Carrier

CARRIER COMMERCIAL REFRIGERATION, INC.

Providing BEVERAGE-AIR • FRIGIDAIRE • KELVINATOR • UNIVERSAL NOLIN Products/Services

SERVICE & INSTALLATION MANUAL





LOW TEMPERATURE VERTICAL FREEZERS

1/03

51-1450-01

If additional information is necessary, call the factory.

Our toll free number is **1-800-684-1199**. Technical assistance engineers are willing to assist you in any way possible. Office hours are from 8:00a.m. to 5:30 p.m., Eastern Standard Time.

Important information is contained in this manual which should be retained in a convenient location for future reference.

ALL DATA AND INFORMATION IN THIS MANUAL IS SUBJECT TO CHANGE WITHOUT NOTICE.

MODEL DESIGNATION INFORMATION

PART NO.	MODELS	STYLE	CONDENSER	SPECIAL USE
52-1923-02	BT30CW-EXPR	SOLID ONE DOOR	TOP MOUNT	EXPLOSION PROOF
52-1958-01	BT30CWFMS-2	SOLID ONE DOOR	TOP MOUNT	FLAMMABLE MAT'L STORAGE
52-1993-06	BT30FS-4	SOLID ONE DOOR	TOP MOUNT	SCIENTIFIC GENERAL PURPOSE
52-1993-12	BT50FS-4	SOLID TWO DOOR	TOP MOUNT	SCIENTIFIC GENERAL PURPOSE
52-1993-18	BT80FS-4	SOLID THREE DOOR	TOP MOUNT	SCIENTIFIC GENERAL PURPOSE
52-1993-21	BTL30FS-4	SOLID ONE DOOR	TOP MOUNT	SCIENTIFIC LOW TEMPERATURE
52-1993-22	BTQ50FSHD-4	SOLID QUAD DOOR	TOP MOUNT	SCIENTIFIC LOW TEMPERATURE
52-1993-25	ST30FSBB-4	SOLID ONE DOOR	TOP MOUNT	BLOOD STORAGE
52-1993-28	STL30FSBB-4	SOLID ONE DOOR	TOP MOUNT	BLOOD STORAGE LOW TEMP
52-1991-07	T30HSP-4	SOLID ONE DOOR	TOP MOUNT	HARDENING
52-1991-36	T30LGP-5	GLASS ONE DOOR	TOP MOUNT	
52-2026-10	T30LGPE-5	GLASS ONE DOOR	TOP MOUNT	EXPORT (220V 50HZ)
52-1997-26	T30LGPRBR-5	GLASS ONE DOOR	REMOTE TOP	
52-1991-50	T30LSP-5	SOLID ONE DOOR	TOP MOUNT	
52-1991-69	T30LSPHD-5	SOLID ONE DOOR	TOP MOUNT	HEAVY DUTY
52-1991-14	T50HSQHP-4	SOLID QUAD DOOR	TOP MOUNT	HARDENING
52-1991-15	T50HSQL-4	SOLID QUAD DOOR	TOP MOUNT	HARDENING
52-1991-38	T50LGP-5	GLASS TWO DOOR	TOP MOUNT	
52-2026-11	T50LGPE-5	GLASS TWO DOOR	TOP MOUNT	EXPORT (220V 50HZ)
52-1991-41	T50LGPHD-5	GLASS TWO DOOR	TOP MOUNT	HEAVY DUTY
52-1997-24	T50LGPR-5	GLASS TWO DOOR	REMOTE TOP	
52-1991-54	T50LSP-5	SOLID TWO DOOR	TOP MOUNT	
52-1997-33	T50LSPR-5	SOLID TWO DOOR	REMOTE TOP	
52-1991-44	T80LGP-5	GLASS THREE DOOR	TOP MOUNT	
52-2026-12	T80LGPE-5	GLASS THREE DOOR	TOP MOUNT	EXPORT (220V 50HZ)
52-1997-25	T80LGPR-5	GLASS THREE DOOR	REMOTE TOP	
52-1991-60	T80LSP-5	SOLID THREE DOOR	TOP MOUNT	
52-2026-07	ULG30BF-5	GLASS ONE DOOR	BOTTOM MOUNT	EXPORT (220V 50HZ)
52-1992-19	ULG30BS-5	GLASS ONE DOOR	BOTTOM MOUNT	
52-1992-20	ULG50BC-5	GLASS TWO DOOR	BOTTOM MOUNT	
52-2026-08	ULG50BF-5	GLASS TWO DOOR	BOTTOM MOUNT	EXPORT (220V 50HZ)
52-1997-22	ULG50RD-5	GLASS TWO DOOR	REMOTE BTM	
52-1992-23	ULG80BC-5	GLASS THREE DOOR	BOTTOM MOUNT	
52-2026-09	ULG80BF-5	GLASS THREE DOOR	BOTTOM MOUNT	EXPORT (220V 50HZ)
52-1997-23	ULG80RD-5	GLASS THREE DOOR	REMOTE BTM	
52-1997-32	ULS30US-5	SOLID ONE DOOR	REMOTE TOP	

This manual pertains to units produced beginning with serial number _____

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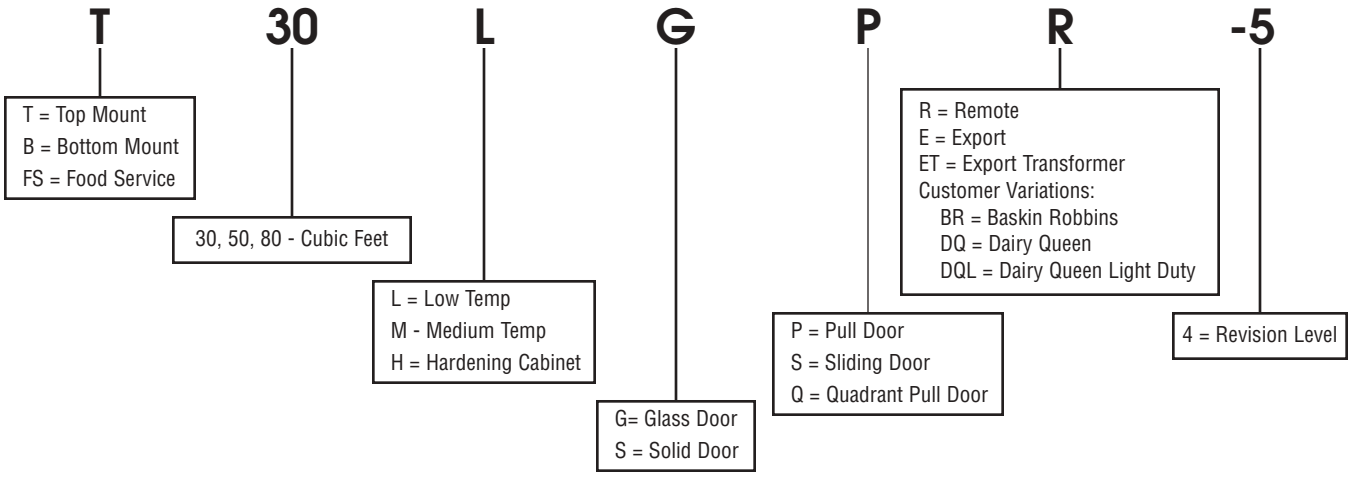
Low Temperature Vertical Freezers
Introduction

These Freezers have been designed to maintain a low temperature environment. These multi-purpose freezers are available in one-, two-, and three-door solid or glass door models.

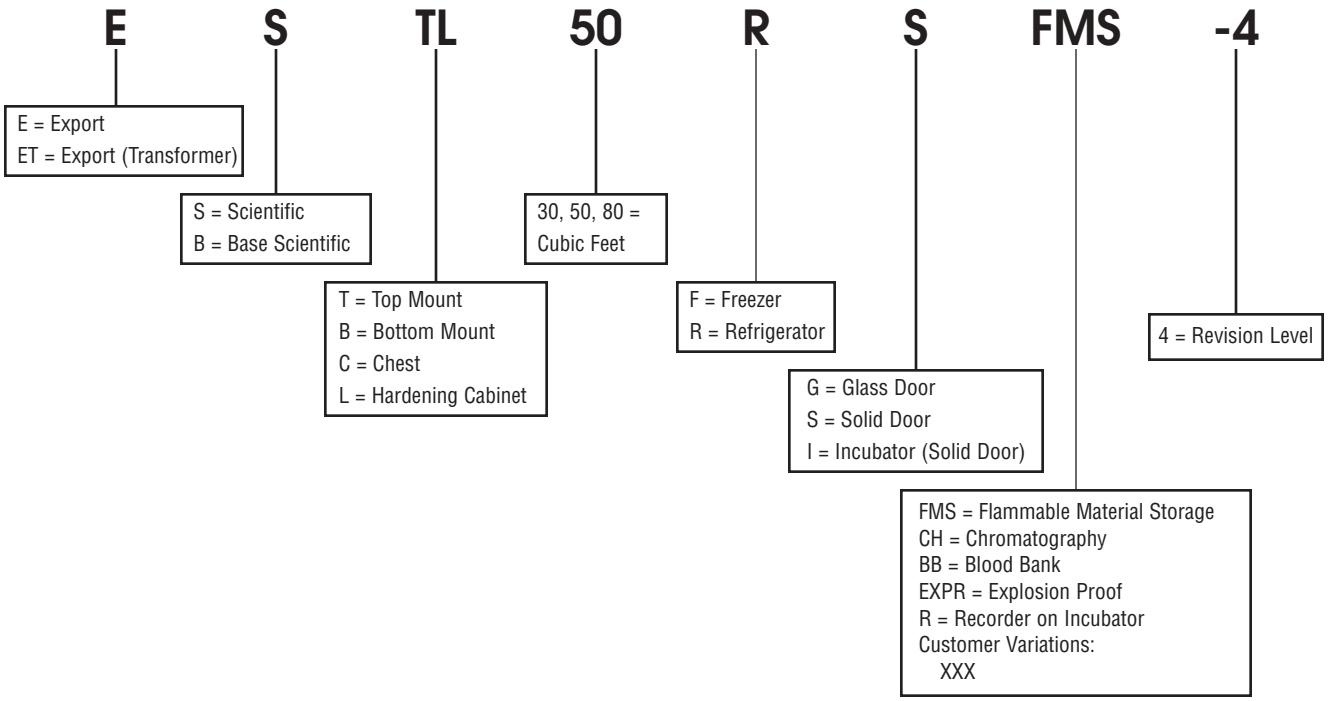
Except for routine cleaning, these low temperature cabinets will require little maintenance. In the unusual event that repair should be necessary, this manual presents information that is helpful in maintaining, diagnosing, and repairing these cabinets.

MODEL CODES

Kelvinator Model Example: T30LGPR-5

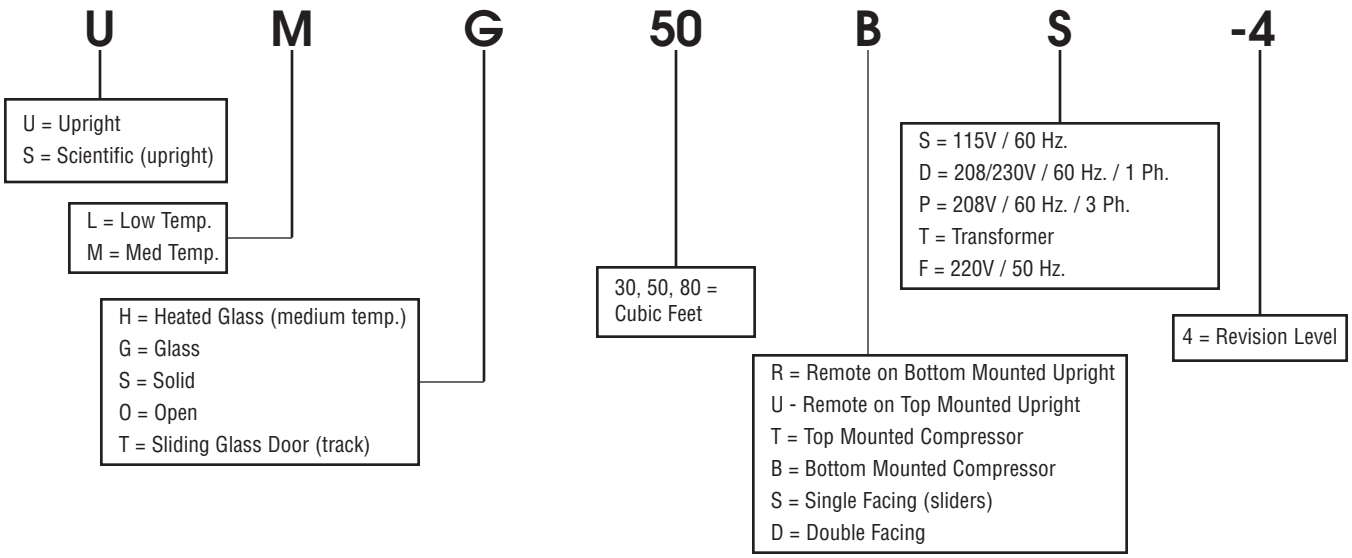


Kelvinator Scientific Model Example: ESTL50RSFMS-4



MODEL CODES

Universal Nolin Model Example: UMG50BS-4



SECTION I – HANDLING & INSTALLATION

FREIGHT DAMAGES & SHORTAGES

IMPORTANT: The cabinet was inspected and packaged at the factory, and should arrive in excellent condition. The transportation company or other parties involved in the shipment are responsible for loss and/or damage. Always make an inspection before and after uncrating. Inspect the crated unit(s) before locating (preferably at the point of unloading by the transportation company).

INSPECTING FOR DAMAGES

NOTE: *Always use care when removing shipping tape, blocks, pads, hardware or other material until you are satisfied that the unit is completely operational. Contact the factory if technical assistance is required.*

Check the cartons or containers. If these are damaged in any way, open them and inspect the contents in the driver's presence. If damage is detected:

1. Have the driver note the nature and extent of the damage on the freight bill.
2. Notify the transportation company at once to request an inspection. Carrier claim policies usually require inspections to be made within 15 days of delivery.
3. If damage is noticed, file a claim with the transportation company.

FILING A CLAIM

File a claim for loss at once with the transportation company for:

A. A cash adjustment; B. Repairs; or C. Replacement.

When filing your claim, retain all packaging materials and receipts.

HANDLING THE CABINET

NOTE: *The refrigeration system of the cabinet is designed to operate with the cabinet located on a level surface.* ***Do not tilt the cabinet more than 10° to any side.*** *If the cabinet must be tilted on an angle for handling or moving purposes, allow it to sit in an upright position 30 minutes prior to starting.*

CHOOSING A LOCATION

This model cabinet should be situated to allow proper air circulation. These cabinets require a 2" minimum clearance behind for proper air circulation.

