operation.
Start	When held for 3 seconds, it overrides cut-in value and starts compressor. When DLL or HPL lockout condition occurs, it resets lockout condition when held for 3 seconds 2 consecutive times (if temperatures or pressures exceed cut-out trip point values, pressing **Start** button will not clear the fault).
△ **(UP)**	Displays current condenser temperature. In programming mode, it browses parameters or increases the displayed parameter value.
▽ **(DOWN)**	Displays current discharge temperature. In programming mode, it browses parameters or decreases the displayed parameter value.
📖 **Alarm Menu**	Enters Alarm menu (See **Section 3**).
⌐ **SERVICE Menu**	Enters SERVICE menu (See **Section 4**).

Table 3 – Key Combinations

Key Combinations	
△ + ▽	Locks and unlocks the keypad.
SET + ▽	Enters programming mode.
SET + △	Returns to suction pressure display.

2.4 Viewing Temperature Readings

1. Press △ button to view condenser temperature.
2. Press ▽ button to view discharge temperate.

2.4.1 Viewing Setpoints

1. Press and immediately release **SET** button: the display will show the "Cin" message.
2. Press **SET** button to see the setpoint value.
3. Press and immediately release **SET** button: the display will show the "CoU" message.
4. Press **SET** button to see the setpoint value.

2.5 Changing a Parameter Value

To change a parameter value, do the following:

1. Hold down **SET** + ▽ keys for 3 seconds, or until the "PSI" LED starts blinking, to enter the Programming Menu.
2. Press △ or ▽ button to select the required parameter. Press **SET** button to display parameter value.
3. Press △ or ▽ button to change parameter value.
4. Press **SET** button to store the new parameter value.

TO EXIT: Press **SET** + △ keys or wait up to 30 seconds without pressing a button or key.

NOTE: The set value is stored, even when the procedure is exited, by waiting for the time-out to expire.

2.6 Entering the Advanced Options Menu

The Advanced Options Menu will be locked 5 minutes after the controller is powered. If access to the Advanced Options Menu is needed, cycle power to the controller.

1. Hold down **SET** + ▽ keys for 3 seconds, or until the "**PSI**" LED starts blinking, to enter the Programming Menu.

2. Release keys, then hold down **SET** + ▽ keys again for at least 7 seconds. The "PR2" label will be displayed immediately followed by the "Ci.n" parameter.

NOTE: THIS IS THE ADVANCE OPTIONS MENU.

3. Press △ or ▽ button to select the required parameter.
4. Press **SET** button to display parameter value.
5. Press △ or ▽ button to change parameter value.
6. Press **SET** button to store the new parameter value.

TO EXIT: Press **SET** + △ keys or wait up to 30 seconds without pressing a button or key.

NOTE: If no parameter is present in "PR1" after 3 seconds, the controller will display the "noP" message. Keep the keys pushed until the "PR2" message is displayed.

NOTE: The set value is stored, even when the procedure is exited, by waiting for the time-out to expire.

2.6.1 Moving Parameters between Programming Menu and Advanced Options Menu

While in the Advanced Options Menu, certain parameters will have a period between the 2nd and 3rd characters. For example: "Ci.n". These parameters are in both the Programming and Advanced Options menus.

To add or remove a parameter from the Programming Menu, do the following:

1. Enter the Advanced Options Menu and select the required parameter (See **Section 2.6, steps 1 through 3**).
2. With the required parameter displayed, press **SET** + ▽ keys.

NOTE: A period will be added or removed between the 2nd and 3rd characters of the selected parameter.

TO EXIT: Press **SET** + △ keys or wait up to 30 seconds without pressing a button or key.

2.6.2 Programming Using a Hotkey

Hotkeys can be used to store the user's custom parameters. To upload parameters to a hotkey, do the following:

1. Turn controller ON.

2. Ensure controller is programmed as desired.

3. Disconnect 5-pin harness from rear of controller (See **Figure 5**).

4. Insert hotkey into 5-pin receptacle on rear of controller (See **Figure 5**).

5. Press △ + 🔧 keys; controller will blink "uPl" and then display the "End" message.

6. Press **SET** button; "End" message will disappear.

7. Turn controller OFF.

8. Remove hotkey from rear of controller (See **Figure 5**).

9. Connect 5-pin harness to rear of controller (See **Figure 5**).

10. Turn controller ON.

NOTE: If controller displays an "Err" message, programming has failed. Repeat steps 1-9 to restart upload process. Remove hotkey to abort.

To program controller using a hotkey, do the following:

1. Turn controller OFF.

2. Disconnect 5-pin harness from rear of controller (See **Figure 5**).

3. Insert pre-programmed hotkey into 5-pin receptacle on rear of controller (See **Figure 5**).

4. Turn controller ON.

NOTE: The download is successful when the following happens:

> a. Controller blinks "dol" and displays "End." message.

> b. After 10 seconds, the controller goes back to the default display (suction pressure).

5. Remove hotkey from rear of controller (See **Figure 5**).

6. Connect 5-pin harness to rear of controller (See **Figure 5**).

NOTE: If controller displays an "Err" message, programming has failed. Cycle power to controller to restart download process. Remove hotkey to abort.
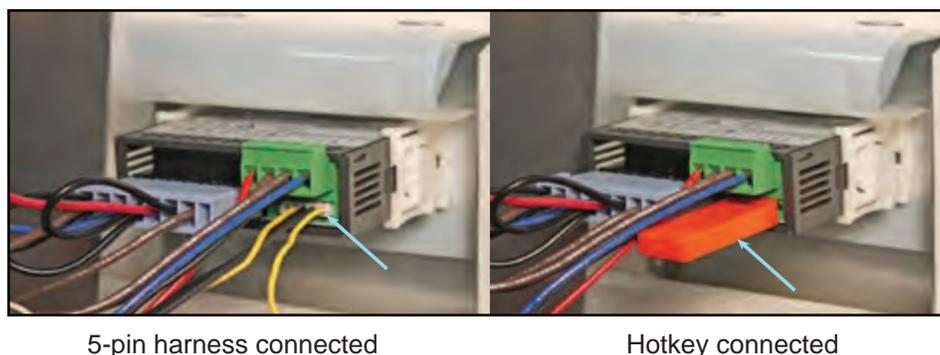

5-pin harness connected   Hotkey connected

Figure 5 – Programming Using a Hotkey

	Application Engineering	Copeland®
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2.7 Locking the Keypad

1.   Press △ + ▽ keys for more than 3 seconds.

NOTE: Controller will display "POF" message when keypad is locked. While keypad is locked, only set points can be viewed. If a key is pressed for more than 3 seconds, controller will display "POF" message.

2.8 Unlocking the Keypad

1.   Press △ + ▽ keys for more than 3 seconds, until controller displays "Pon" message.

2.9 Resetting Alarm and Runtime Counters

See **Sections 3** and **4** for more information on Alarm and Service menus. The Advanced Options Menu will be locked for 5 minutes after the controller is powered. If counters need to be reset during this time, cycle power to the controller.

1.   Hold down **SET** + ▽ keys for 3 seconds, or until the "**PSI**" LED starts blinking, to enter the Programming Menu.

2.   Release keys, then hold down **SET** + ▽ keys again for at least 7 seconds. The "PR2" label will be displayed immediately followed by the "Ci.n" parameter.

NOTE: THIS IS THE ADVANCED OPTIONS MENU.

3.   Press △ or ▽ button to select the required parameter, listed below:

rSA – Reset Alarm Counters (HP, dlt, and Loc)

rCA – Reset Compressor Starts Counters

rCH – Reset Compressor Run Hours Counters

rFH – Reset Fan Run Hours Counters

4.   Press **SET** button to display counter values.

5.   Press △ button to change "n" to "Y."

6.   Press **SET** button to store new value and reset counter.

7.   Repeat steps 3 through 6 to reset other counters.

3. Alarm Menu 📖

The controller records the activations of the following alarms in the Alarm menu:

•   High pressure trips (up to 999) – HP

•   High DLT temperature alarm (up to 999) – dlt

•   Total number of manual restarts (HPL and dLL) (up to 255) – Loc

To view alarm counters, do the following:

1.   Press and release the 📖 button; controller will display the "HP" label.

2.   With controller displaying the "HP" label, press **SET** button to see the number of high pressure trips.

3.   With controller displaying the "dlt" label, press **SET** button to see the number of DLT trips.

4.   With controller displaying the "Loc" label, press **SET** button to see the number of manual resets.

4. Service Menu ⚒

The controller stores the following values in the SERVICE menu:

•   **Number of compressor starts:**
StH (0-999; resolution 1,000);
StI (0-999; resolution 1) -
Example: If StH = 12 and StI = 500:
Total number of compressor starts = 12,500

•   **Compressor run hours:**
CHH (0-65; resolution 1,000);
CHL (0-999; resolution 1) -
Example: If CHH = 8 and CHL = 500:
Total number of compressor run hours = 8,500

•   **Fan motor 1 run hours:**
F1H (0-65; resolution 1,000);
F1L (0-999 resolution 1)

•   **Fan motor 2 run hours:**
F2H (0-65; resolution 1,000);
F2L (0-999 resolution 1)

To view service counters, do the following:

1.   Hold down ⚒ button for 3 seconds.

2.   Press **SET** button to view selected service counters. See the above list for counter names and meanings.

5. Parameter List

All parameters and their descriptions, default values, and operating ranges are listed in **Tables 4** and **5**. Depending on the condensing unit model, some parameter values may be different than shown or not applicable.