The cabinet must be installed on sturdy, solid, level floor.

The cabinet must be located so it can be plugged into a properly grounded three-prong electrical outlet of 115 volt, 60 hz. The electrical outlet should not be controlled by a wall switch which might be turned off accidentally.

UNCRATING THE CABINET

The cabinet should be moved as close as possible to the operating location before removing crate base. Be sure to follow the steps in the "**INSPECTING FOR DAMAGES**" instructions.

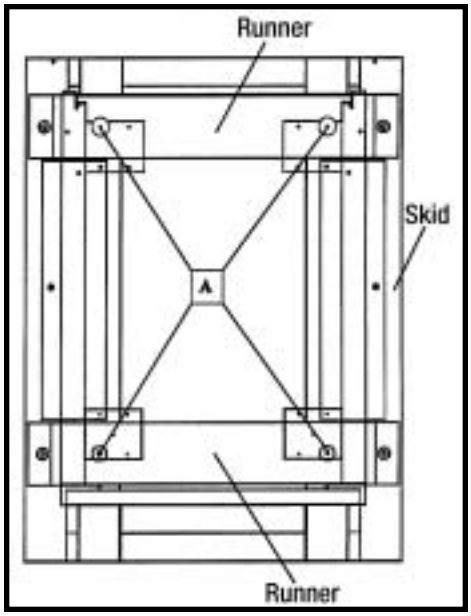
INSTALLING THE CABINET

(Models with Top Mounted Compressor)

Whenever possible leave the crate base on the cabinet until it is moved close to the final position. When it is necessary to move the cabinet through a doorway, it may be necessary to remove the crate base.

Wood runners are provided on the underside of the cabinet for ease in sliding. These runners should be left attached to the cabinet when the crate base is removed and should remain attached until after the legs are installed. The cabinet can then be pushed around more easily without scratching the floor. The runners also prevent damage to the electrical receptacle and condensate pan hardware on the cabinet bottom.

After the cabinet has been moved to the approximate final location, remove the package containing the legs from the cabinet interior. Tape the doors to prevent accidental opening when handling. Raise the sides of the cabinet high enough to mount the legs at the locations provided on the bottom of the cabinet.



IMPORTANT:

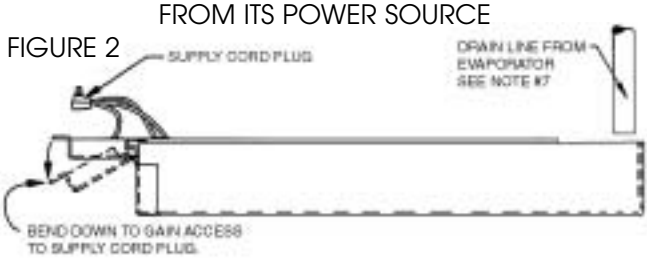
AFTER REMOVAL OF WOOD RUNNER, REPLACE BOLT "A" INTO LEG MOUNTING BRACKETS. THIS IS EXTREMELY IMPORTANT TO THE SECURE ATTACHMENT OF THE CABINET LEG. THERE MUST BE FOUR (4) BOLTS SECURING EACH LEG.

Level the cabinet by means of the leg adjustments. Cabinet doors are self-closing, and the cabinet must be level to operate properly.

CONDENSATE PAN INSTALLATION INSTRUCTIONS

MAKE SURE THE CABINET IS DISCONNECTED FROM ITS POWER SOURCE

FIGURE 2



1. Remove and discard protective cover over electrical receptacle on bottom of cabinet
2. Bend down front part of housing. (See above.)
3. Insert condensate evaporator pan assembly into the slide supports on the underside of the cabinet by pushing toward back of cabinet until it stops.
4. Plug supply cord into receptacle in underside of cabinet.
5. Bend up front part of housing. Line up slot with rivnut in cabinet bottom and insert thumbscrew through slot onto rivnut in cabinet bottom. Insert thumb screw through slot onto rivnut and tighten.
6. The assembly will now operate when power is supplied to the cabinet.
7. Inspect rear of cabinet to ensure that the drain line from the evaporator is properly positioned over the condensate pan.

On top mount models, allow a minimum of twelve (12) inches between the top of the cabinet and ceiling and two (2) inches from the back of the cabinet to the wall, for proper air circulation through the condensing unit.

(Models with Bottom Mounted Compressor)

Remove the crate base mounting clips located behind the front grill. Slide the cabinet forward on the crate base to clear the rear mounting clips.

After removing the crate base, move the cabinet into location. Make sure the cabinet is level to ensure operation of the “self-closing” doors.

Allow a minimum of two (2) inches between the back of the cabinet and the wall for proper air circulation through the condensing unit.

CABINET STARTUP

Once the cabinet has been located in its permanent location and the proper power and grounding have been provided, the following items must be checked or completed:

1. Cut and remove the compressor hold-down band (if applicable) so the compressor “floats” freely.
2. Check for traces of oil on the compressor pan which could mean a broken or leaking refrigeration line.

   UNDER NO CIRCUMSTANCE SHOULD THE COMPRESSOR BE STARTED WHEN OIL IS PRESENT UNTIL INSPECTED BY A SERVICE TECHNICIAN.
3. **INSPECT THE FACTORY WIRING FOR TERMINALS THAT MIGHT HAVE VIBRATED LOOSE IN SHIPPING. TIGHTEN ALL SCREW-TYPE TERMINALS.**
4. Check the refrigeration lines to see that they are “free” and no damage was done during shipping.
5. Check fan blade(s) for “free” operation.
6. Turn on the main power switch. Once the compressor starts, the voltage should be checked at the compressor terminals to determine if there is proper voltage to the compressor. The voltage should not exceed 10% above or below the rated compressor voltage.

EXAMPLE: If the voltage reads 115 volts with no load and it drops below 103 volts when the compressor starts, it may indicate that the supply wiring is too small or that the wire run is too long.

7. Make sure that the drain line has not been dislodged or broken during shipping and that the drain trap terminates properly in the condensate pan or floor drain. (See **Condensate Pan** on top mounted compressor.)
8. Listen for any unusual noise such as lines vibrating, etc. Correct problem by tightening screws, slightly bending tubing, etc.
9. Check proper tension on doors. (See **Door Torque Adjustment.**)
10. NOTE: Allow cabinet to pull down and cycle prior to loading with product.
11. a 2" clearance must be maintained between the back wall and product shelving to allow for proper air movement within the cabinet.

SYSTEM CONTROL/OPERATION ELECTRO-MECHANICAL

Thermostat Settings

The freezer is shipped from the factory with a thermostat setting of approximately the mid-point of the operating range. Final thermostat setting must be made in the field.

Allow the cabinet to operate until the compressor cycles on the thermostat. The normal operating temperature range for the refrigerator is:

0°F to -20°F (-17°C to -26°C) for freezer models;

0°F to -40°F (-17°C to -40°C) for low temp. freezer models;

and 5°F to 122°F (-15°C to -50°C) for incubator models

The thermostat is easily adjusted with a standard screwdriver.

NOTE: DO NOT OPERATE THE CABINET WITH THERMOSTAT SETTINGS BELOW:

-23°F (-30°C) ON FREEZERS;

-40°F (-40°C) ON LOW TEMP. FREEZERS;

The cabinet thermostat is located on the electrical box (top mount models) top left hand side of cabinet. It can be accessed without re4moving the front top panel with the use of a stepladder, and a screw driver.

Cabinet Operation (Freezer & Low Temp. Freezer)

There are two thermodiscs located on the evaporator coil. The purpose of one is to keep the evaporator fan motors and anti-condensate heater off after defrost cycles until the coil reaches 32°F (O°C). This prevents moisture from being pulled down into the product area and provides faster pull-down. The purpose of the other control is to de-energize the defrost heater and to energize the trip solenoid in the time clock to terminate the defrost cycle when the fin coil reaches 62°F (17°C).

When the refrigeration system first starts up, the room temperature and the coil temperature are above 62°F(17°C). The fan delay thermostat is open and the fans and anti-condensate heaters remain off. The fan motors will come on when the evaporator temperature is pulled down to approximately 32°F (0°). This fan delay control cannot be adjusted. If a single fan motor fails to start when the thermostat is below 32°F (0°C), it may be an indication of a defective fan motor. If all fan motors fail to start, it is an indication of a defective fan delay control.

NOTE: ON SOME MODELS, THE EVAPORATOR FANS TURN OFF WHEN THE DOORS ARE OPENED.

SYSTEM CONTROL/OPERATION ELECTRONIC (PULSE)

Note: The “Pulse” information that follows pertains to set-up and basic operation. For more comprehensive operation, repair, and maintenance information refer to the Pulse service manual part number 51-2484-00.

Display Settings

the freezer is shipped from the factory with a thermostat setting of approximately the midpoint of the operating range. Final thermostat setting must be made in the field.

The normal operating temperature ranges are:

0°F to -20°F (-17°C to -26°C) for freezer models;

0°F to -40°F (-17°C to -40°C) for low temp. freezer models;

and 5°F to 122°F (-15°C to -50°C) for incubator models

NOTE: DO NOT OPERATE THE CABINET WITH THERMOSTAT SETTINGS BELOW:

-23°F (-30°C) ON FREEZERS;

-40°F (-40°C) ON LOW TEMP. FREEZERS;

Cabinet Temperature & Defrost Management

These functions are controlled by a computerized control board located in the electrical box behind the front grill. The control board utilizes 3 inputs, a display board, and two temperature sensors. The display allows the user to monitor the change the cabinet temperature (located with-in the door frame).

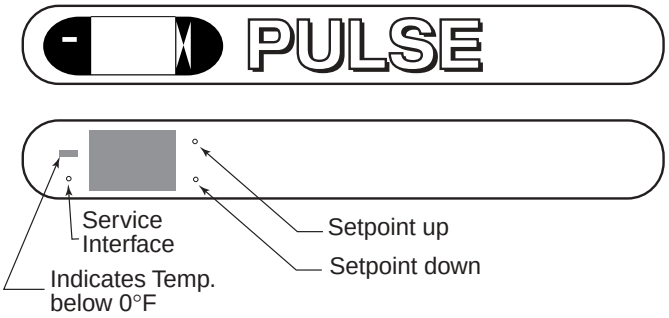
Cabinet Operation

When supply power is hooked up to cabinet and power switch is turned on. The control board has a built-in 3 minute delay on start up. The cabinet temperature display will read the current cavity temperature. The cavity temperature set point can now be set or checked by depressing lower right button on the display board. The upper right button will raise the cabinet temperature set point. this can be done with an ordinary paper clip. the lower left button is a service interface and only a qualified service technician should activate this program. the evaporator fans should start up as the coil reaches 28°F the cabinet temperature will continue to drop until the cavity temperature set point is reached.

NOTE: Control board only breaks on side of supply voltage to the compressor and defrost circuit.

Notable points

1. The system utilizes a 3 minute off cycle timer to prevent short cycles.



2. When the system initiates a defrost, the setpoint will flash on and off until the defrost is terminated and the cavity reaches the setpoint. At this time the cavity temperature will be displayed as normal.

Display Functions

NOTE: Use a paper clip to access the function keys.

1. Pressing the top right button on the display unit will raise the set point one degree. Holding the button down will scroll the adjustment.
2. Pressing the bottom right button on the display unit will lower the set point one degree. Holding the button down will scroll the adjustment. After an adjustment is made the cavity temperature will automatically return to the display after a brief moment.
3. When the system enters a defrost state, the set point will flash on and off repeatedly on the display and continue to flash until the defrost state is terminated and the cavity temperature returns to the set point. At this time the cavity temperature will be displayed as normal.
4. Touching any key on the display will acknowledge and turn off the local audible alarm as well as the optional remote alarm.

IMPORTANT: When the freezer is plugged in or anytime power is disrupted and then restored, the system will pull down to the set point, begin the cycle, and then initiate a defrost in 3.2 hours from initial start-up. This is normal and is part of the initialization mode for the microcontroller to collect data from the system.

The Service Interface and the Service Menu

The service menu offers the service technician direct control of the components of the system. This allows the technician to force the system into a defrost state or the refrigeration state. This feature also allows the technician to toggle the state in order to analyze separate components of the system (e.g., start kit, compressor, heaters, etc.).

1. To access the service menu, press and hold lower left button on the display with a paper clip for 2 seconds. The system will enter the service menu and **c0** will alternately flash with evaporator temperature. This is the top of the service menu. to exit the service menu, press the service key again at any time.
2. The service menu offers five functions: Refrigeration state, Defrost state, code revision level indication, the option to blank the display (code version 1.6 and later),

Celsius or Fahrenheit operation (code version 1.6 and later), and Error code history (code 3.1 and later). While in the service menu, the down key serves to scroll the men and the up key serves as a toggle 6to activate and deactivate the function state.

A. Hold lower left button for 2 seconds to enter service menu.

1. Upper right key toggles current menu item “on” (indicated by a “1” in the right hand digit of the display and an “off” (indicated by a “0” in the right hand digit of display).

2. Lower right key scrolls down through the menu.

a) 1st item: Refrigeration state (on or off)/ evaporated temp. This state is denoted by a “C0” or a “C1” on the display alternately flashing with the evaporator temperature.

b) 2nd Item: Defrost state (on or off) This state is denoted by a “d0” or a “d1” on the display.

c) 3rd Item: Code version (passive state, no action)

d) 4th Item: Display state (on or off) This state is denoted by a “S0” or a “S1”. Note: Does not turn off display o error codes.

e) 5th Item: Temperature state (Fahrenheit or Celsius) This state is denoted by a “F” or a “C”.

f) 6th Item: Error Code history (view and clean) This state allows the ability to view and clean the last three error codes encountered by the unit. If no errors occurred since last cleaned, this item is skipped and display returns to 1st item.

3 3. Lower left key to exit service menu.

Notes: a. When an attempt is made to scroll the menu while a function state is active, the active function state will automatically deactivate. This is to prevent the service technician from simultaneously activating the Refrigeration state and the Defrost state. Only one function may be active at any give time.

b. If no operation is performed within 45 minutes while in the service menu, the system will automatically exit the service menu and return to normal refrigeration.

c. If the Defrost state is activated and left unattended, the service menu will terminate the defrost as normal on evaporator temperature; otherwise, the defrost will terminate in 45 minutes. Upon defrost termination the system will automatically exit the service menu.

d. When the system exits the service menu, the compressor will not start for 3 minutes.

e. The off cycle timer is not incorporated in the service menu so the service technician has direct control of components.

SCIENTIFIC CONTROL AND ANNUNCIATOR PANELS

Cabinets for Scientific use may be equipped with a variety of optional control, alarm, and recorder devices. Each cabinet is shipped with the appropriate operators manual for the device installed on the cabinet. These operator manuals pertain to the set-up and basic operation of the control panel devices. For more comprehensive operation, repair, and maintenance information refer to the control panel service manual part number 51-0170-01.

QUAD DOOR HARDENING FREEZER

These cabinets were developed for low temperature storage (-30°F, -34°C + -40°F, -40°C). Defrost timer to be set 8 A.M., 4 P.M. and 12 P.M. Failsafe to be set at 30 minutes. Defrost will terminate by time only. The temperature control is located on the side of the electrical box. It can be adjusted without removing the upper control panel.

Ways to Minimize Frost & Ice Buildup Inside Hardening Freezers

Moisture-laden air migrates into the freezer during door opening and under normal operation, will be absorbed or removed by the refrigeration system and the defrost cycle.

The lover the temperature is in the freezer, the more rapidly frost and ice will accumulate. Opening doors frequently will also increase frost and ice buildup.

There are several things that you can do to reduce the accumulation of lice/frost on the interior parts of the cabinet and product. If this icing condition exists, the following items should be checked and corrected as required.

1. Minimize door openings by using the hardening freezer to harden the product, then move to a storage or display freezer that is less critical in temperature.

2.Keep the length of time door is open to a minimum.

3. Avoid opening all doors at once. Open only one of the outer doors plus only one of the inner doors (top or bottom) at one time on the hardening freezer.

4. Check the door gaskets for possible air leaks. Look for frost patches around the door openings of both the inner and outer doors. Make sure that gasket seals all around door opening; any leak will allow moist outside air to enter the cabinet.

5. Make sure the inner door latches work properly.

6. These freezers are designed to operate in a range of -15° to -40°F. Keep freezer thermostat set as high as possible to minimize frost buildup.

7. Look for moisture draining from the drain tube at the rear of the cabinet during and and after a defrost. This is normal and tells you that the unit is going through the proper defrost cycle.The drain must be properly trapped as shipped from the factory.

8. Evaporator defrost heater and the drain tube heater must work properly and have proper voltage supply. The one- and two-door freezers are rated at 115 volts.

9. The defrost heater and drain heater must be in their proper locations.

10. Ensure that the freezer is sealed where tubing enters upper lefthand corner of the cabinet.

11. The freezer should not be located where excessive drafts from doors or air conditioning vents can blow into it.

NOTE:

These cabinets come from the factory with defrosts set from 8 a.m., 4 p.m., and 12 a.m. on a 24-hour cycle. Do not adjust the failsafe time since the freezers terminate on time only.

GROUNDING INSTRUCTIONS

This appliance is equipped with a three-prong (grounding) plug for your protection against shock hazards. The appliance should be plugged directly into a properly grounded three-prong receptacle.

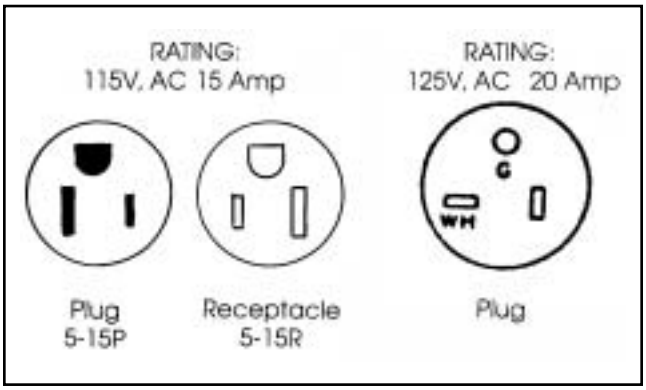
Where a two-prong wall receptacle is encountered, it must be replaced with a properly grounded three prong receptacle in accordance with the National Electrical Code and local codes and ordinances. The work must be done by a licensed electrician.

IMPORTANT

Do not under any circumstances cut or remove the round grounding prong from the equipment plug.

WARNING

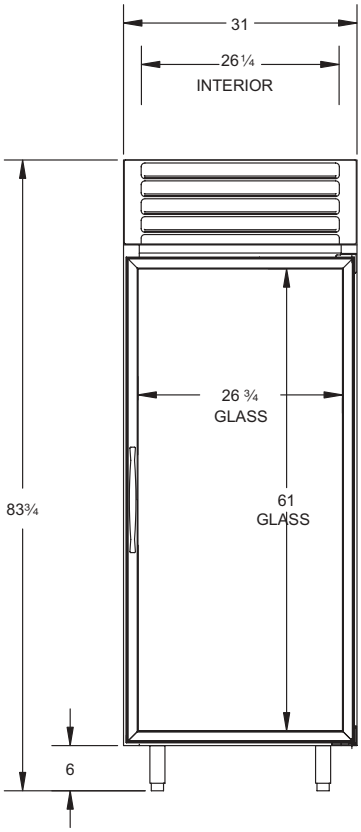
Consult a licensed electrician if you have any doubt about the grounding of your wall receptacle. Only a licensed electrician can determine the polarization of your wall receptacle. Only a properly installed three-pronged wall receptacle assures the proper polarization with the equipment plug.

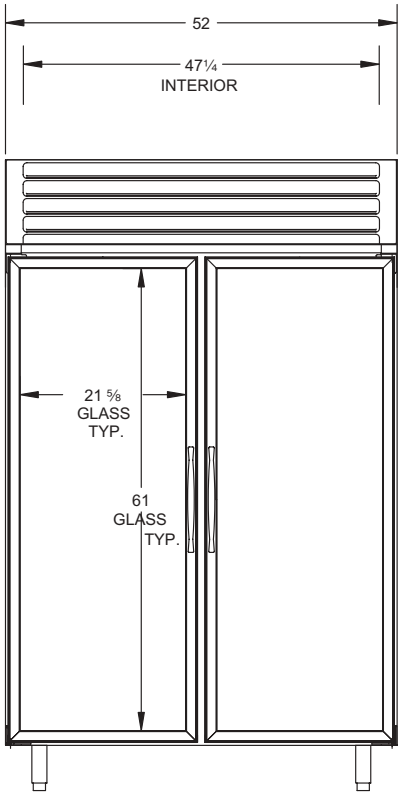


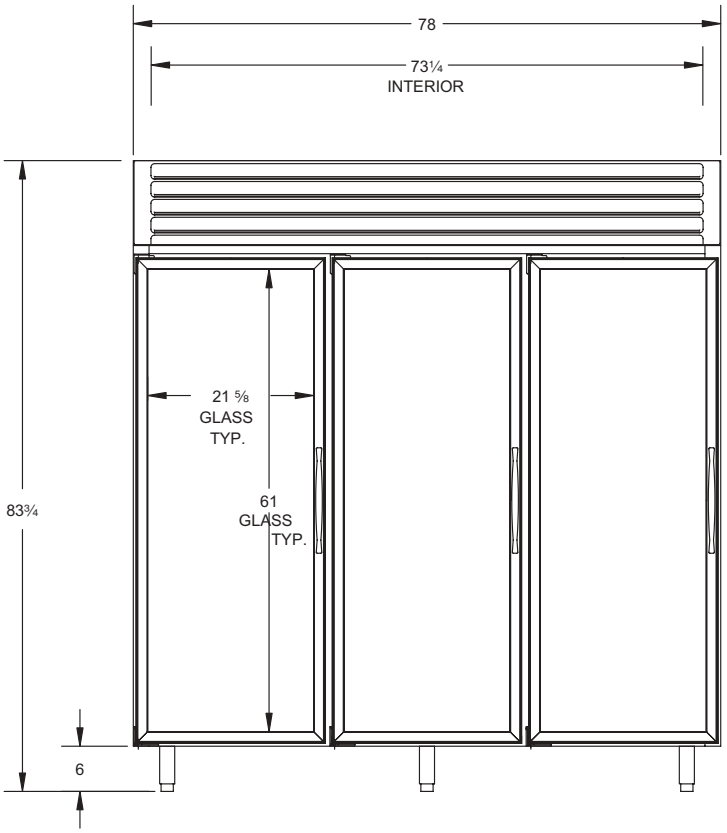
SERIAL RATING PLATES

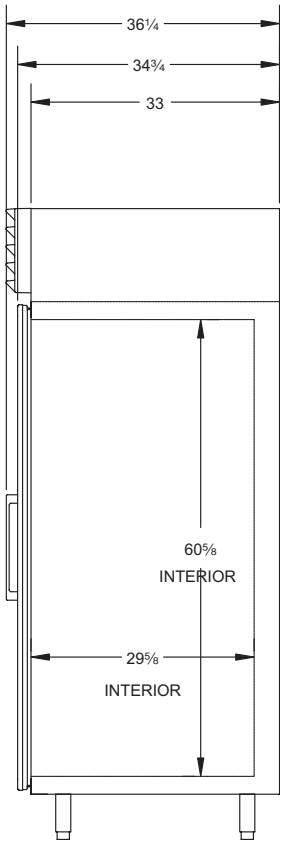
Serial Number Rating Plates on each vertical cabinet are located on the inside upper left hand corner. This plate contains all technical data necessary to the operation of the cabinet. Warranty administration is based on the serial number as printed on the rating plate.

Low Temperature, Top Mount, Glass Pull Door Freezers Dimensional Drawings







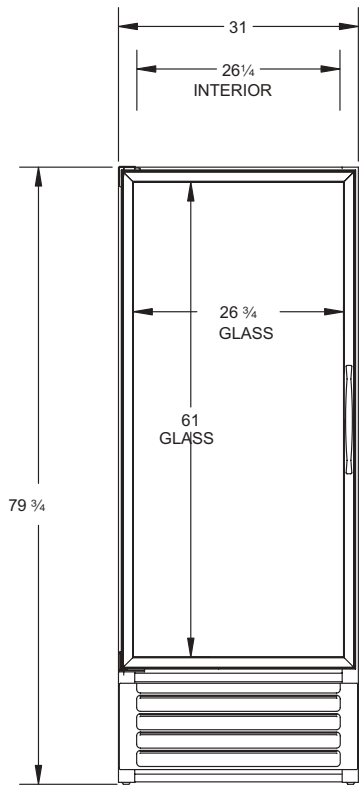


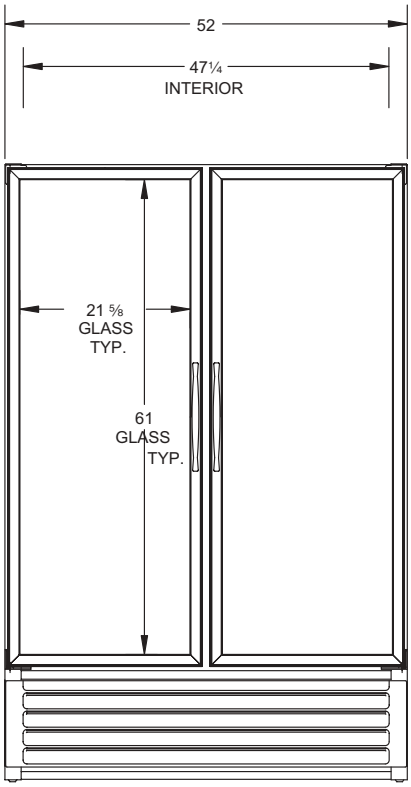
SIDE VIEW

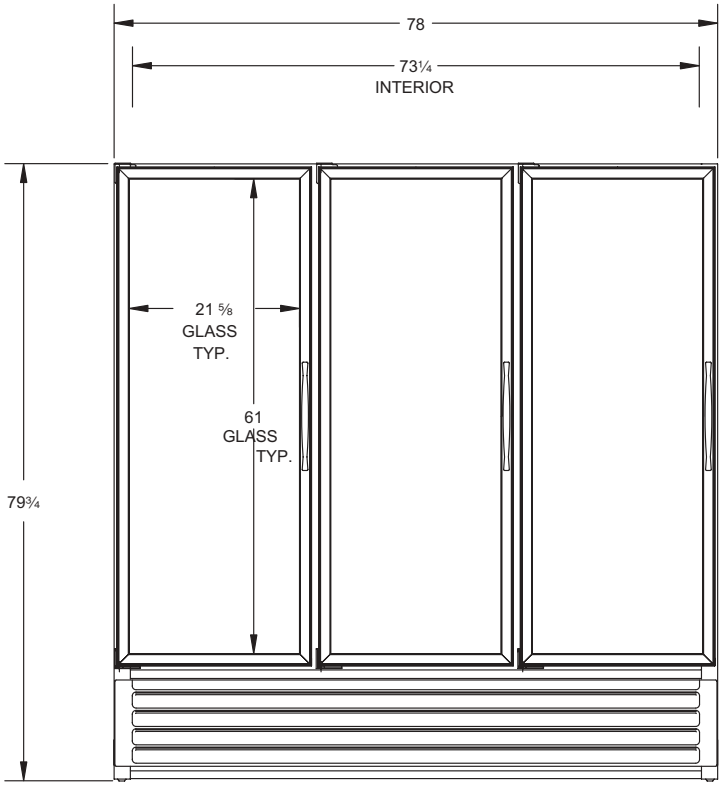
Low Temperature, Top Mount, Glass Pull Door Freezers Specifications