Table 4 – Parameters

Label	Description	Default	Range
	Default Display Value		
	Current Suction Pressure (PSIG)		
	Adjustable In Programming Menu		
Cin	Compressor cut-in (PSIG)	25	CoU - US
CoU	Compressor cut-out (PSIG)	15	LS - Cin
	Adjustable From Advanced Options Menu		
odS	Outputs delay at start up (seconds) (Only adjustable on single phase scroll units)	2 or 4	2 - 255
AC	Anti-short cycle delay (Minimum time between compressor off then on) (seconds)	6	6 - 900
Con	Compressor ON time with faulty probe (minutes)	5	0 - 255
CoF	Compressor OFF time with faulty probe (minutes)	5	0 - 255
P1F	Suction Pressure Transducer Offset (PSI)	0	-120 -120
bNp	Bump start enabled	no	no - YES
nPs	Number of activations of DLT alarm in a hour to lock compressor (Units with discharge line temperature protection only)	4	0-15; 0 = always automatic restart
HPn	UL safety digital input activation before compressor lock (Units with fixed high pressure controls only)	5	0-15; 0 = always automatic restart
SF1	Fan 1 Cut-out (°F) (Fan cycling units only)	70	-40 - SF2
HF1	Fan 1 differential (°F) (Fan cycling units only)	10	1 -100
SF2	Fan 2 Cut-out (°F) (Fan cycling units only)	85	SF1 - 230
HF2	Fan 2 differential (°F) (Fan cycling units only)	15	1 - 100
rSA	Reset Alarm Counters (HP, dLt, and Loc)		
rCA	Reset Compressor Starts Counters		
rCH	Reset Compressor Run Hours Counters		
rFH	Reset Fan Run Hours Counters (Fan cycling units only)		

Table 5 – Factory Set Parameters

Label	Description	Default	Range
	Factory Set Definitions		
LS	Minimum set point (PSIG)	-7 or 5	-7 - US
US	Maximum set point (PSIG)	135	LS - 135
ono	Minimum time between two compressor starts (minutes)	0	0 - 15
nFA	Number of fans on during probe fault	2	0 - 2
Unt	Measurement unit for pressure: PSIG, bar, kPA	PSI	PSI, bAr, HPA
CF	Measurement unit for temperature	F	C or F
on	Bump Start Compressor on time (seconds)	2	1 - 15
off	Bump Start Compressor off time (seconds)	5	1 - 15
nUb	Number of cycles during bump start	3	1 - 15
bEn	Compressor stop time for next bump start (hours)	4.0	1.0 - 23.5
doF	DLT alarm temperature to stop compressor (°F)	220	don - 302
don	DLT temperature for compressor restart (°F)	170	-58 - doF
ALd	DLT stop compressor delay (seconds)	0-5	0 - 255
dlF	Minimum time of compressor off with dLL alarm (minutes)	0	0 - 15
AU2	Cut-in for Condenser Temperature/Pressure alarm (°F)	150	AH2 - 230
AH2	Cut-out for high Condenser Temperature/Pressure alarm (°F)	140	-40 - AU2
Ad2	High condenser temperature alarm delay (minutes)	0	0 - 255
HPF	Minimum off time after a High-Pressure Trip (minutes)	5	0 - 15
P1i	Start scale for probe 1 (PSIG)	-15	-15 to P1E
P1E	End scale for probe 1 (PSIG)	135	P1i to 999
P1d	P1 alarm display delay, with P1C=0-5V (min)	0	0 -100
P2P	Probe 2 presence		YES, NO
P2C	Probe 2 configuration		NTC, 0-5
P2i	Start scale for probe 2 (PSIG)	-15	-15 to P2E
P2E	End scale for probe 2 (PSIG)	485	P2i to 999
P3C	Probe 3 configuration		Nu, DLT, CPA
Ab2	High condenser temperature alarm with compressor off		Yes, No
oA1	AUX 1 configuration		Fan, Fn2, Alr
oA2	AUX 2 configuration		Fan, Fn2, Alr

Application Engineering

Copeland
brand products

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Climate Technologies

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6. Controller Wiring

⚠️**WARNING**   *Always disconnect and lockout the power supply before beginning electrical installations or troubleshooting.*
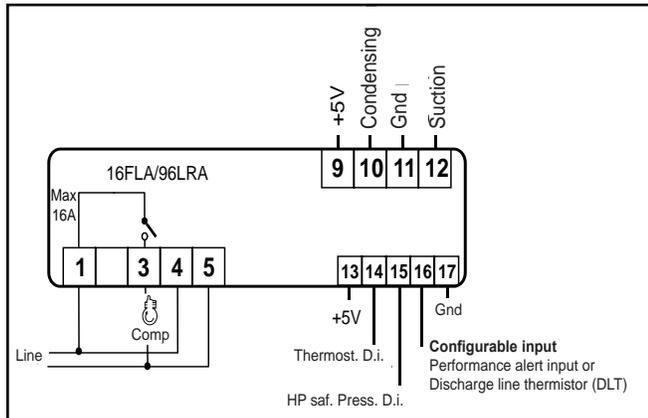
6.1 Non-Fan Cycling Wiring Schematic

Figure 6 – Non-Fan Cycling Wiring Schematic

Compressor: Use terminals 1-3.

Power Supply: Use terminals 4-5 (terminals 4 and 5 are for power supply at 110VAC or 230VAC, depending on the model).

Suction Pressure Transducer: Use terminal 9 (+5V) for supply, terminal 11 for ground, and terminal 12 for signal.

Condenser Temperature Sensor: Connect probe to terminal 11 (ground) and 10.

Thermostat Digital Input: Use terminals 14-17.

UL HP input: Use terminals 15-17.

DLT Sensor: Connect probe to terminals 16-17.

Copeland PerformanceAlert (CPA): See **Figure 8.**

6.2 Fan Cycling Wiring Schematic
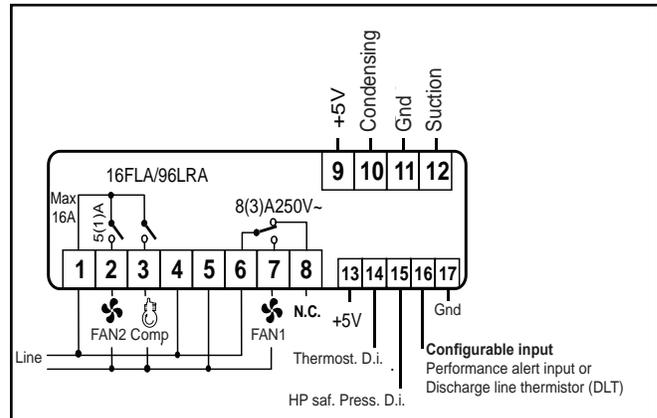
Figure 7 – Fan Cycling Wiring Schematic

Compressor: Use terminals 1-3.

Power Supply: Use terminals 4-5 (terminals 4 and 5 are for power supply at 110VAC or 230VAC, depending on the model).

FAN 1: Use terminals 6-7.

FAN 2: Use terminals 1-2.

Suction Pressure Transducer: Use terminal 9 (+5V) for supply, terminal 11 for ground, and terminal 12 for signal.

Condenser Temperature Sensor: Connect probe to terminal 11 (ground) and 10.

Thermostat Digital Input: Use terminals 14-17.

UL HP input: Use terminals 15-17.

DLT Sensor: Connect probe to terminals 16-17.

Copeland PerformanceAlert (CPA): See **Figure 8.**

6.3 Copeland PerformanceAlert Connection
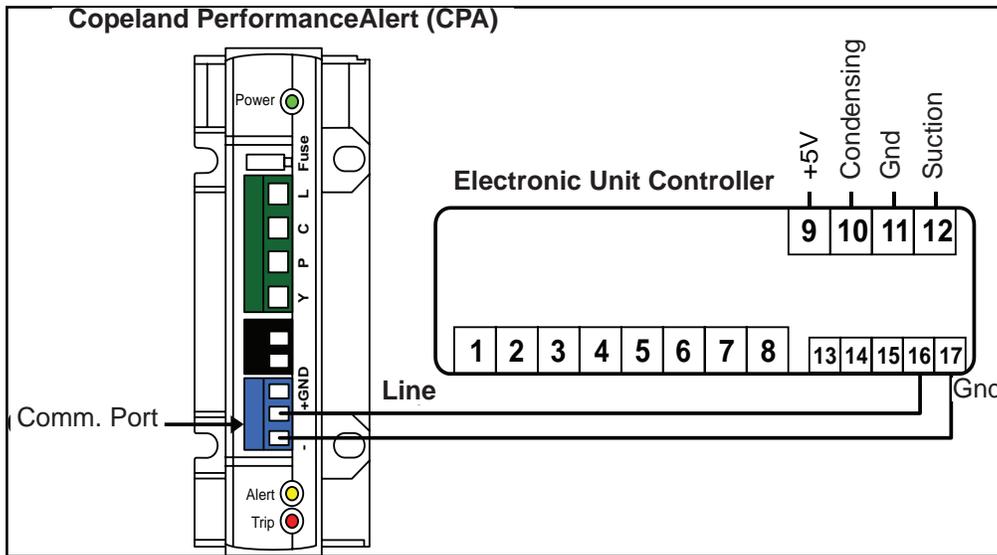
Figure 8 – Wiring Schematic Example for Controller with Copeland PerformanceAlert

Copeland PerformanceAlert (CPA) connection: Use terminals 16-17. Connect the CPA as shown in **Figure 8.** For more information on PerformanceAlert, see Application Engineering Bulletin AE8-1347.

6.4 Additional Controller Inputs
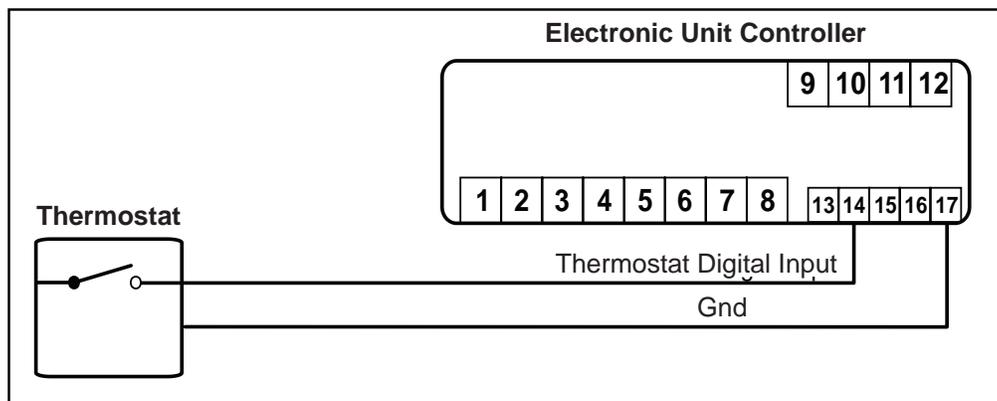
Figure 9 – Wiring Schematic Example for Optional Thermostat

If another device, such as a thermostat, will be used to control the condensing unit, terminals 14 and 17 need to be connected to a dry contact (no voltage). The additional controller (thermostat) provides voltage to the dry contact.

Terminals 14 and 17 are located on the hotkey cable and will be connected together by push-on type connectors. See **Figures 6, 7, 8, and 9 f**or wiring details.

NOTE: If using a control (e.g., thermostat) with another device (e.g., pump down solenoid), no connections to the controller are required.

7-13

7. Alarms and Notifications

In the event of an issue or fault, the codes listed below will flash to indicate the alarm condition. See **Section 9** for troubleshooting information.

Table 6 – Alarms and Notifications

Code	Description
PoF	Keypad locked
Pon	Keypad unlocked
P1	Suction probe failure
P2	Condenser probe failure
P3	DLT probe failure
HA	High condenser temperature alarm
dlt	DLT temperature alarm
dll	DLT lock alarm
HP	High-pressure trip alarm
HPL	High-pressure trip lockout alarm
CPA	Copeland PerformanceAlert not connected properly
EE	Electronic Unit Controller failure
CH	Compressor working hour counter alarm
FH	Fan working hour counter alarm
HdL	Maximum alarm count has been reached - alarm counters need to be reset

If a Copeland PerformanceAlert* module is installed in the unit, PerformanceAlert error codes will be displayed on the controller screen. This eliminates the need to count lights flashed on the PerformanceAlert module itself. For more information on PerformanceAlert, see Application Engineering Bulletin **AE8-1347**.

Table 7 – Copeland PerformanceAlert Error Codes

Code	Three Phase Recip.	Three Phase Scroll	Single Phase
C01	Discharge Temperature Trip	Discharge Temperature Trip	Discharge Temperature Trip
C02	System Trip	System Trip	System Trip
C03	Short Cycling	Short Cycling	Short Cycling
C04	Locked Rotor	Locked Rotor	Locked Rotor
C05	Open Circuit	Open Circuit	Open Circuit
C06	Missing Phase	Missing Phase	Open Start
C07	N/A	Reverse Phase	Open Run
C08	Welded Contactor	Welded Contactor	Welded Contactor
C09	Low Voltage	Low Voltage	Low Voltage
C10	Lost Communications	Lost Communications	Lost Communications
C11	DLT Sensor Failure	DLT Sensor Failure	DLT Sensor Failure

*Copeland PerformanceAlert is not replaced by the Electronic Unit Controller. The PerformanceAlert module includes many features not included in the Electronic Unit Controller, such as locked rotor protection, loss of phase, etc. The Electronic Unit Controller is able to interface with PerformanceAlert to display error codes in an easy-to-read format.

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7.1 Discharge Line Temperature Protection

The Electronic Unit Controller uses a temperature sensor, which allows for more flexibility in what the controller can do. If the unit trips, the unit will display an error code and log that an error has occurred. In addition, the controller will allow an automatic reset up to 4 times per hour. On the fourth trip, the controller will require a manual reset. The parameter "nPS" can be changed in the Advanced Options Menu (see **Section 2.6**) to adjust the total number of trips allowed in an hour before a lockout. If an automatic reset is always needed, parameter "nPS" can be set to 0.

Controllers built in September 2015 and after are programmed with a higher discharge line cut-out temperature and a 5 second trip delay, reducing nuisance trips.

NOTE: If nuiscance trips are occuring on controllers built before September 2015 (15I date code), contact application engineering for support.

Controllers built before September 2015:

Default Discharge Line Cut-in Temp:	170°F
Default Discharge Line Cut-out Temp:	220°F
Trip Delay:	N/A

Controllers built September 2015 and after:

Default Discharge Line Cut-in Temp:	170°F
Default Discharge Line Cut-out Temp:	225°F
Trip Delay:	5 seconds

7.2 UL High Pressure Safety Control

High-pressure control is a UL (Underwriters Laboratories) safety device. As such, Emerson Climate Technologies condensing units equipped with the Electronic Unit Controller still come with the high-pressure mechanical control installed on the unit. The high-pressure controls will all be fixed to work with the control, and the value of the cut-out will be determined by the working pressure of the high side of the condensing unit. This should have no affect on a customer's UL requirements.

The high-pressure control will break power to the compressor output relay, which will shut down the compressor regardless of the program state. This change will also allow the controller to read the high-pressure control state and display the appropriate error codes. In addition, the controller will allow an automatic reset up to 4 times per hour. On the fifth trip, the controller will require a manual reset. The parameter "HPn" can be changed in the Advanced Options Menu (See **Section 2.6**) to adjust the total number of trips allowed in an hour before a lockout. If an always automatic reset is needed, parameter "HPn" should be set to 0.

![Emerson Climate Technologies]	Application Engineering	![Copeland brand products]
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8 Electronic Unit Controller Replacement

> ⚠️ **WARNING**
>
> Electronic Unit Controller replacement must be performed in accordance with safety instructions. **Disconnect and lockout power before servicing.** See **Safety** section for additional information.