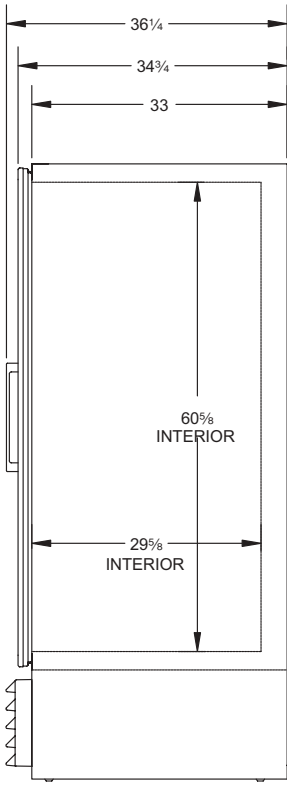
Specification	1-Door	2-Door	3-Door
Compressor Mount	Top	Top	Top
Temperature Range	0° to 20° (-18° to 29°C)	0° to 20° (-18° to 29°C)	0° to 20° (-18° to 29°C)
Number of Doors	1	2	3
Door Construction	Triple Pane	Triple Pane	Triple Pane
Hinge Type	Torsion Bar	Torsion Bar	Torsion Bar
Number of Shelves	4	8	12
Shelf Type	Cantilever Epoxy Coated	Cantilever Epoxy Coated	Cantilever Epoxy Coated
Shelf Adj.	3/4"	3/4"	3/4"
Insulation - CFC-Free	Foam-in-Place Urethane	Foam-in-Place Urethane	Foam-in-Place Urethane
Wall Thickness	2 3/8"	2 3/8"	2 3/8"
Capacity - Gross	27.3 $ft.^3$	49.1 $ft.^3$	76.2 $ft.^3$
Capacity (1/2 gal. ice cream)	183	366	549
Shipping Weight (Approx.)	520 lbs.	760 lbs.	1010 lbs.
Compressor Size.	3/4 hp	1 hp	1 1/2 hp
Condenser Type	Fin & Tube Forced Air	Fin & Tube Forced Air	Fin & Tube Forced Air
Evaporator Type	Fin & Tube Forced Air	Fin & Tube Forced Air	Fin & Tube Forced Air
Refrigerant Type	R-404A	R-404A	R-404A
Refrigerant Control	Expansion Valve	Expansion Valve	Expansion Valve
Amp Rating	16	14.6	16
Electrical Specs. (V / Hz / Ph)	115 / 60 / 1	115 / 208-230 / 60 / 1	115 / 208-230 / 60 / 1
NSF	NSF7	NSF7	NSF7
UL & CSA Listed	Yes	Yes	Yes
Interior Finish	Baked Enamel, Covered Corners	Baked Enamel, Covered Corners	Baked Enamel, Covered
Corners			
Exterior Finish	Baked Enamel	Baked Enamel	Baked Enamel
Sign Panel	Optional	Optional	Optional
Lighting	2 Insul. 1500 Milliamp Fluor. Lamps	3 Insul. 1500 Milliamp Fluor. Lamps	4 Insul. 1500 Milliamp Fluor. Lamps

Low Temperature, Bottom Mount, Glass Pull Door Freezers Dimensional Drawings







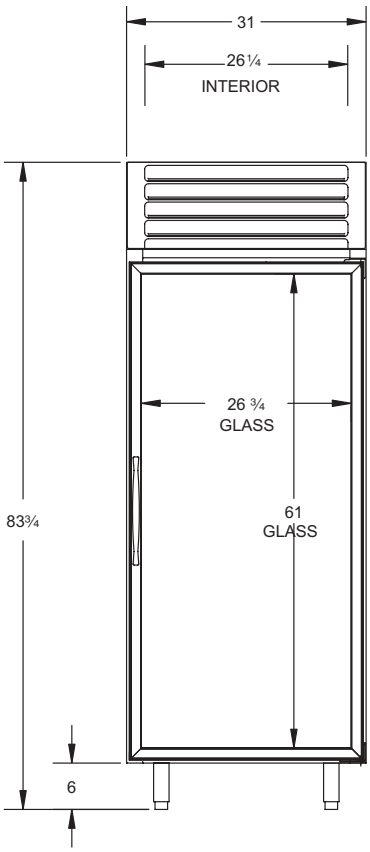


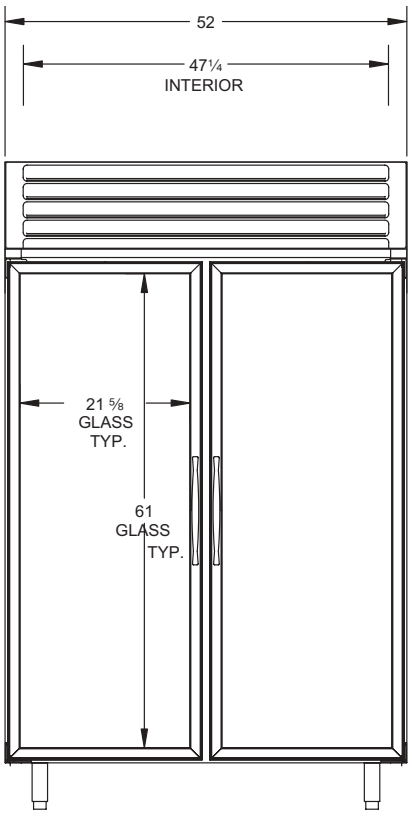
SIDE VIEW

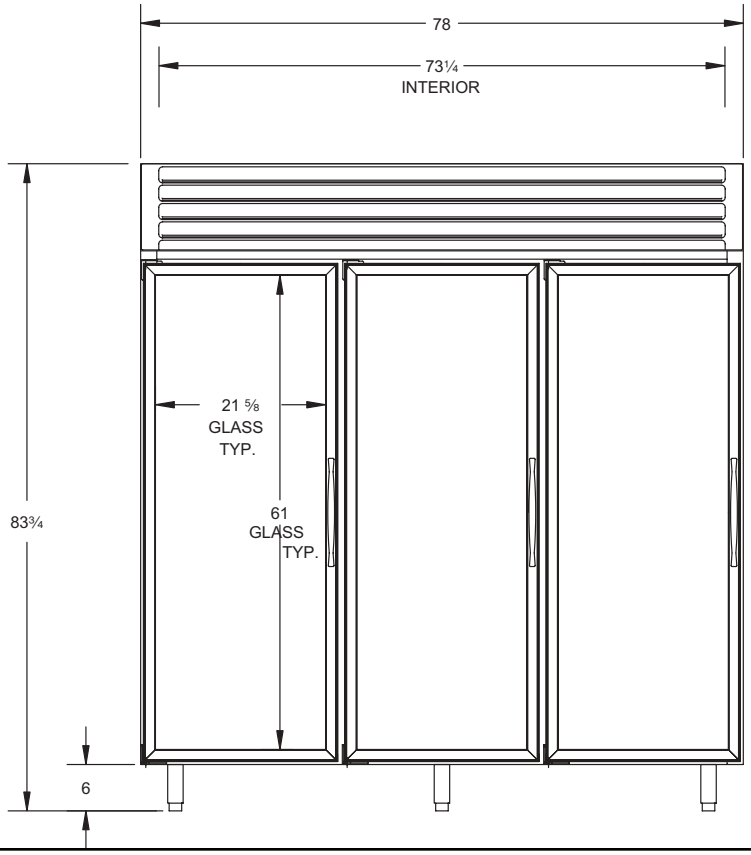
Low Temperature, Bottom Mount, Glass Pull Door Freezers Specifications

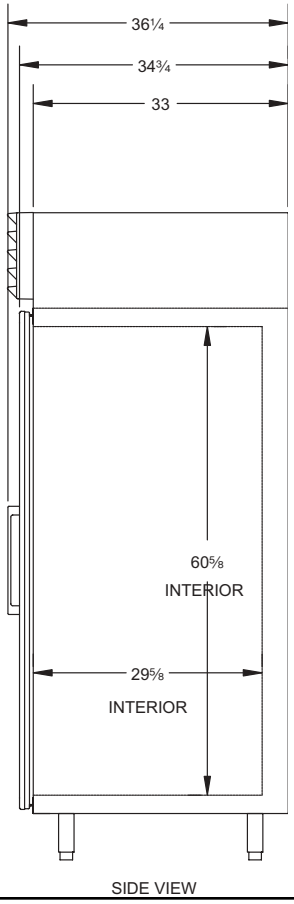
Specification	1-Door	2-Door	3-Door
Compressor Mount	Bottom	Bottom	Bottom
Temperature Range	0° to -20° (-18° to -29°C)	0° to -20° (-18° to -29°C)	0° to -20° (-18° to -29°C)
Number of Doors	1	2	3
Door Construction	Triple Pane	Triple Pane	Triple Pane
Hinge Type	Torsion Bar	Torsion Bar	Torsion Bar
Insulation - CFC-Free	Foam-in-Place Urethane	Foam-in-Place Urethane	Foam-in-Place Urethane
Wall Thickness	2 3/8"	2 3/8"	2 3/8"
Capacity - Gross	27.3 $ft.^3$	49.1 $ft.^3$	76.2 $ft.^3$
Shipping Weight (Approx.)	516 lbs.	705 lbs.	984 lbs.
Compressor Size	3/4 hp	1 hp	1 1/2 hp
Condenser Type	Fin & Tube Forced Air	Fin & Tube Forced Air	Fin & Tube Forced Air
Evaporator Type	Fin & Tube Forced Air	Fin & Tube Forced Air	Fin & Tube Forced Air
Refrigerant Type	R-404A	R-404A	R-404A
Refrigerant Control	Expansion Valve	Expansion Valve	Expansion Valve
Amp Draw	14.6	13.0	16.0
Electrical Specs. (V / Hz / Ph)	115 / 60 / 1	208/230-60-1	208/230-60-1
NSF	NSF7	NSF7	NSF7
UL & CSA Listed	Yes	Yes	Yes
Interior Finish	Baked Enamel, Covered Corners	Baked Enamel, Covered Corners	Baked Enamel, Covered
Corners			
Exterior Finish	Baked Enamel	Baked Enamel	Baked Enamel
Lighting	2 Insul. 1500 Milliamp Fluor. Lamps	3 Insul. 1500 Milliamp Fluor. Lamps	4 Insul. 1500 Milliamp Fluor. Lamps
Electrical Information	20 Amp Service Cord	20 Amp Service Cord	20 Amp Service Cord

Low Temperature, Top Mount, Solid Pull Door Freezers
Dimensional Drawings









SIDE VIEW

Low Temperature, Top Mount, Solid Pull Door Freezers Specifications

Specification	1-Door	2-Door	3-Door
Compressor Mount	Top	Top	Top
Temperature Range	0° to -20° (-18° to -29°C)	0° to -20° (-18° to -29°C)	0° to -20° (-18° to -29°C)
Number of Doors	1	2	3
Door Construction	Foam-In-Place	Foam-In-Place	Foam-In-Place
Hinge Type	Camlift / Spring	Camlift / Spring	Camlift / Spring
Number of Shelves	4 x 1 bottom rack	8 x 2 bottom racks	12 x 3 bottom racks
Shelf Type	Cantilever, Epoxy Coated Steel Wire	Cantilever, Epoxy Coated Steel Wire	Cantilever, Epoxy Coated Steel Wire
Shelf Adj.	3/4"	3/4"	3/4"
Insulation - CFC-Free	Foam-in-Place Urethane	Foam-in-Place Urethane	Foam-in-Place Urethane
Wall Thickness	2 3/8"	2 3/8"	2 3/8"
Capacity - Gross	27.3 $ft.^3$	49.1 $ft.^3$	76.2 $ft.^3$
Shipping Weight (Approx.)	460 lbs.	660 lbs.	870 lbs.
Compressor Size	1/2 hp	1/2 hp	3/4 hp
Condenser Type	Fin & Tube Forced Air	Fin & Tube Forced Air	Fin & Tube Forced Air
Evaporator Type	Fin & Tube Forced Air	Fin & Tube Forced Air	Fin & Tube Forced Air
Refrigerant Type	R-404A	R-404A	R-404A
Refrigerant Control	Expansion Valve	Expansion Valve	Expansion Valve
Amp Draw (80° Running)	7.3	13.0	16.0
Electrical Specs. (V / Hz / Ph)	115 / 60 / 1	115/60/1	115/60/1
NSF	NSF7	NSF7	NSF7
UL & CSA Listed	Yes	Yes	Yes
Interior Finish	Baked Enamel, Covered Corners	Baked Enamel, Covered Corners	Baked Enamel, Covered
Corners			
Electrical Information	15 Amp Service Cord	20 Amp Service Cord	20 Amp Service Cord

Low Temperature, Top Mount, Solid Pull Door Hardening/Flash Freezers -Specifications

Specification	1-Door Hardening Cabinet	Quad Door Hardening Cabinet	Quad Door Flash Freezer
Compressor Mount	Top -	Top	Top
Temperature Range	0° to -30° (-18° to -34°C)	0° to -30° (-18° to -34°C)	0° to -40° (-18° to -40°C)
Number of Doors	1 Outer, 2 Inner	4 Outer	4 Outer
Door Construction	Foam-In-Place on Outer Door	Foam-In-Place	Foam-In-Place
Hinge Type	Camlift / Spring	Camlift / Spring	Camlift / Spring
Number of Shelves	4 x 1 bottom rack	8 x 2 bottom racks	8 x 2 bottom racks
Shelf Type	Cantilever, Epoxy Coated Steel Wire	Cantilever, Epoxy Coated Steel Wire	Cantilever, Epoxy Coated Steel Wire
Shelf Adj.	3/4"	3/4"	3/4"
Insulation - CFC-Free	Foam-in-Place Urethane	Foam-in-Place Urethane	Foam-in-Place Urethane
Wall Thickness	2 3/8"	2 3/8"	2 3/8"
Capacity - Gross	27.3 ft.^{3}	49.1 ft.^{3}	41.9 ft.^{3}
Shipping Weight (Approx.)	460 lbs.	660 lbs.	660 lbs.
Compressor Size	1/2 hp	3/4 hp	11/2 hp
Condenser Type	Fin & Tube Forced Air	Fin & Tube Forced Air	Fin & Tube Forced Air
Evaporator Type	Fin & Tube Forced Air	Fin & Tube Forced Air	Fin & Tube Forced Air
Refrigerant Type	R-404A	R-404A	R-404A
Refrigerant Control	Expansion Valve	Expansion Valve	Expansion Valve
Amp Draw (80° Running)	11.5	16.0	7.4
Electrical Specs. (V / Hz / Ph)	115 / 60 / 1	115/60/1	115/208-230/60/1
NSF	NSF7	NSF7	NSF7
UL & CSA Listed	Yes	Yes	Yes
Interior Finish	Baked Enamel, Covered Corners	Baked Enamel, Covered Corners	Baked Enamel, Covered
Corners			
Exterior Finish	Baked Enamel	Baked Enamel	Baked Enamel
Electrical Information	20 Amp Service Cord w/NEMA 5-20P Plug	20 Amp Service Cord w/NEMA 5-20P Plug	Conduit Connected max. fuse size 15A

SECTION II

Electrical

and

Refrigeration

ELECTRICAL & REFRIGERATION SPECIFICATIONS
Low Temp., Glass, 1-Door Freezers

SYSTEM COMPONENTS

Compressor Model Number	Copeland KAJB-007E-1AA
Cabinet Volts	115/60/1
Expansion Device	Sporlan Y1232-FBS 1/4
Charge Refrig. Type / Oz. / Grams	404A / 18 oz. / 510 grams