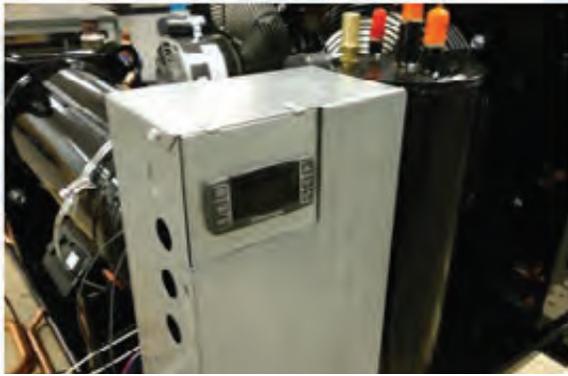### 8.1 Silver Electrical Box Applications

Figure 10 – Silver Electrical Box

1. Disconnect main power source.

2. Remove electrical box cover.

3. Remove Electronic Unit Controller assembly and rotate it up 90 degrees. The assembly should now slide and clip onto the top of the electrical box, leaving the wiring harnesses exposed.

4. Disconnect three wiring harnesses from rear of controller.

5. Verify replacement controller and existing controller have the same part number (e.g., part number: 543-0133-00).

   NOTE: A controller with a part number ending in -00 may be replaced with a controller with a part number ending in -01 or -02 (See **Section 8.5**).

6. Insert replacement controller through the slot. Ensure controller wiring schematic is pointing away from the operator.

7. Connect three wiring harnesses to rear of controller. Ensure the part number on the blue harness is facing towards the operator.

8. Unclip Electronic Unit Controller assembly from the top of the electrical box and slide it back into its original position.

9. Install electrical box cover.

10. Connect main power source.

11. Set controller parameters to match values listed on inside label (See **Section 8.4**).

8.2 Small Black Electrical Box Applications

Figure 11 – Small Black Electrical Box

1. Disconnect main power source.

2. Remove electrical box cover.

3. Bend the metal tabs on either side of the controller outward and pull controller approximately halfway out.

4. Disconnect three wiring harnesses from rear of controller.

5. Completely remove controller from assembly.

6. Verify replacement controller and existing controller have the same part number (e.g., part number: 543-0133-00).

   NOTE: A controller with a part number ending in -00 may be replaced with a controller with a part number ending in -01 or -02 (See **Section 8.5**).

7. Bend the metal tabs on either side of the empty slot inward prior to installing replacement controller.

8. Insert replacement controller through the slot with label facing away. Push controller halfway in.

9. Connect three wiring harnesses to rear of controller. Ensure controller wiring schematic is pointing away from the operator.

10. Finish installing replacement controller in assembly.

11. Install electrical box cover.

12. Connect main power source.

13. Set controller parameters to match values listed on inside label (See **Section 8.4**).

8.3 Plastic Retainer Applications (Large Black Electrical Box and X-Line Units)

Figure 12 – Large Black Electrical Box

1. Disconnect main power source.

2. Remove electrical box cover.

3. Disconnect three wiring harnesses from rear of controller.

4. Press the centers of the white plastic connectors and pull them straight out.

5. Remove controller.

6. Verify replacement controller and existing controller have the same part number (e.g., part number: 543-0133-00).

   NOTE: A controller with a part number ending in -00 may be replaced with a controller with a part number ending in -01 or -02 (See **Section 8.5**).

7. Insert replacement controller through the slot. Ensure controller wiring schematic is facing up.

8. Secure controller with white retainer clips.

9. Connect three wiring harnesses to rear of controller. Ensure part label on blue wiring harness is facing down.

10. Install electrical box cover.

11. Connect main power source.

12. Set controller parameters to match values listed on inside label (See **Section 8.4**).

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8.4 Setting Controller Parameters After Replacement

Control settings vary for each condensing unit model. The replacement controller must be programmed for the condensing unit to function properly.

See the provided programming instruction label (052-7272-00) or wiring schematic (X-Line units only) for a list of default parameter values.

To program a replacement controller with default parameter values, do the following:

1. Hold down **SET** + ▽ keys for 3 seconds, or until the "**PSI**" LED starts blinking, to enter the Programming Menu.

2. Release keys, then hold down **SET** + ▽ keys again for at least 7 seconds. The "PR2" label will be displayed immediately followed by the "Ci.n" parameter.

NOTE: THIS IS THE ADVANCED OPTIONS MENU.

3. Press △ or ▽ button to select the required parameter.

4. Press **SET** button to display parameter value.

5. Compare displayed values with the values on the provided label (See **Figure 13**).
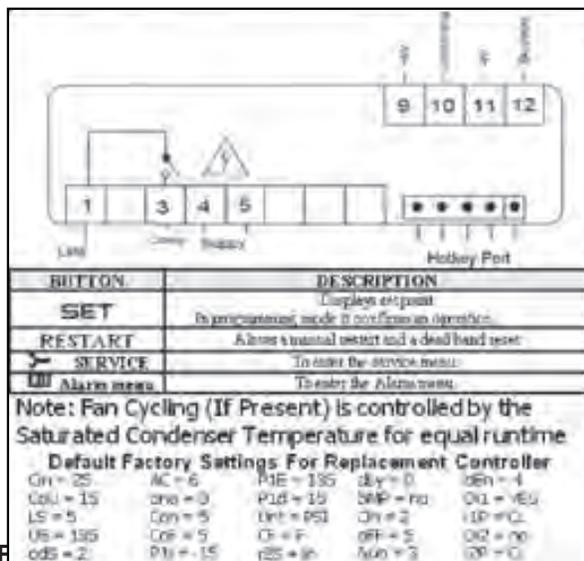
Figure 13 – Example of Factory Settings Schematic on Inside Label

6. Press △ or ▽ button to change parameter value, if needed.

7. Press **SET** button to store the new parameter value, if needed.

8. Repeat steps 3 through 7 as needed to complete the process.

TO EXIT: Press **SET** + △ keys or wait 15 seconds without pressing a button or key.

8.5 Replacing -00 Controller with -01 or -02 Controller

1. Check to see if there is a blue wire in the jumper cable (See **Figure 14**).
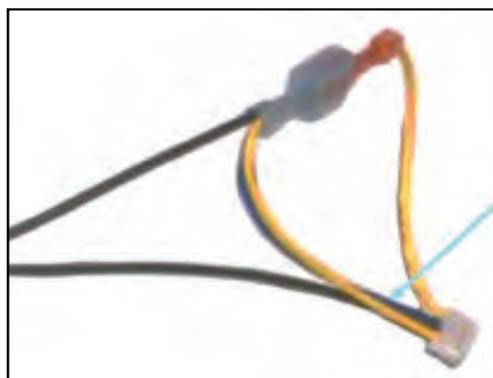

Figure 14 – Jumper Cable with Blue Wire

- If blue wire is present, continue with controller replacement.

- If blue wire is not present, use the jumper cable supplied with the replacement controller kit and continue with controller replacement.

NOTE: If the jumper cable without a blue wire is not replaced, replacement controller will flash "HP" error code and will not operate.

NOTE: The replacement jumper cable includes a discharge line temperature probe. If condensing unit is not equipped with discharge temperature protection, secure discharge line temperature probe to jumper cable using a cable tie.

9. Thermistor Temperature/Resistance Values for Condenser Temperature Sensor

Deg C	Deg F	Resistance (kOhms)	Deg C	Deg F	Resistance (kOhms)	Deg C	Deg F	Resistance (kOhms)	Deg C	Deg F	Resistance (kOhms)
-50	-58	329.5	-8	18	38.77	34	93	7.192	76	169	1.869
-49	-56	310.9	-7	19	37.06	35	95	6.94	77	171	1.816
-48	-54	293.5	-6	21	35.44	36	97	6.699	78	172	1.765
-47	-53	277.2	-5	23	33.9	37	99	6.467	79	174	1.716
-46	-51	262	-4	25	32.44	38	100	6.245	80	176	1.668
-45	-49	247.7	-3	27	31.05	39	102	6.032	81	178	1.621
-44	-47	234.3	-2	28	29.73	40	104	5.827	82	180	1.577
-43	-45	221.7	-1	30	28.48	41	106	5.629	83	181	1.533
-42	-44	209.9	0	32	27.28	42	108	5.438	84	183	1.491
-41	-42	198.9	1	34	26.13	43	109	5.255	85	185	1.451
-40	-40	188.5	2	36	25.03	44	111	5.08	86	187	1.411
-39	-38	178.5	3	37	23.99	45	113	4.911	87	189	1.373
-38	-36	169	4	39	23	46	115	4.749	88	190	1.336
-37	-35	160.2	5	41	22.05	47	117	4.593	89	192	1.3
-36	-33	151.9	6	43	21.15	48	118	4.443	90	194	1.266
-35	-31	144.1	7	45	20.3	49	120	4.299	91	196	1.232
-34	-29	136.7	8	46	19.48	50	122	4.16	92	198	1.2
-33	-27	129.8	9	48	18.7	51	124	4.026	93	199	1.168
-32	-26	123.3	10	50	17.96	52	126	3.896	94	201	1.137
-31	-24	117.1	11	52	17.24	53	127	3.771	95	203	1.108
-30	-22	111.3	12	54	16.56	54	129	3.651	96	205	1.079
-29	-20	105.7	13	55	15.9	55	131	3.536	97	207	1.051
-28	-18	100.5	14	57	15.28	56	133	3.425	98	208	1.024
-27	-17	95.52	15	59	14.69	57	135	3.318	99	210	0.9984
-26	-15	90.84	16	61	14.12	58	136	3.215	100	212	0.9731
-25	-13	86.43	17	63	13.58	59	138	3.116	101	214	0.9489
-24	-11	82.26	18	64	13.06	60	140	3.02	102	216	0.9246
-23	-9	78.33	19	66	12.56	61	142	2.927	103	217	0.9014
-22	-8	74.61	20	68	12.09	62	144	2.838	104	219	0.8789
-21	-6	71.1	21	70	11.63	63	145	2.751	105	221	0.8572
-20	-4	67.77	22	72	11.2	64	147	2.668	106	223	0.836
-19	-2	64.57	23	73	10.78	65	149	2.588	107	225	0.8155
-18	0	61.54	24	75	10.38	66	151	2.511	108	226	0.7956
-17	1	58.68	25	77	10	67	153	2.436	109	228	0.7763
-16	3	55.97	26	79	9.632	68	154	2.364	110	230	0.7576
-15	5	53.41	27	81	9.281	69	156	2.295			
-14	7	50.98	28	82	8.944	70	158	2.228			
-13	9	48.68	29	84	8.622	71	160	2.163			
-12	10	46.5	30	86	8.313	72	162	2.1			
-11	12	44.43	31	88	8.014	73	163	2.039			
-10	14	42.47	32	90	7.728	74	165	1.98			
-9	16	40.57	33	91	7.454	75	167	1.924			

9.1 Thermistor Temperature/Resistance Values for Discharge Temperature Sensor

Deg C	Deg F	Resistance (kOhms)	Deg C	Deg F	Resistance (kOhms)
-40	-40	2889.60	70	158	15.07
-35	-31	2087.22	75	167	12.73
-30	-22	1522.20	80	176	10.79
-25	-13	1121.44	85	185	9.20
-20	-4	834.72	90	194	7.87
-15	5	627.28	95	203	6.77
-10	14	475.74	100	212	5.85
-5	23	363.99	105	221	5.09
0	32	280.82	110	230	4.45
5	41	218.41	115	239	3.87
10	50	171.17	120	248	3.35
15	59	135.14	125	257	2.92
20	68	107.44	130	266	2.58
25	77	86.00	135	275	2.28
30	86	69.28	140	284	2.02
35	95	56.16	145	293	1.80
40	104	45.81	150	302	1.59
45	113	37.58	155	311	1.39
50	122	30.99	160	320	1.25
55	131	25.68	165	329	1.12
60	140	21.40	170	338	1.01
65	149	17.91	175	347	0.92
			180	356	0.83

10. Measuring Pressure/Voltage Values for Suction Pressure Transducer

To measure voltage to the suction pressure transducer manually, do the following:

1. Turn controller ON.

2. Monitor current suction pressure on controller display (See **Section 2.2**) and record reading.

3. Using a voltmeter, measure voltage between pin 12 and pin 11 on the top of the green-block-plug located on rear of controller (See **Figure 15**).
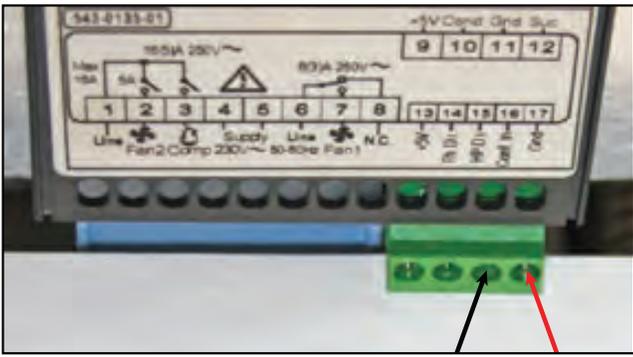
4. Compare suction pressure and voltage to the table below.

Figure 15 – Measuring Suction Pressure Transducer Voltage

DC Voltage	PSI	DC Voltage	PSI
0.5	-15.0	2.5	60.0
0.6	-11.3	2.6	63.8
0.7	-7.5	2.7	67.5
0.8	-3.8	2.8	71.3
0.9	0.0	2.9	75.0
1	3.8	3	78.8
1.1	7.5	3.1	82.5
1.2	11.3	3.2	86.3
1.3	15.0	3.3	90.0
1.4	18.8	3.4	93.8
1.5	22.5	3.5	97.5
1.6	26.3	3.6	101.3
1.7	30.0	3.7	105.0
1.8	33.8	3.8	108.8
1.9	37.5	3.9	112.5
2	41.3	4	116.3
2.1	45.0	4.1	120.0
2.2	48.8	4.2	123.8
2.3	52.5	4.3	127.5
2.4	56.3	4.4	131.3
		4.5	135.0

9. Troubleshooting Guide

Display	Likely Causes	Other Possible Causes
Controller display remains blank after applying power	• Unit power not properly applied - check for proper applied voltage • Power cable harness not plugged in properly or securely into the back of the controller – check connections	• Power cable miswired – inspect cable, replace if needed • Electrical assembly miswired – trace wiring diagrams
Controller displays correctly, but the green compressor light is off and the compressor is not running	• Jumper cable not plugged in properly or securely into the back of the controller – check connections • Controller is currently above the cut-in setting – check cut-in and cut-out settings	• Jumper cable miswired – inspect cable, replace if needed
Controller displays correctly and the green compressor light is on and the compressor is not running	• Power cable harness not plugged in properly or securely into the back of the controller – check connections	• Power cable not wired to the contactor or compressor correctly – check wiring • Power cable miswired – inspect cable, replace if needed
Controller flashes "135" or "P1"	• Current system pressure is above 135 PSIG – wait for system to pull down • Green harness not plugged in properly or securely into the back of the controller – check connections • Cable not connected properly with the pressure transducer – check connections	• Transducer cable miswired – inspect cable, replace if needed • Damaged transducer – inspect transducer, replace if needed
Controller flashes "P2" on a unit with fan cycling	• Green harness not plugged in properly or securely into the back of the controller – check connections	• Transducer cable miswired – inspect cable, replace if needed • Check condenser temperature sensor resistance values against table in **Section 9.**
Controller flashes "P2" on a unit without fan cycling after replacing a controller	• Controller not programmed properly – check parameters in Advanced Options Menu	
Controller flashes "P3" on a unit with DLT	• Jumper cable not plugged in properly or securely into the back of the controller – check connections	• Jumper cable miswired – inspect cable, replace if needed • Faulty DLT temperature sensor – check the discharge line temperature sensor resistance values against table in **Section 9.**
Controller flashes "P3" on a unit without DLT after replacing a controller	• Controller not programmed properly – check parameters in Advanced Options Menu	

Troubleshooting Guide (continued)

Display	Likely Causes	Other Possible Causes
Fans not running on a fan cycling unit and the fan lights are not on	• Condensing temperature is currently below the fan cut-in • Condensing temperature sensor not properly installed – check installation	• Transducer cable miswired – inspect cable, replace if needed. • Faulty temperature sensor – check condenser temperature sensor resistance values against table in **Section 9.**
Fans not running on a fan cycling unit and the fan lights are on	• Power cable harness not plugged in properly or securely into the back of the controller – check connections	• Power cable miswired – inspect cable, replace if needed. • Electrical assembly miswired – trace wiring diagrams.
Controller flashes "HP" at power-up	• Jumper cable not plugged in properly or securely into the back of the controller – check connections • High pressure switch is seeing above the cut-out pressure • For a replacing an -00 controller, ensure that the jumper cable is the latest revision. It should have a blue wire in the harness. See **Section 8.5** for more details.	• Jumper cable miswired – inspect cable; replace if needed. • Faulty fixed Hp switch – inspect switch; replace if needed.
Controller flashes "HP" or "HPL"	• System operation causing high discharge pressures, check system operations	• Bad high pressure switch – verify system pressure when the pressure switch trips. • See **Section 7.2** for more details.
Controller flashes "DLT" or "DLL"	• System operation causing high discharge line temperatures, check system operations	• Faulty temperature sensor – check DLT sensor values against table **in Section 9**. • See **Section 7.1** for more details
Controller flashing "HPL" or "DLL"	• System operation causing high discharge pressures (HPL) or high discharge line temperatures (DLL) repeatedly, check system operations • To clear an HPL or DLL lockout, hold the Start button for 3 seconds 2 consecutive times, or cycle power to the unit. If using the reset button, the alarm condition will have to clear (DLT temperature drops or Hp switch resets) and any minimum off time will need to complete (5 minutes for the fixed Hp switch).	