SYSTEM PERFORMANCE

AMBIENT	**70°F / 21.1°C**	**80°F / 27°C**	**90°F / 32.5°C**
Cavity Temp. (F/C)	-6 / -21	-7 / -22	-9 / -23
Suction Pressure (PSIG / Kpa)	4.0 / 27.6	4.0 / 27.6	5.0 / 34
Discharge Pressure (PSIG / Kpa)	201/1385	233/1537	247/1703
Compressor Amps	9.9	9.6	9.8
Total Refrigeration Amps	13.7	13.4	13.6

Low Temp., Solid, 1-Door Freezer

SYSTEM COMPONENTS

Compressor Model Number	Americold HP121-1-3087
Recommended Operating Temp. Range (F/C)	0°F to -20°F (-18°C to -29°C)
Cabinet Volts	115/60/1
Expansion Device	Sporlan Y1232-FBS 1/4
Charge Refrig. Type / Oz. / Grams	R404A / 22 oz. / 623.7 grams

SYSTEM PERFORMANCE

AMBIENT	**70°F / 21.1°C**	**80°F / 27°C**	**90°F / 32.5°C**
Cavity Temp. (F/C)	-4 / -20	-5 / -21	-6 / -7
Suction Pressure (PSIG / Kpa)	12	8.7	12.5
Discharge Pressure (PSIG / Kpa)	194	210	220
Compressor Amps	2.9	2.7	2.8
Total Refrigeration Amps	5.4	5.4	5.4

ELECTRICAL & REFRIGERATION SPECIFICATIONS
Low Temp., Glass, 2-Door Freezers

SYSTEM COMPONENTS

Compressor Model Number	Copeland KALB-010E-CAV
Recommended Operating Temp. Range (F/C)	0°F to -20°F (-18°C to -29°C)
Cabinet Volts	115/208-230/60/1
Expansion Device	Sporlan Y1232-FBS 1/4
Charge Refrig. Type / Oz. / Grams	R404A / 29 oz. / 822.9 grams

SYSTEM PERFORMANCE

AMBIENT	**70°F / 21.1°C**	**80°F / 27°C**	**90°F / 32.5°C**
Cavity Temp. (F/C)	-6 / -21	-6.5 / -21	-7.5 / -22
Suction Pressure (PSIG / Kpa)	6.7 / 46	7.0 / 48	7.6 / 52
Discharge Pressure (PSIG / Kpa)	213/1468	223/1537	250/1723
Compressor Amps	5.0	5.0	5.0
Total Refrigeration Amps	6.0	6.0	6.0

Low Temp., Solid, 2-Door Freezer

SYSTEM COMPONENTS

Compressor Model Number	Copeland KAGB-005E-IAA
Recommended Operating Temp. Range (F/C)	0°F to -20°F (-18°C to -29°C)
Cabinet Volts	115/60/1
Expansion Device	Sporlan Y1232-FBS 1/4
Charge Refrig. Type / Oz. / Grams	R404A / 22 oz. / 623.7 grams

SYSTEM PERFORMANCE

AMBIENT	**70°F / 21.1°C**	**80°F / 27°C**	**90°F / 32.5°C**
Cavity Temp. (F/C)	-3 / -19	-4 / -20	-4.5 / -21
Suction Pressure (PSIG / Kpa)	9 / 62	9 / 62	9.5 / 65
Discharge Pressure (PSIG / Kpa)	222 / 1530	240 / 1654	265 / 1827
Compressor Amps	8.0	8.0	8.0
Total Refrigeration Amps	11.0	11.0	11.0

ELECTRICAL & REFRIGERATION SPECIFICATIONS
Low Temp., Glass, 3-Door Freezers

SYSTEM COMPONENTS

Compressor Model Number	Copeland KATB-015E-CAV
Recommended Operating Temp. Range (F/C)	0°F to -20°F (-18°C to -29°C)
Cabinet Volts	115/208-230/60/1
Expansion Device	Sporlan Y1232-FBS 1/2
Charge Refrig. Type / Oz. / Grams	R404A / 42 oz. / 1190.7 grams

SYSTEM PERFORMANCE

AMBIENT	**70°F / 21.1°C**	**80°F / 27°C**	**90°F / 32.5°C**
Cavity Temp. (F/C)	-7 / -22	-8 / -22	-14 / -26
Suction Pressure (PSIG / Kpa)	5.0 / 34	6.5 / 44	8.5 / 58
Discharge Pressure (PSIG / Kpa)	191/1316	223/1606	262/1806
Compressor Amps	6.5	6.9	7.1
Total Refrigeration Amps	8.2	8.5	8.7

Low Temp., Solid, 3-Door Freezer

SYSTEM COMPONENTS

Compressor Model Number	Copeland KAJB-007E-IAA
Recommended Operating Temp. Range (F/C)	0°F to -20°F (-18°C to -29°C)
Cabinet Volts	115/60/1
Expansion Device	Sporlan Y1232-FBS 1/4
Charge Refrig. Type / Oz. / Grams	404A / 25 oz. / 708.75 grams

SYSTEM PERFORMANCE

AMBIENT	**70°F / 21.1°C**	**80°F / 27°C**	**90°F / 32.5°C**
Cavity Temp. (F/C)	-5 / -21	-6 / -21	-7 / -22
Suction Pressure (PSIG / Kpa)	7 / 48.3	7.5 / 51.7	8 / 55.2
Discharge Pressure (PSIG / Kpa)	205 / 1413	245 / 1689	270 / 1861
Compressor Amps	8.5	8.5	8.5
Total Refrigeration Amps	12.9	12.9	12.9

ELECTRICAL & REFRIGERATION SPECIFICATIONS
Hardening Cabinet, Solid, 1-Door Freezer

SYSTEM COMPONENTS

Compressor Model Number	Copeland KAGB-005E-IAA
Recommended Operating Temp. Range (F/C)	0°F to -40°F (-18°C to -40°C)
Cabinet Volts	115/60/1
Expansion Device	Sporlan Y1232-FBS 1/4
Charge Refrig. Type / Oz. / Grams	R404A / 22 oz. / 623.7 grams

SYSTEM PERFORMANCE

AMBIENT	**70°F / 21.1°C**	**80°F / 27°C**	**90°F / 32.5°C**
Cavity Temp. (F/C)	-20 / -29	-20 / -29	-20 / -29
Suction Pressure (PSIG / Kpa)	4.0 / 27	6.0 / 41	6.6 / 46
Discharge Pressure (PSIG / Kpa)	180.0/1241	228/1572	234/1613
Compressor Amps	7.8	7.9	7.8
Total Refrigeration Amps	10.3	10.3	10.2

ELECTRICAL & REFRIGERATION SPECIFICATIONS
Hardening Cabinet, Solid, Quad Door Freezer

SYSTEM COMPONENTS

Compressor Model Number	Copeland KAJB-007E-IAA
Recommended Operating Temp. Range (F/C)	0°F to -40°F (-18°C to -40°C)
Cabinet Volts	115/60/1
Expansion Device	Sporlan Y1232-FBS 1/4
Charge Refrig. Type / Oz. / Grams	R404A / 22 oz. / 623.7 grams

SYSTEM PERFORMANCE

AMBIENT	**70°F / 21.1°C**	**80°F / 27°C**	**90°F / 32.5°C**
Cavity Temp. (F/C)	-16 / -27	-18 / -28	-18 / -28
Suction Pressure (PSIG / Kpa)	2.6 / 18	3.6 / 25	4.0 / 28
Discharge Pressure (PSIG / Kpa)	200/1379	224/1544	245/1689
Compressor Amps	7.9	7.9	7.8
Total Refrigeration Amps	11.1	11.0	10.9

ELECTRICAL & REFRIGERATION SPECIFICATIONS
Flash Freezer, Solid, Quad Door

SYSTEM COMPONENTS

Compressor Model Number	KALB-015E-CAV
Recommended Operating Temp. Range (F/C)	0°F to -40°F (-18°C to -40°C)
Cabinet Volts	115/208-230/60/1
Expansion Device	Sporlan Y1232-FBS 1/2
Charge Refrig. Type / Oz. / Grams	R404A / 29 oz. / 822.15 grams

SYSTEM PERFORMANCE

AMBIENT	**70°F / 21.1°C**	**80°F / 27°C**	**90°F / 32.5°C**
Cavity Temp. (F/C)	-19	-19	-20
Suction Pressure (PSIG / Kpa)	3.3	3.7	4.3
Discharge Pressure (PSIG / Kpa)	193	219	252
Compressor Amps	5.7	5.6	5.5
Total Refrigeration Amps	9.5	9.5	5.5

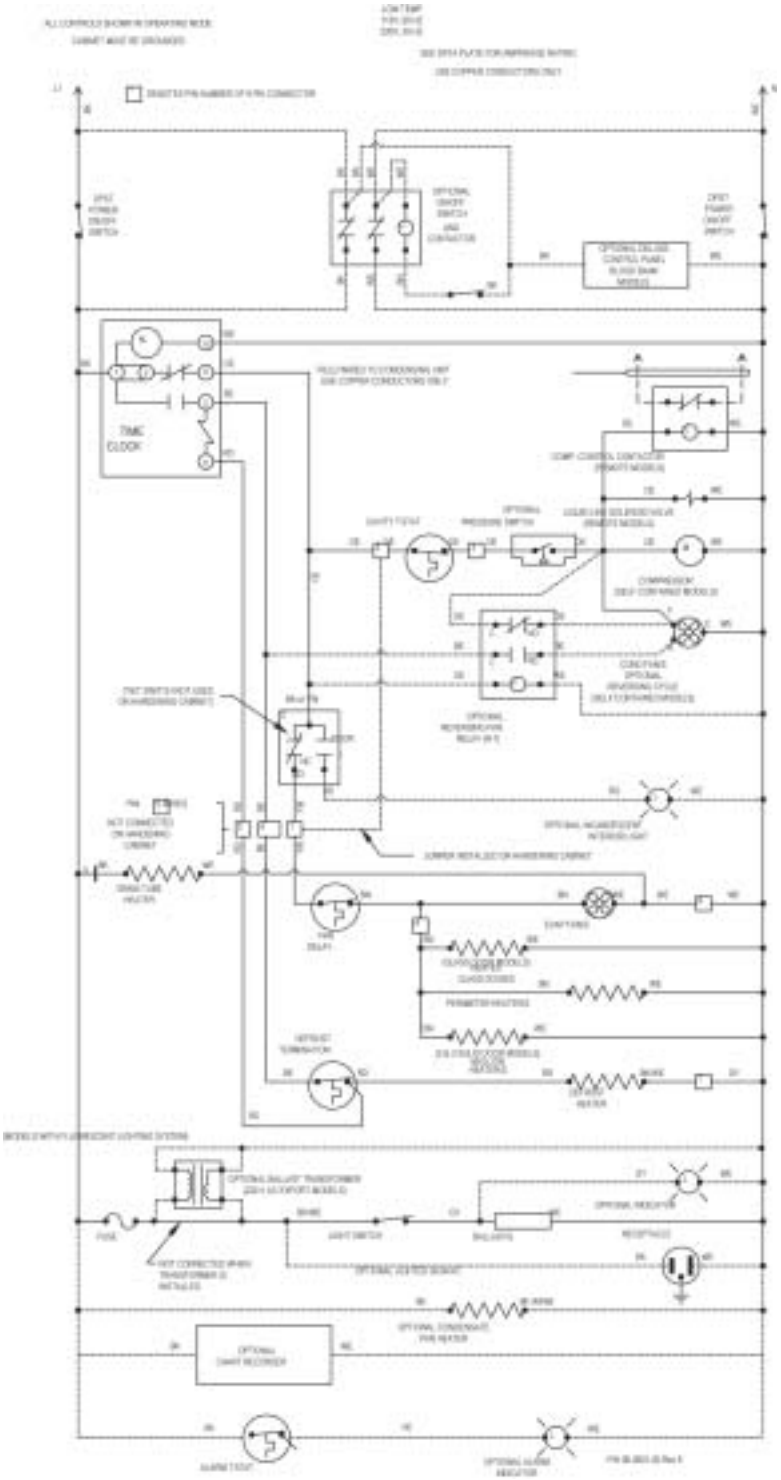
GENERAL LOW TEMPERATURE FREEZER COMPONENT SPECIFICATIONS

	1-DOOR	2-DOOR	3-DOOR
Door Heater 115V 230V	94.4 watts 140 ohms 477 ohms 110.9 watts	168 ohms 585 ohms	168 ohms 585 ohms
Perimeter Heater 115V 230V	63.8 watts 207 ohms 746 ohms 70.9 watts	230 ohms 782 ohms	230 ohms 782 ohms
Condensate Heater 115V 230 V	174 watts 76 ohms 257 ohms 205.8 watts	174 watts 76 ohms 257 ohms	174 watts 76 ohms 257 ohms
Drain Heater 115V 230V	6.0 watts 2204 ohms 7704 ohms 6.8 watts	6.0 watts 2204 ohms 7704 ohms	6.0 watts 2204 ohms 7704 ohms
Defrost Heater	Solid / Glass 16.5 ohms / 16.5 ohms 800 watts / 800 watts 115 volts / 115 volts	Solid / Glass 16.5 ohms / 46 ohms 800 watts / 1250 watts 115 volts / 240 volts	Solid / Glass 10.6 ohms / 30 ohms 1250 watts / 1927 watts 115 volts / 240 volts
Lamp	F60T10CWHO	F60T10CWHO	F6010CWHO
Evap. Fan Delay (Non-Pulse)	Close 32° / Open 52°	Close 32° / Open 52°	Close 32° / Open 52°
Defrost Termination(Non-Pulse)	Close 30° / Open 60°	Close 30° / Open 60°	Close 30° / Open 60°
Defrost Time/Temp Failsafe	40 min.	40 min	40 min.
Hardening Cabinets Defrost Time/Time	30 min.	30 min.	N/A
Hardening Cabinet Center Mullion Vertical 115V 230V	N/A	73.5 watts 179 ohms 719 ohms	N/A
Hardening Cabinet Mullion 115V 230V	1511 ohms	8.75 watts 1548 volts 6194 ohms	N/A
CPR Valve 4&6	10PSIG	10PSIG	10PSIG