12. Parts Kits

Kit	Part Number	Description	Qty
943-0152-00 115V Non Fan Cycling Controller	543-0132-00/01/02	CONTROLLER	1
	529-0113-04	CABLE-SENSOR ASSM.	1
	032-7050-00	CLIP	2
	FM-2011IP-74	CONTROLLER FORM	1
943-0153-00 230V Non Fan Cycling Controller	543-0133-00/01/02	CONTROLLER - ELECT UN	1
	529-0113-04	CABLE-SENSOR ASSM.	1
	032-7050-00	CLIP	2
	FM-2011IP-74	CONTROLLER FORM	1
943-0154-00 115V Fan Cycling Controller	543-0134-00/01/02	CONTROLLER - ELECT UN	1
	529-0113-04	CABLE-SENSOR ASSM.	1
	032-7050-00	CLIP	2
	FM-2011IP-74	CONTROLLER FORM	1
943-0155-00 230V Fan Cycling Controller	543-0135-00/01/02	CONTROLLER - ELECT UN	1
	529-0113-04	CABLE-SENSOR ASSM.	1
	032-7050-00	CLIP	2
	FM-2011IP-74	CONTROLLER FORM	1
929-0113-00 White Input Sensor Cable Kit with DLT Sensor	529-0113-02	CABLE-SENSOR ASSM.	1
	529-0113-04	CABLE-SENSOR ASSM.	1
929-0114-00 Suction Pressure Transducer and Cables	039-0026-02	TRANSDUCER - PRESSUR	1
	529-0114-00	CABLE-SENSOR ASSM.	1
	529-0114-01	CABLE-SENSOR ASSM.	1
929-0114-01 Suction Pressure Transducer Cable with Condenser Temperature Sensor	529-0114-01	CABLE-SENSOR ASSM.	1
943-0037-00 115V Non Fan Cycling Stand Alone Kit	543-0132-03	CONTROLLER - ELECT UN	1
	032-7050-00	CLIP	2
	529-0113-02	CABLE-SENSOR ASSM.	1
	529-0114-00	CABLE-SENSOR ASSM.	1
	039-0026-02	TRANSDUCER - PRESSUR	1
	AE8-1376	AE BULLETIN	1

.

| Kit	Part Number	Description	Qty
943-0037-01 230V Non Fan Cycling Stand Alone Kit	543-0133-03	CONTROLLER - ELECT UN	1
	032-7050-00	CLIP	2
	529-0113-02	CABLE-SENSOR ASSM.	1
	529-0114-00	CABLE-SENSOR ASSM.	1
	039-0026-02	TRANSDUCER - PRESSUR	1
	AE8-1376	AE BULLETIN	1
943-0037-02 115V Pressure Based Fan Cycling Stand Alone Kit	543-0134-03	CONTROLLER - ELECT UN	1
	032-7050-00	CLIP	2
	529-0113-02	CABLE-SENSOR ASSM.	1
	529-0114-00	CABLE-SENSOR ASSM.	1
	039-0026-02	TRANSDUCER - PRESSUR	1
	039-0026-03	TRANSDUCER - PRESSUR	1
	AE8-1376	AE BULLETIN	1
943-0037-03 230V Pressure Based Fan Cycling Stand Alone Kit	543-0135-03	CONTROLLER - ELECT UN	1
	032-7050-00	CLIP	2
	529-0113-02	CABLE-SENSOR ASSM.	1
	529-0114-00	CABLE-SENSOR ASSM.	1
	039-0026-02	TRANSDUCER - PRESSUR	1
	039-0026-03	TRANSDUCER - PRESSUR	1
	AE8-1376	AE BULLETIN	1
962-0007-00 EUC Enclosure Kit	062-7048-01	BOX - ELECTRICAL	1
	005-7226-01	COVER - LID	1
	036-0275-00	FITTING - KNOCKOUT PLU	2
	100-0180-09	SCREW - HEX HD SELF TA	1

.

SAFE-NET III™ TEMPERATURE AND DEFROST CONTROLLER

SAFE-NET III™ USER INSTRUCTIONS

Your refrigerated case uses a Hussmann Safe-NET™ III temperature and defrost controller to precisely maintain the temperature and prevent frost buildup on the cooling coil. LEDs indicate when the compressor or refrigeration is on, when the case is in a defrost cycle, if the temperature is outside the desired range, or if there is a sensor failure.

An adjustment knob allows the temperature to be set within the configured range and can power off the controller and compressor. Your controller has been custom-configured to provide the best temperature and defrost control for your chilled or frozen food.

The front of the controller has an adjustment knob and status LEDs. The back of the controller has connections for sensors and switched equipment.
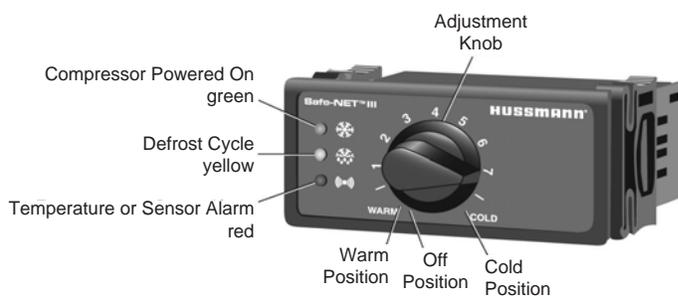
The Safe-NET III controller includes the following features and connections.
• Adjustment knob:
  Adjusts the temperature setpoint.
  Turn adjustment knob to OFF to turn off refrigeration system. Unplug merchandiser from power before servicing the unit.
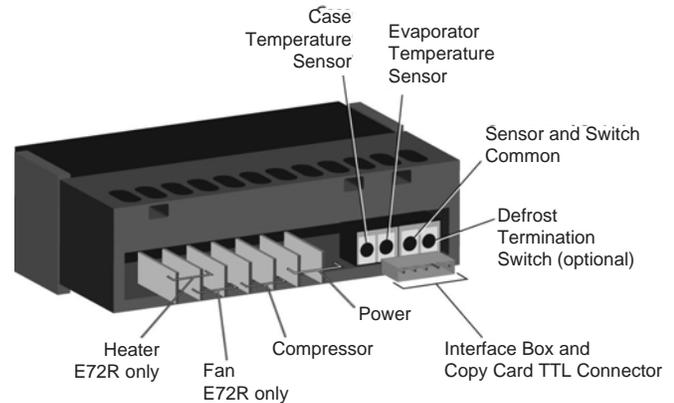
• Controller LEDs:
  ❄ Compressor Powered On LED (green): Lights while the compressor is running or the refrigeration valve is open.
  ❄ Defrost Cycle LED (yellow): Lights while the refrigeration coil is defrosting.
  ((•)) Temperature or Sensor Alarm (red): Lights if the temperature is too warm or too cold. Flashes if a sensor fails.

• Audible Temperature Alarm (optional)

• Rear connections:
– Case temperature sensor:
  • Typically senses the temperature of the air in the case.
    Used by the controller to determine when to power on or power off the compressor or refrigeration.
– Evaporator temperature sensor:
  • Senses the temperature of the refrigeration coil.
    Terminates a defrost cycle when refrigeration coil ice melts.
– Compressor or refrigeration relay:
 • Switches on the compressor or refrigeration valve for cooling.

⚠ WARNING
The evaporator fans remains ON when the adjustment knob is in the OFF position.

DISPLAY

The display includes three red LEDs and two digits for temperature, defrost status, and error codes.

The three display LEDs are red; their behavior matches the LEDs on the controller.

Compressor Powered On — Defrost Cycle — Temperature or Sensor Alarm — HUSSMANN
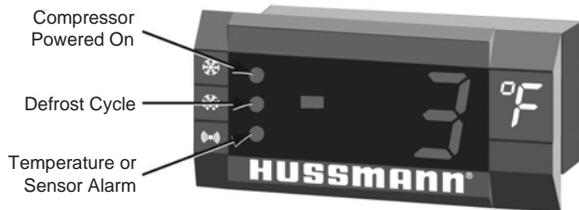
STARTUP

⚠ WARNING

The OFF Position does not disconnect line voltage to the input terminal blocks.

1. After the toggle switch is turned on, fans and lights will energize immediately.

2. After turning on the disconnect switch, wait for the self check to complete. During the self check, each LED flashes for one second, then all LEDs turn on for two seconds. If the LEDs do not flash, make sure the adjustment knob is not in the Off position.
   • After the self check, all LEDs turn off until the compressor starts. **There may be a delay before the compressor starts.** If the red Temperature or Sensor Alarm LED stays on after the self check.

   • The green Compressor Powered On LED turns on when the compressor starts.

3. The compressor will continue to run until it reaches its cut-out temperature (pulldown). Door and frame anti-sweat heaters will energize after the evaporator temperature reaches a stable operating temperature, this may take 30 minutes or longer.
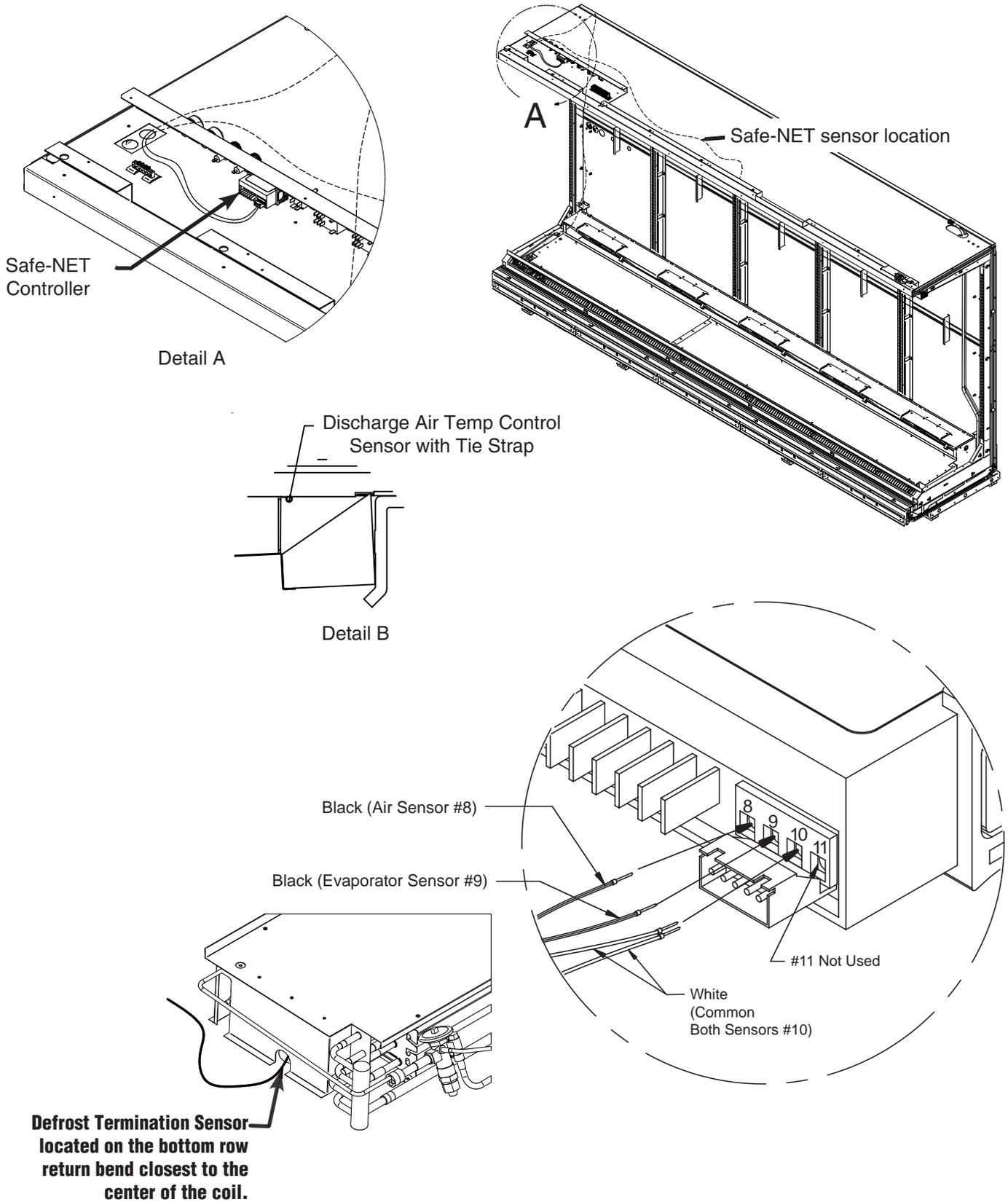
⚠ WARNING

Product will be degraded and may spoil if allowed to sit in a non-refrigerated area.
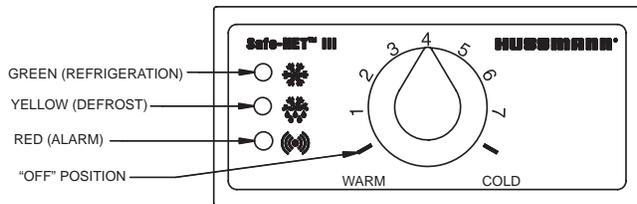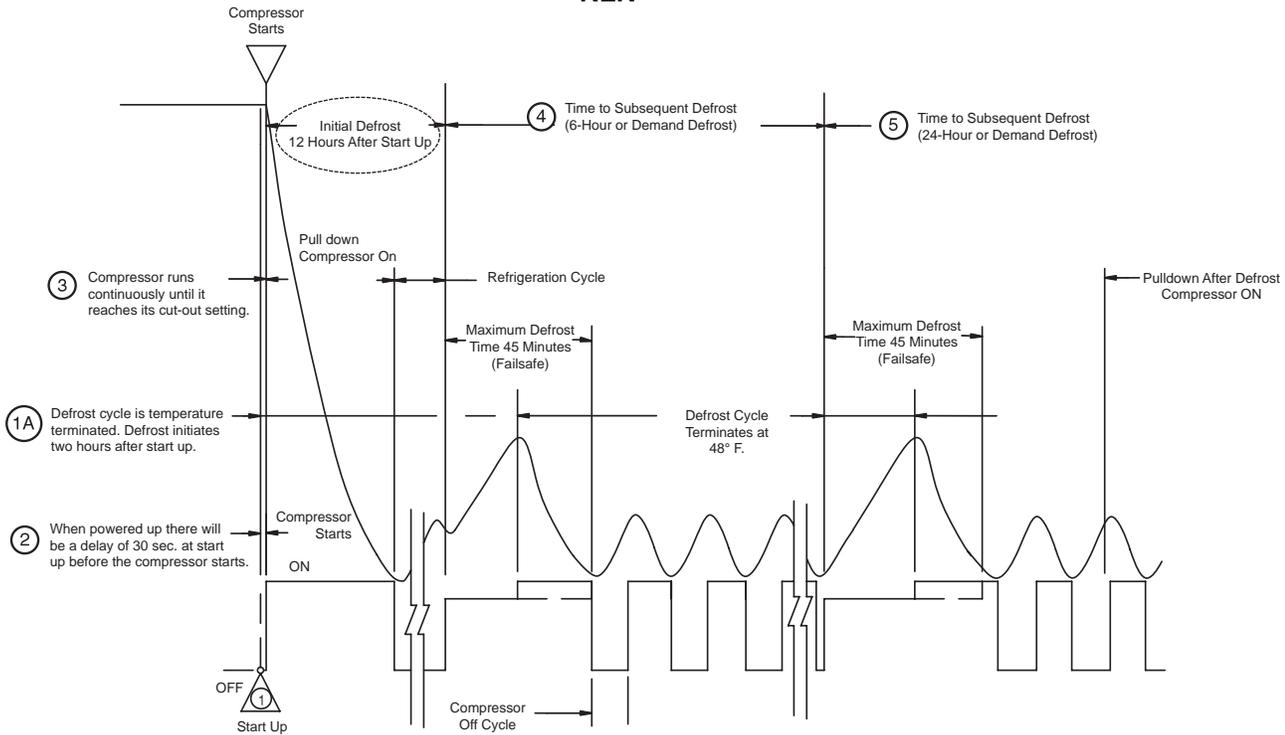
NOTE: Do NOT load product until AFTER merchandiser operates for 24 hours and reaches desired operating temperature.