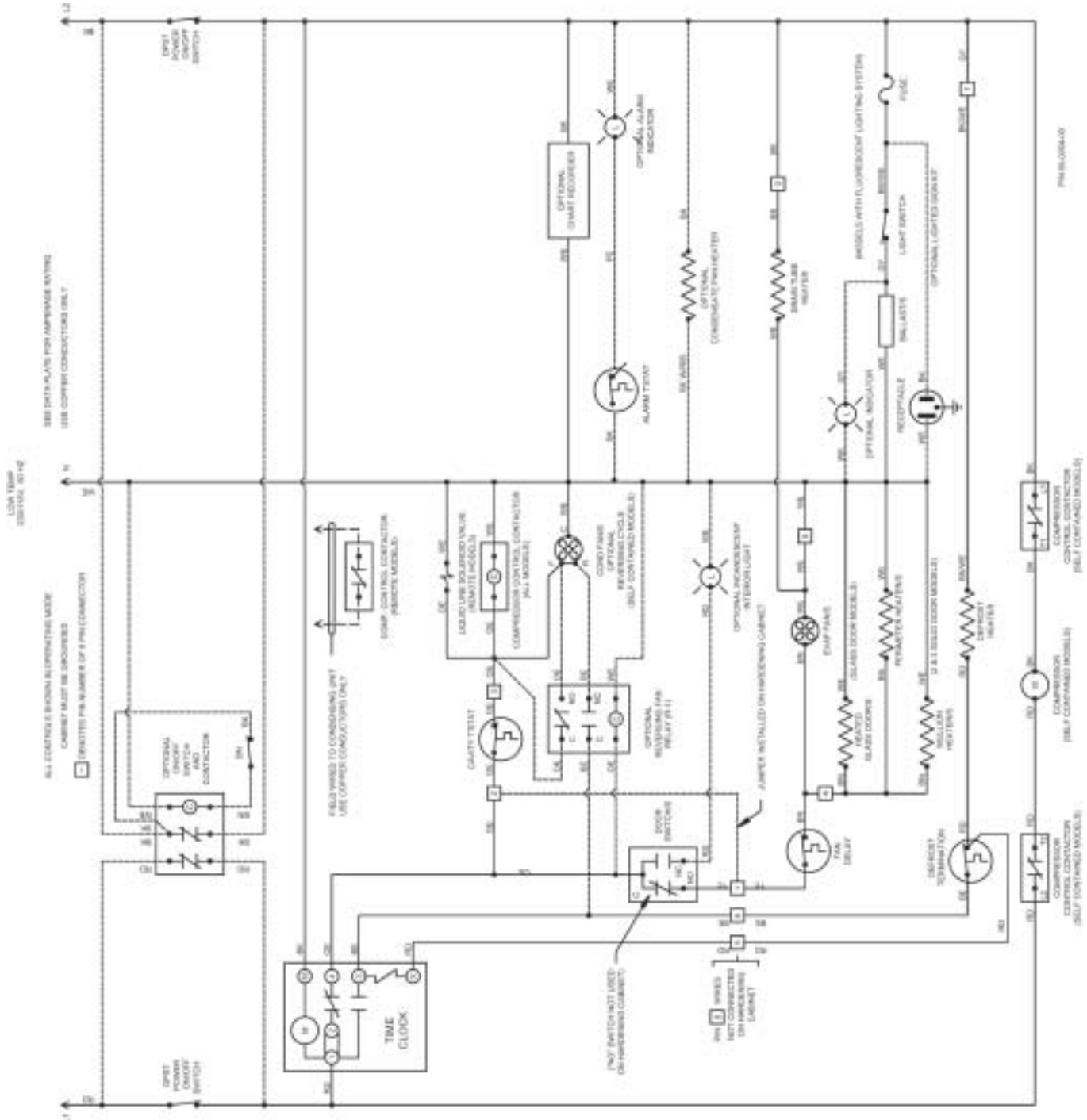
WIRING DIAGRAM REFERENCE

MODELS	LADDER	COMPRESSOR	ELECT BOX	DOOR SWITCH, RACEWAY	ANTI-SWEAT HTR, RACEWAY	INCAND LIGHT, RACEWAY	EVAPORATOR	LIGHTS, FLUORESCENT	SOLENOID	CONTROL PANEL
BT30CW-EXPR	26-0983-00									
BT30CWFMS-2	00-0430-00									
BT30FS-4	00-0051-00	00-0071-00	00-0062-00	00-0061-03	00-0061-04	00-0061-05	00-0050-02			00-0058-01
BT50FS-4	00-0051-00	00-0072-00	00-0062-00	00-0061-02	00-0061-04	00-0061-05	00-0050-02			00-0058-01
BT80FS-4	00-0051-00	00-0068-00	00-0062-00	00-0061-03	00-0061-04	00-0061-05	00-0050-02			00-0058-01
BTL30FS-4	00-0051-00	00-0072-00	00-0062-00		00-0061-04	00-0061-05	00-0050-02			00-0058-01
BTQ50FSHD-4	00-0054-00	00-0069-00	00-0063-00		00-0061-04		00-0050-02			00-0058-01
ST30FSBB-4	00-0051-00	00-0071-00	00-0062-00	00-0061-03	00-0061-04	00-0061-05	00-0050-02			00-0017-11