1. The merchandiser temperature displays at startup. The initial defrost starts twelve hours later. During defrost, the display shows "df." This reading will remain displayed during defrost and until it times out, even though the refrigeration mode has been initiated. (The green LED will be lit.)

2. The compressor will start after a 30 second delay once power is applied.

3. The compressor will continue to run until it reaches its cut-out temperature (Pulldown).

4. The refrigeration cycle will continue for the next subsequent scheduled (24-hours) or demand defrost.

5. The above process will repeat (steps 3 and 4) until the power is interrupted.

6. If power stops, the process will start over at step 1, and the time to subsequent defrost will reset.

7. Medium temperature is the same except for a 60-minute time terminated defrost.
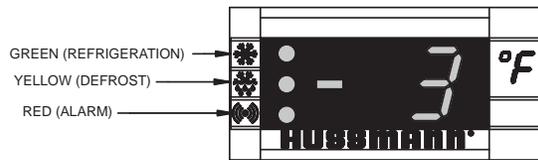
Safe-NET Location

Safe-NET
Controller

Detail A

A

Safe-NET sensor location

Discharge Air Temp Control
Sensor with Tie Strap

Detail B

Black (Air Sensor #8)

Black (Evaporator Sensor #9)

8
9
10
11

#11 Not Used

White
(Common
Both Sensors #10)

**Defrost Termination Sensor
located on the bottom row
return bend closest to the
center of the coil.**

Sequence of Operation
RLN

Safe-Net III Controller

DISPLAY

Low Temperature Freedom Safe-NET III Settings

Safe-NET Dial	Discharge air Cut-In	Discharge air Cut-Out	Avg Discharge Air Temperature	Product Temperature Range
0	Off			
1	0	-6	-2	-5 to 10
4	-4	-10	-7	-6 to 5
7	-10	-16	-13	-11 to 0

Medium Temperature Freedom Safe-NET III Settings

| Safe-NET Dial	Discharge air Cut-In	Discharge air Cut-Out	Avg Discharge air Temperature	Product Temperature Range
0	Off			
1	38	32	36	32 to 42
4	35	29	33	29 to 39
7	33	27	31	27 to 37

TEMPERATURE ADJUSTMENT

Rotate the adjustment knob counter clockwise for a warmer setpoint or clockwise for a colder setpoint.
• While the temperature is being adjusted, the optional display shows the setpoint (cut out value). A few seconds after the temperature is set, the display reverts to showing the sensed temperature in the merchandiser.

ALARMS AND CODES

FLASHING TEMPERATURE OR SENSOR ALARM LED, E1 OR E2
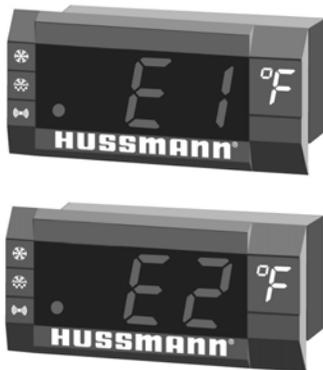
If the Temperature or Sensor Alarm LED (red) on the controller and display is flashing, a temperature sensor has failed. The display shows E1 if the case sensor has failed or E2 if the evaporator sensor has failed.

If the merchandiser sensor fails, refrigeration will run continuously. Turn off, or repeat a duty cycle of a few minutes on and a few minutes off.

When the Safe-NET control is powered up, a two-digit code will be displayed indicating that the current settings are installed.

Safe-NET Status Code	
Low Temperature	68
Medium Temperature	69

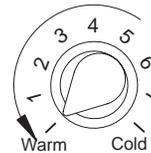| Alarm Settings	
Low Temperature	–7°F to 10°F
Medium Temperature	43°F to 48°F

Alarm settings vary depending on temperature control setting. The Safe-NET control features an alarm delay to allow for stocking, pulldown after defrost, and startup.
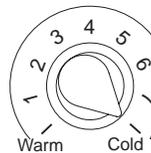
MANUAL DEFROST

Note:
This procedure initiates a manual or forced defrost.
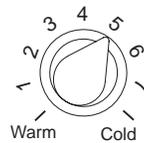
1. Note location of knob setting
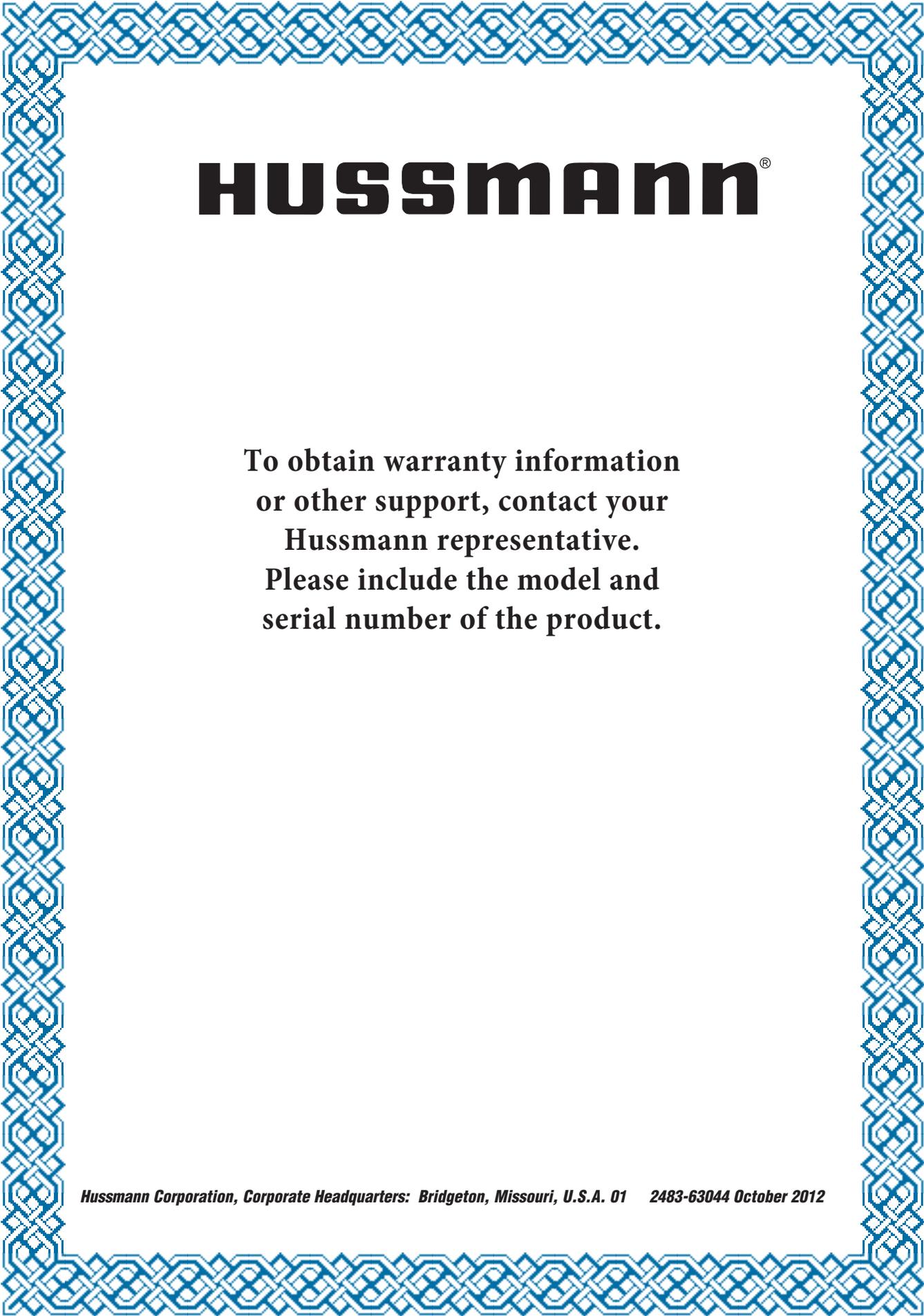2. Rotate knob fully counterclockwise until it stops (full warm - "OFF" position)
3. After 10 seconds, but before 20 seconds, rotate knob fully clockwise until it stops (full cold position)

IMPORTANT: Return the control knob to its original setting (Step 1) once the manual defrost has been initiated.

HUSSMANN®

To obtain warranty information
or other support, contact your
Hussmann representative.
Please include the model and
serial number of the product.