STL30FSBB-4	00-0051-00	00-0072-00	00-0062-00		00-0061-04	00-0061-05	00-0050-02			00-0017-11
T30HSP-4	00-0051-00	00-0072-00	00-0062-00		00-0061-04		00-0050-02			
T30LGP-5	00-0107-00	00-0068-00	00-0109-00	00-0061-01	00-0061-04		00-0050-05	00-0067-01		
T30LGPE-5	00-0107-00	00-0069-00	00-0112-00	00-0061-01	00-0061-04		00-0050-05	00-0067-04		
T30LGPRBR-5	00-0107-00		00-0109-00	00-0061-01	00-0061-04		00-0050-05	00-0067-01	00-0060-00	
T30LSP-5	00-0107-00	00-0071-00	00-0109-00	00-0061-01	00-0061-04		00-0050-05			
T30LSPHD-5	00-0107-00	00-0072-00	00-0109-00	00-0061-01	00-0061-04		00-0050-05			
T50HSQHP-4	00-0054-00	00-0069-00	00-0063-00		00-0061-04		00-0050-02			
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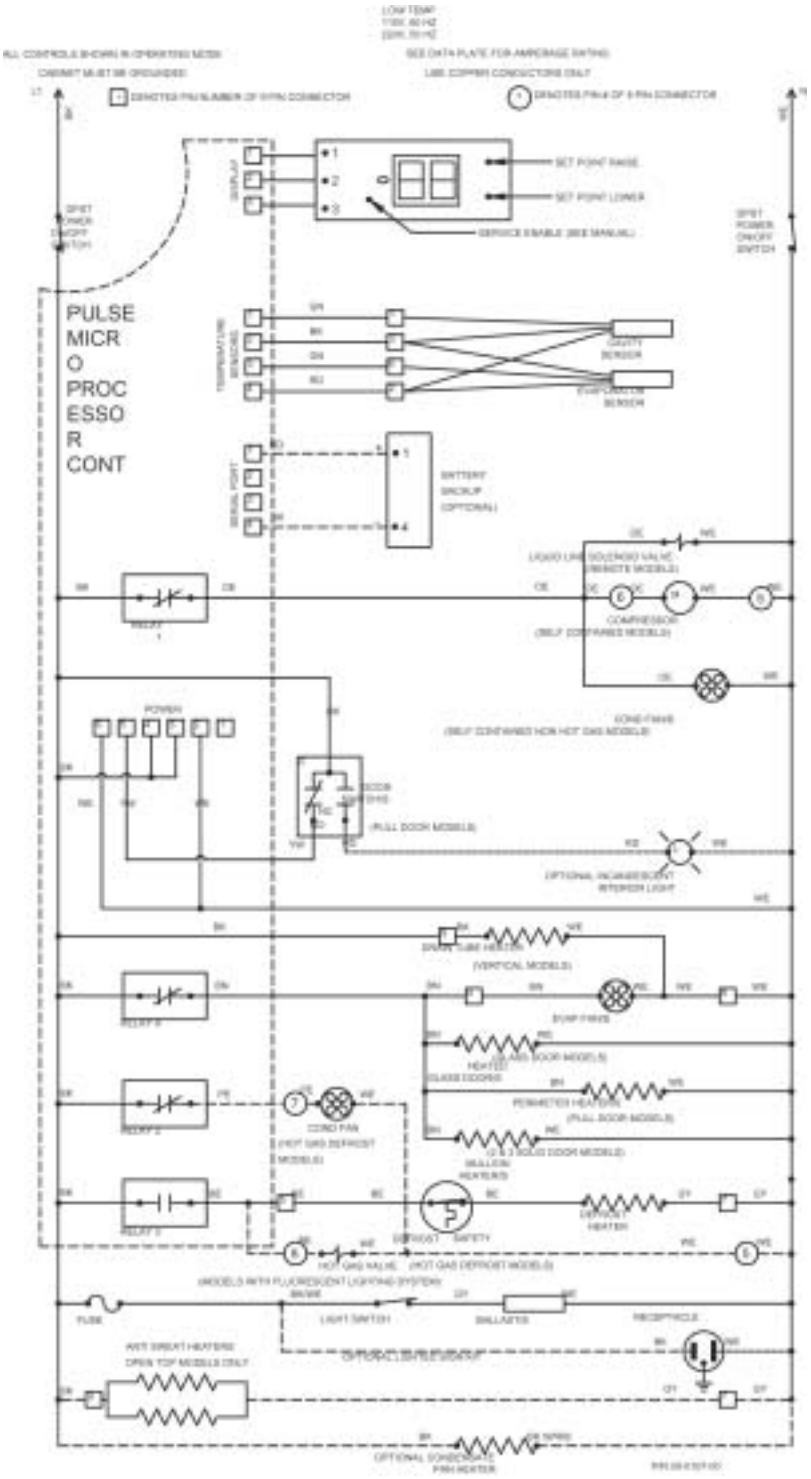
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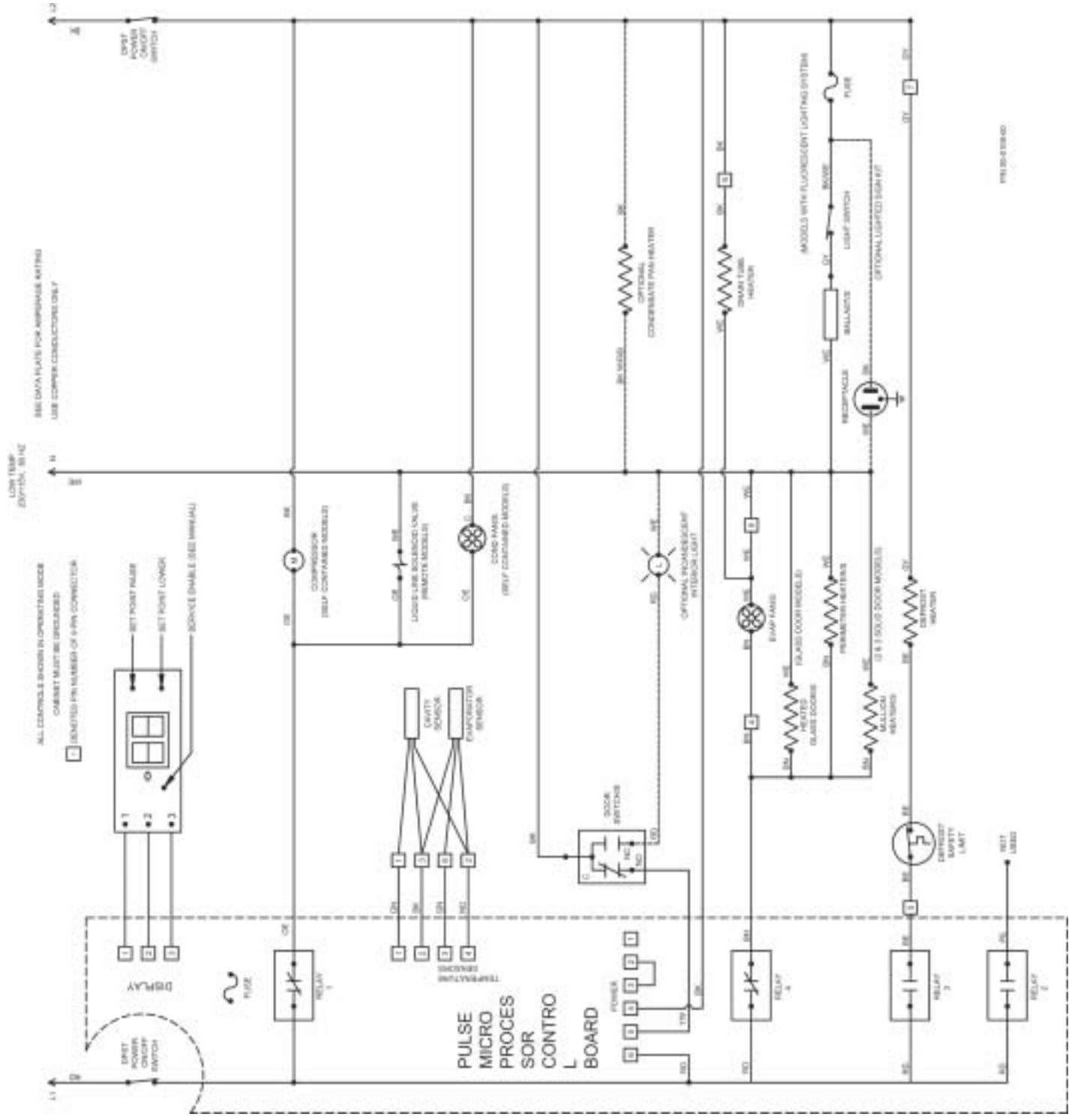
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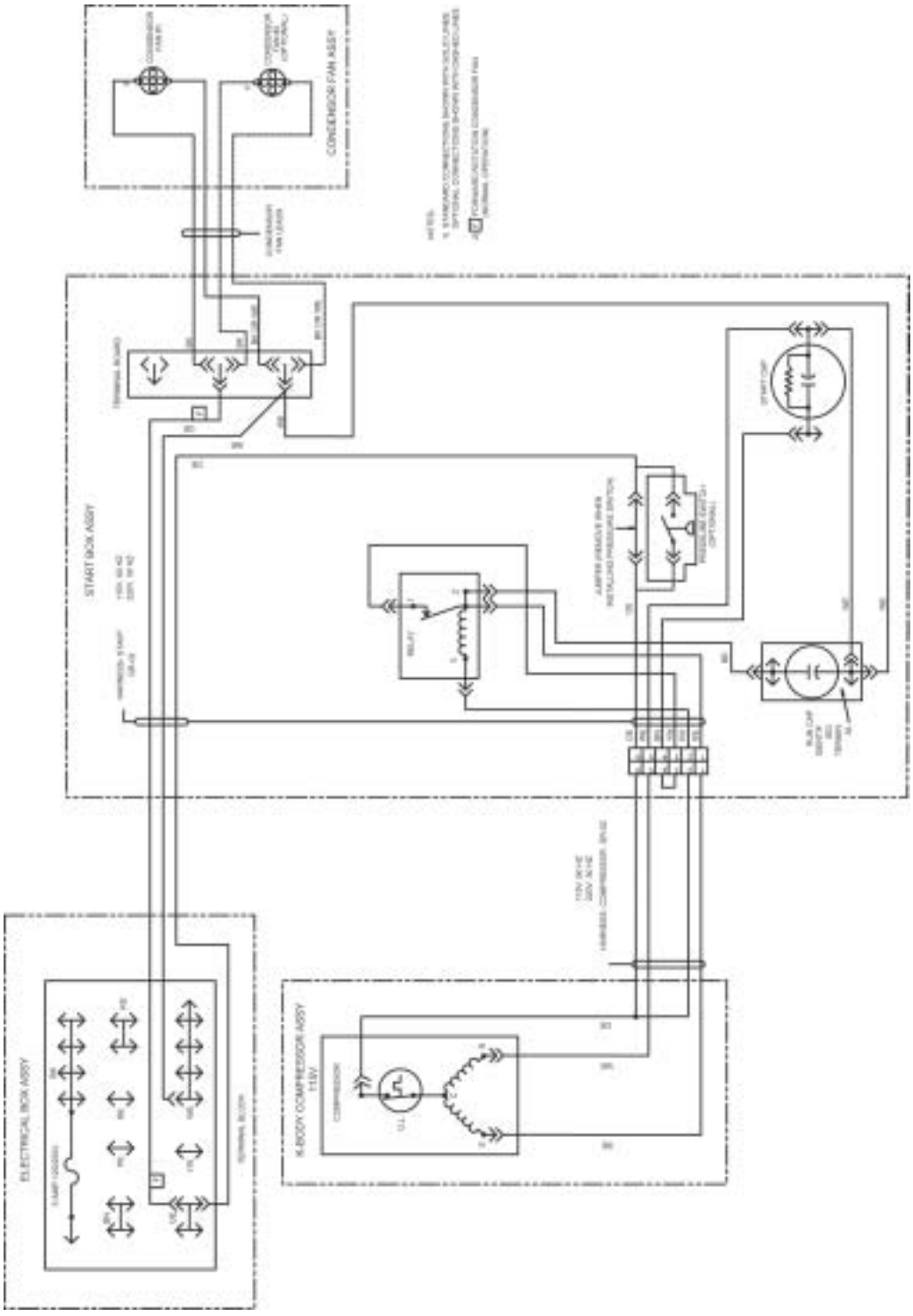
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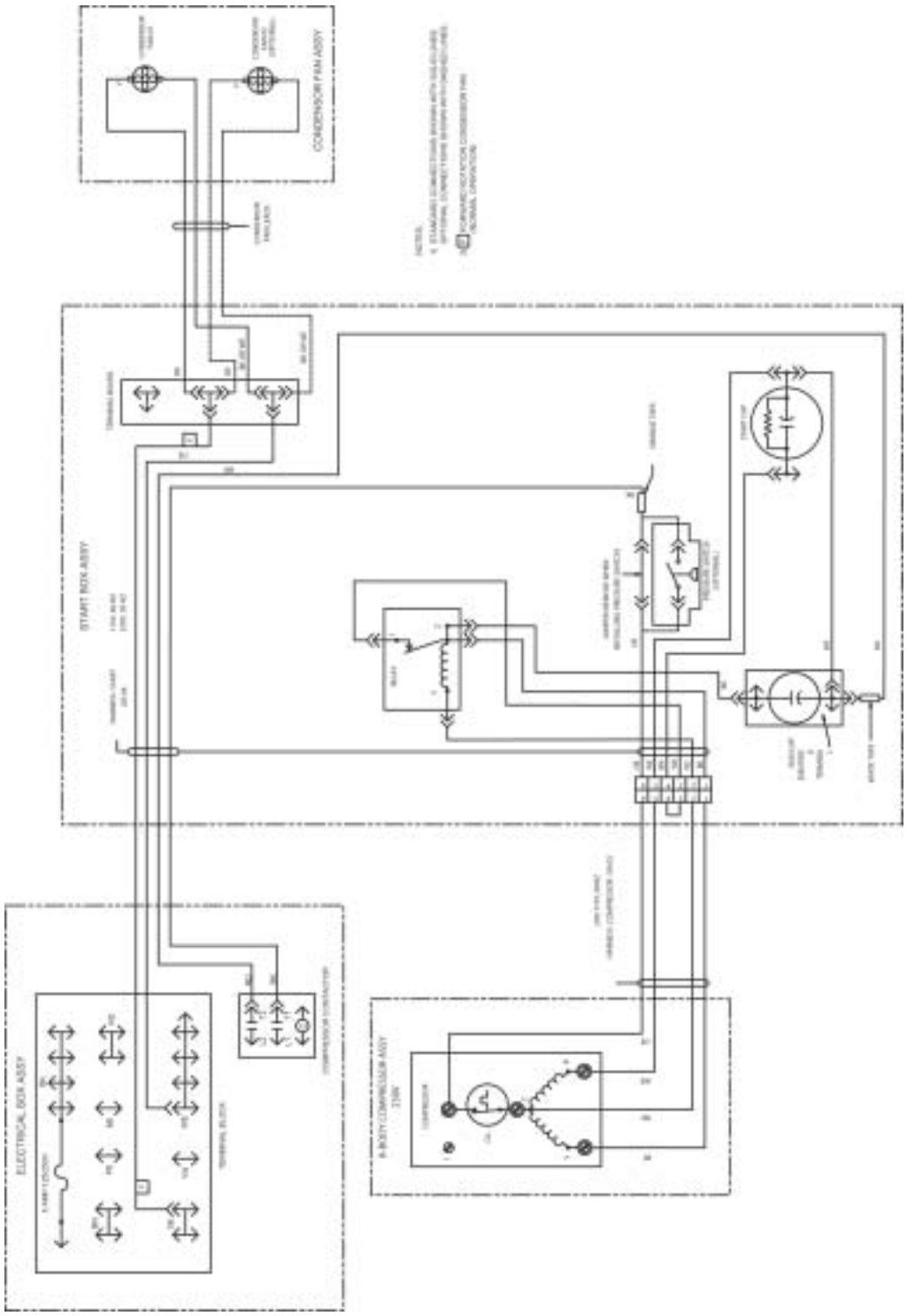
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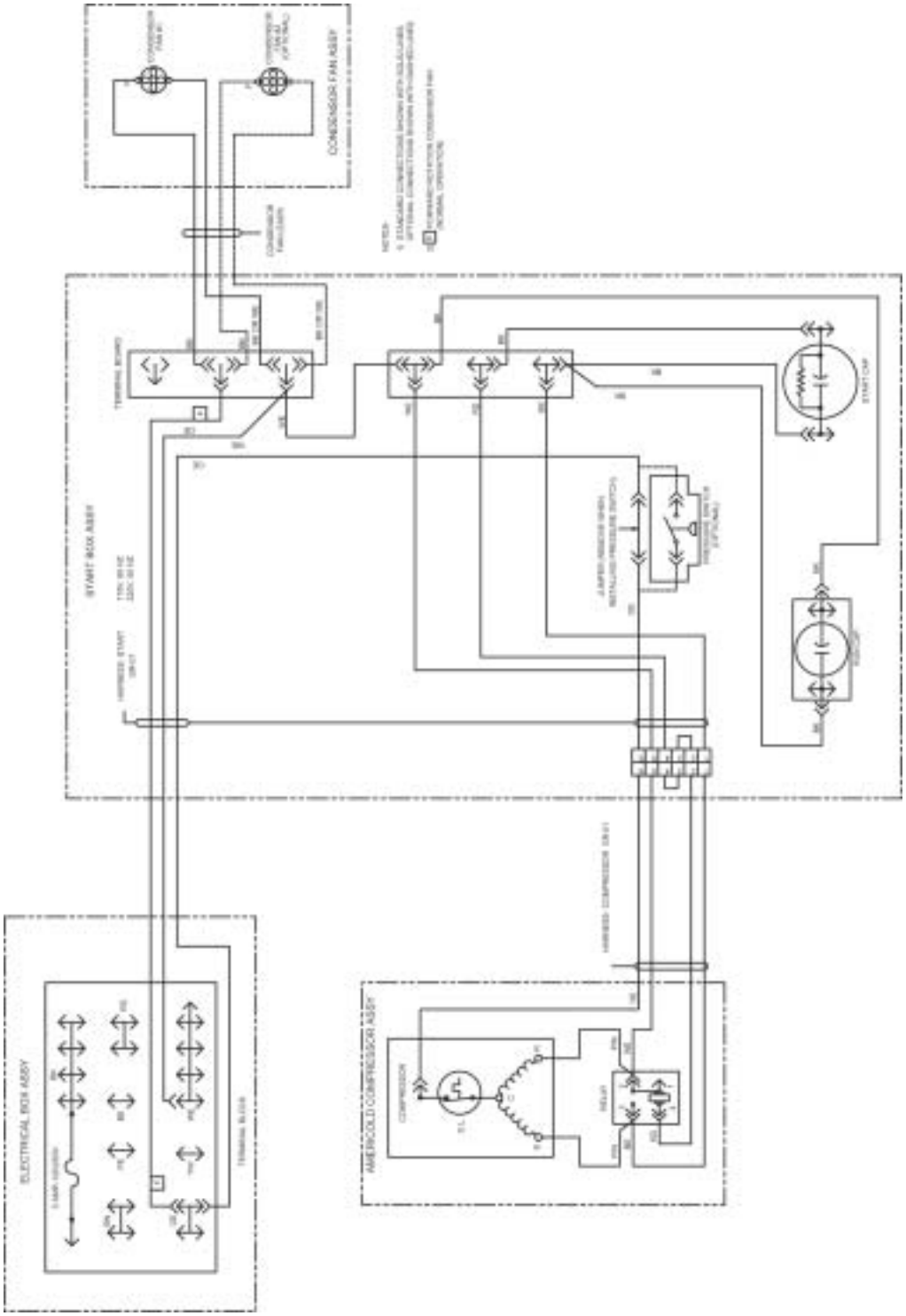
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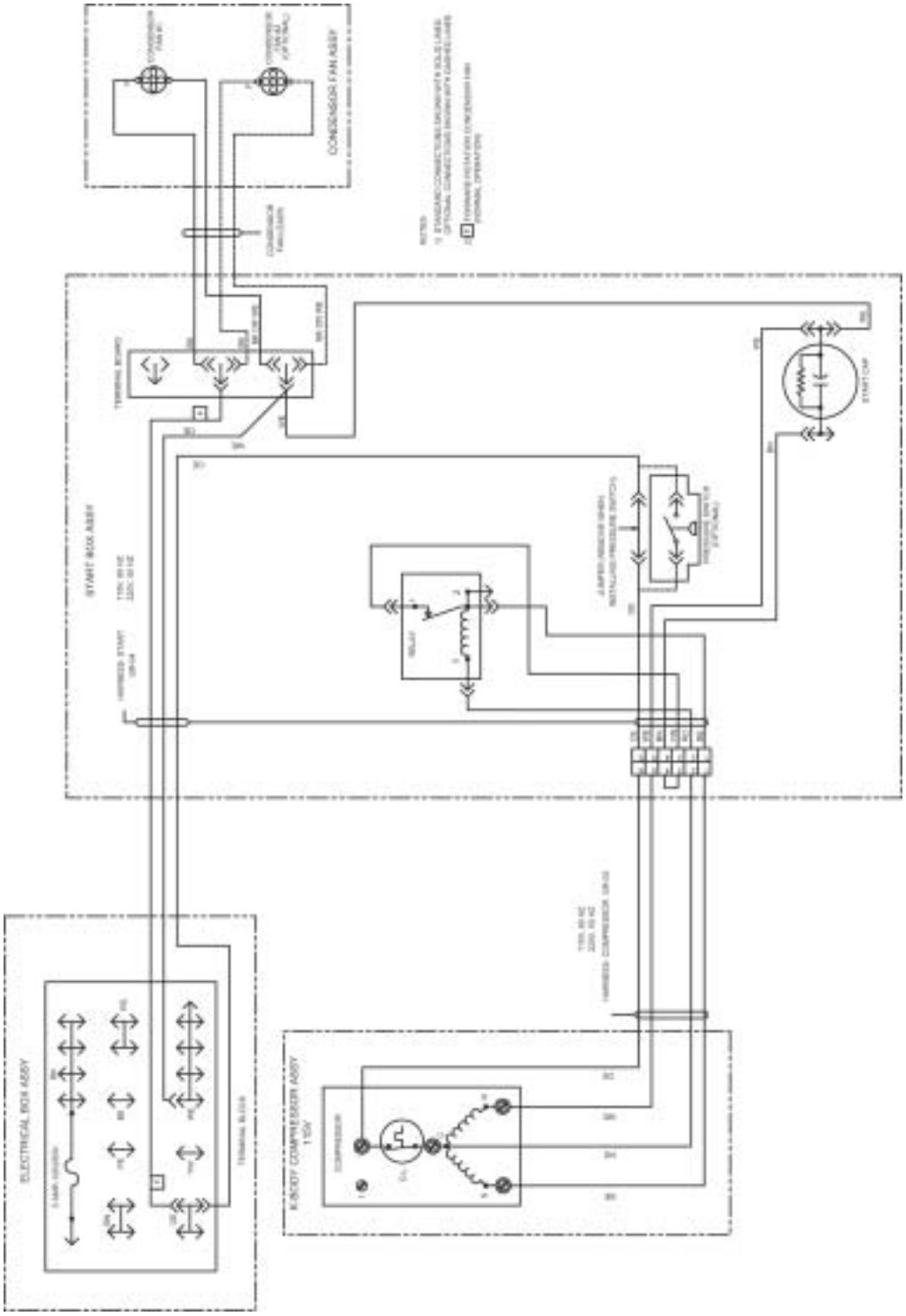
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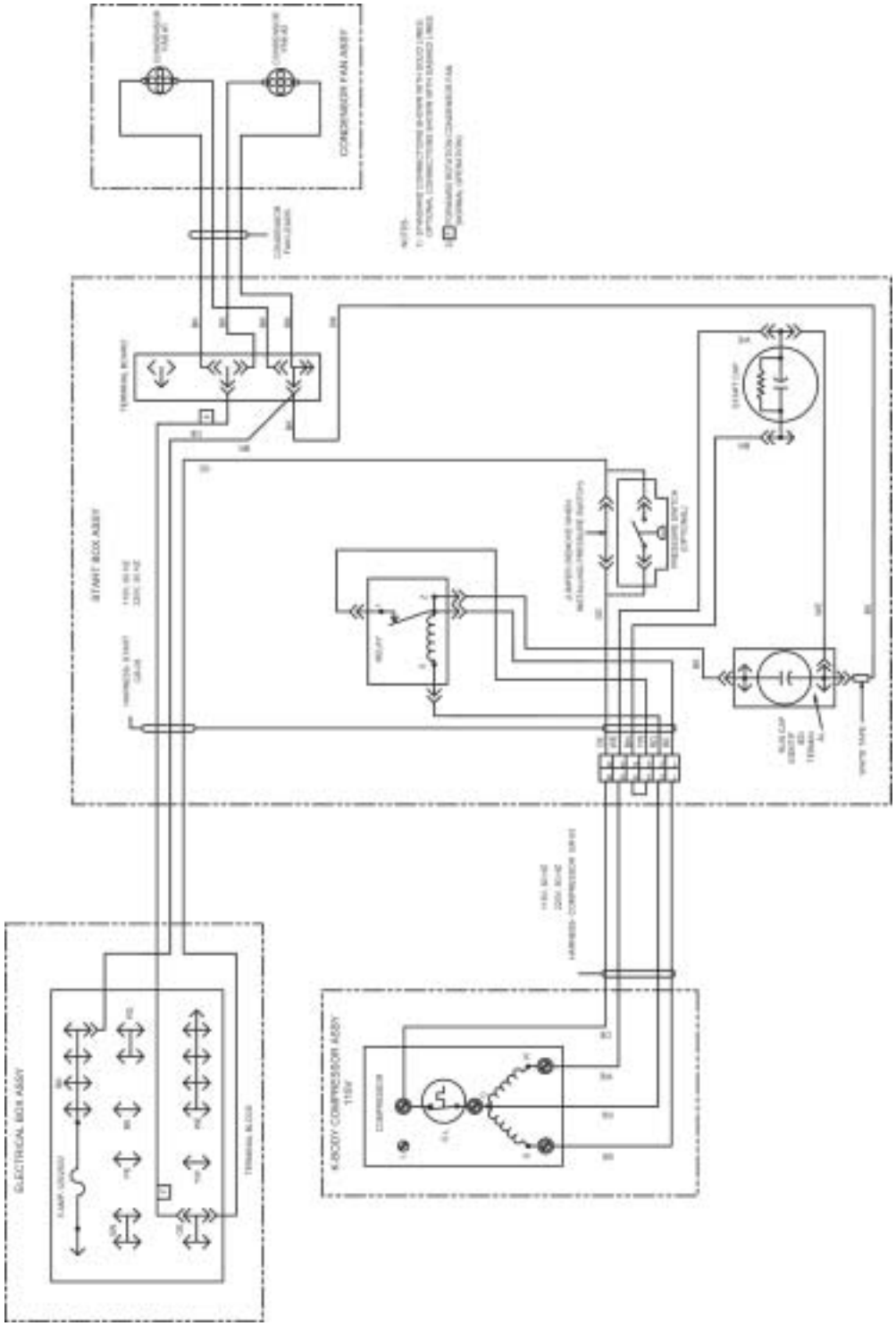
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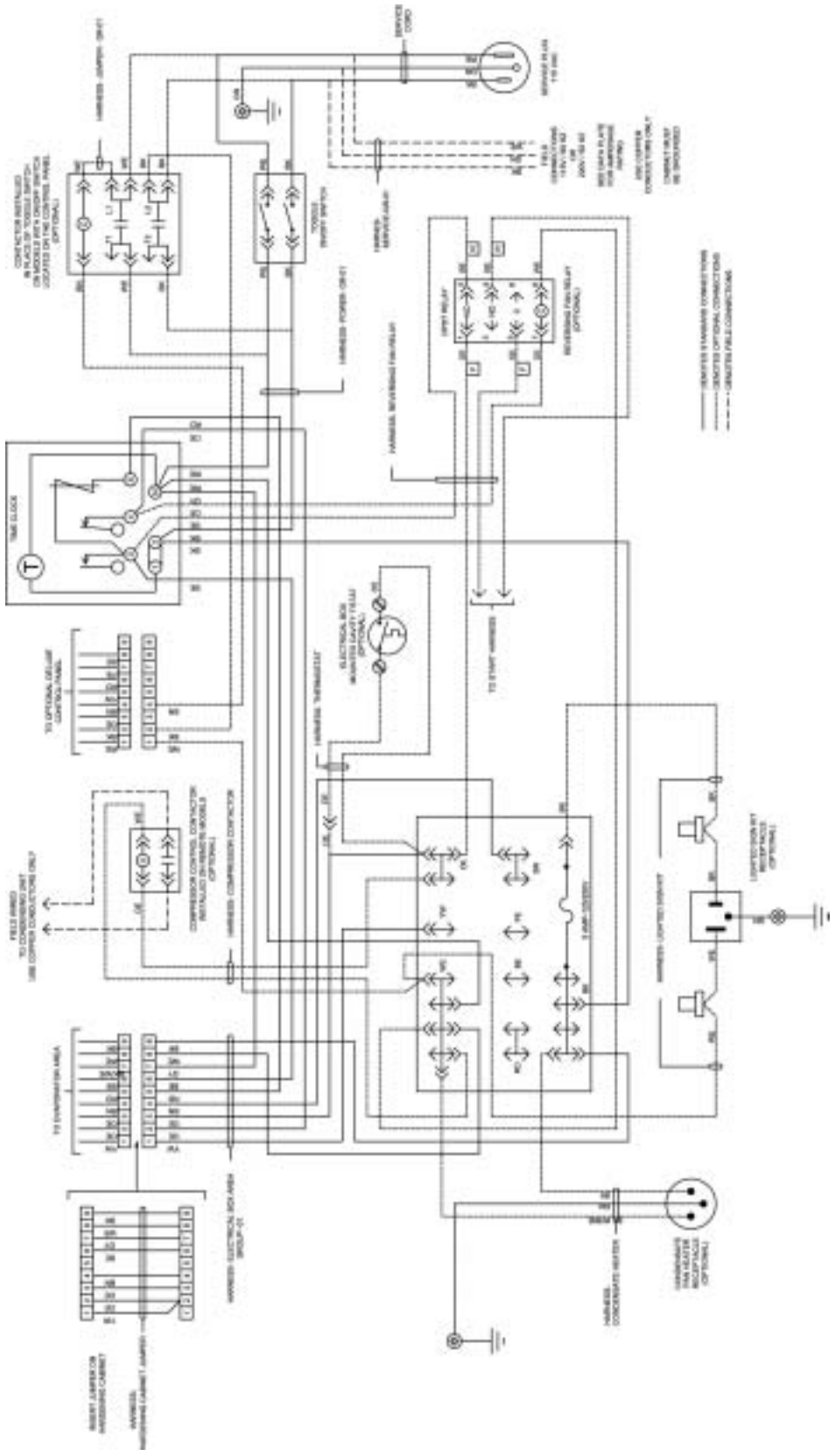
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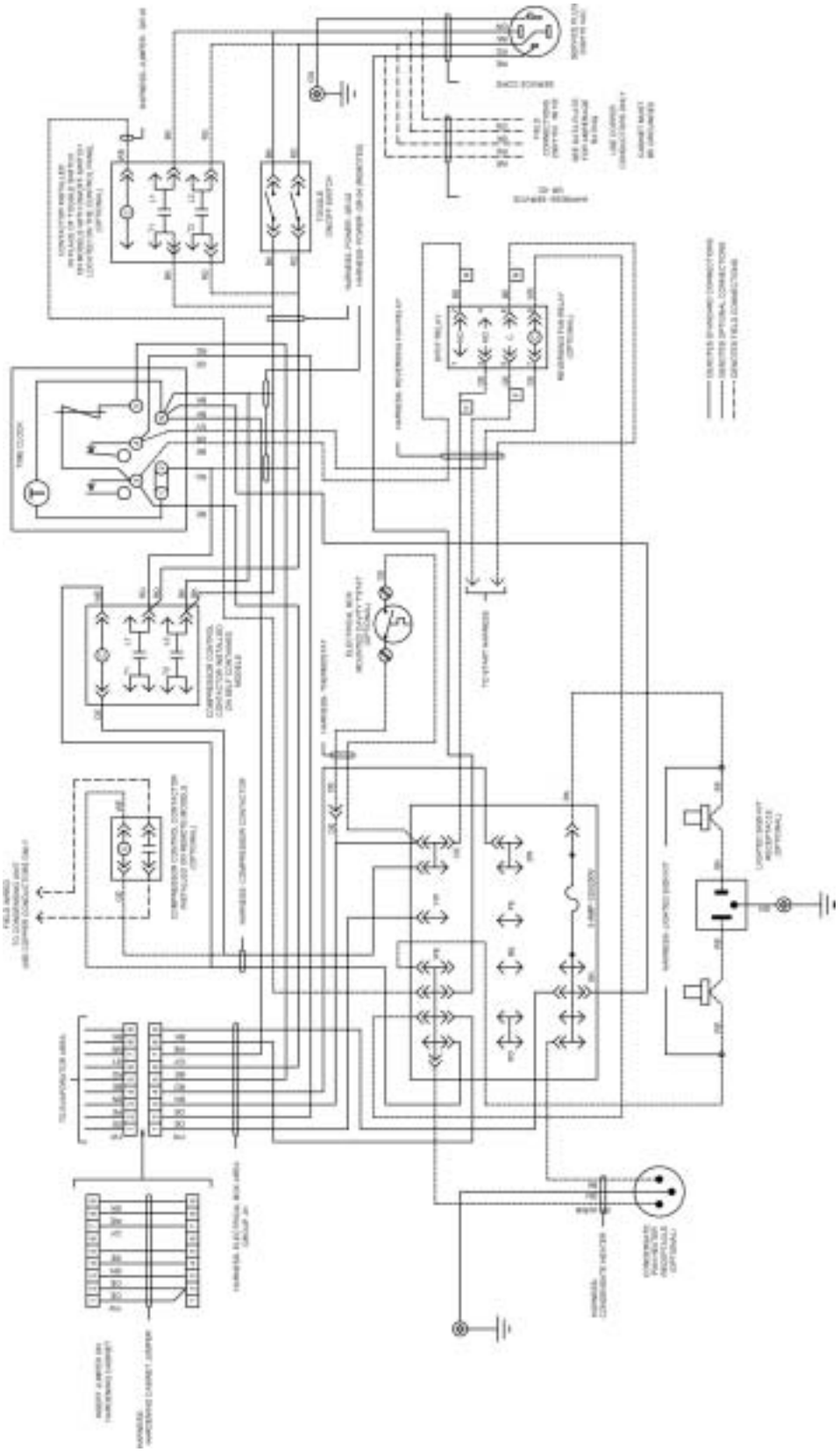
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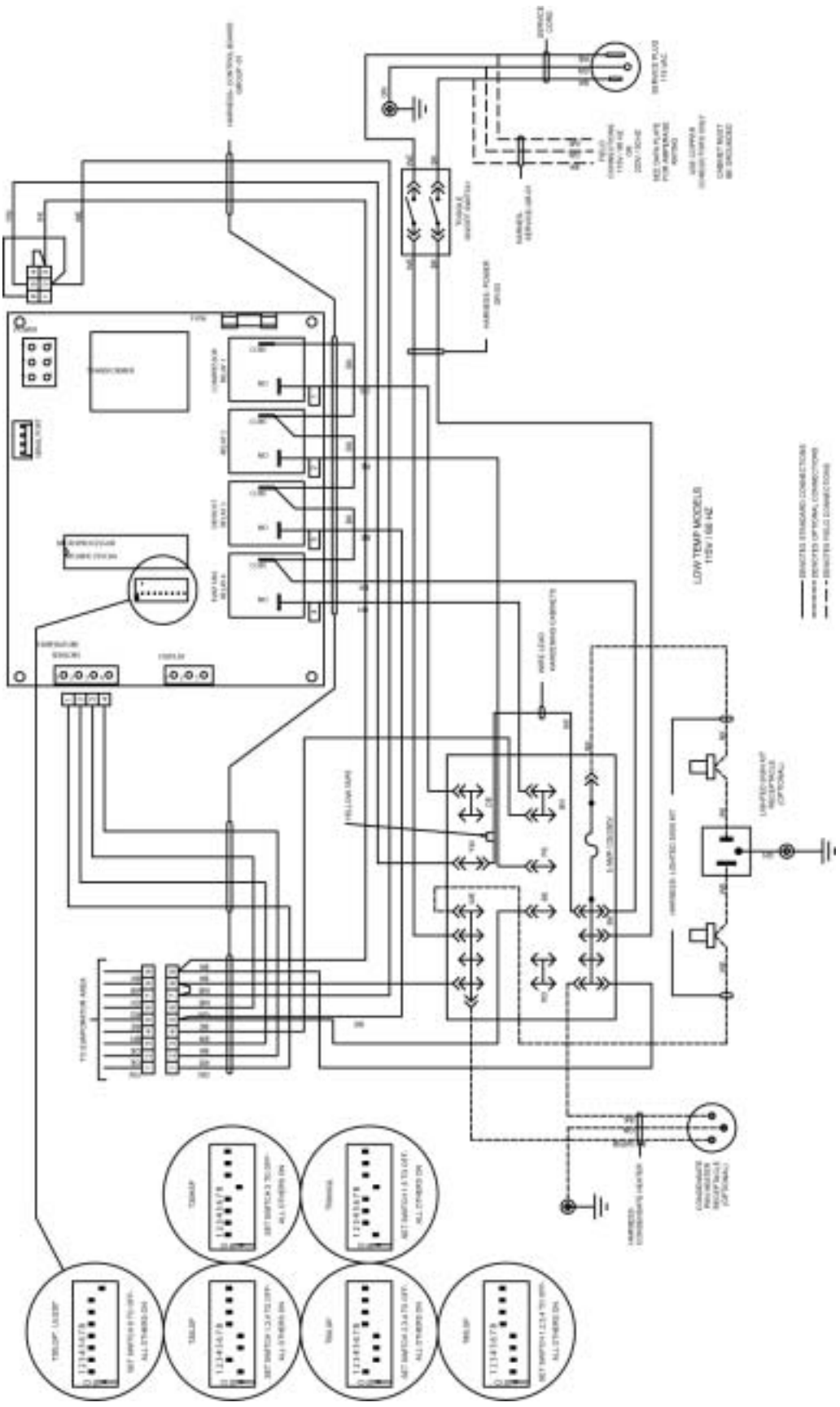
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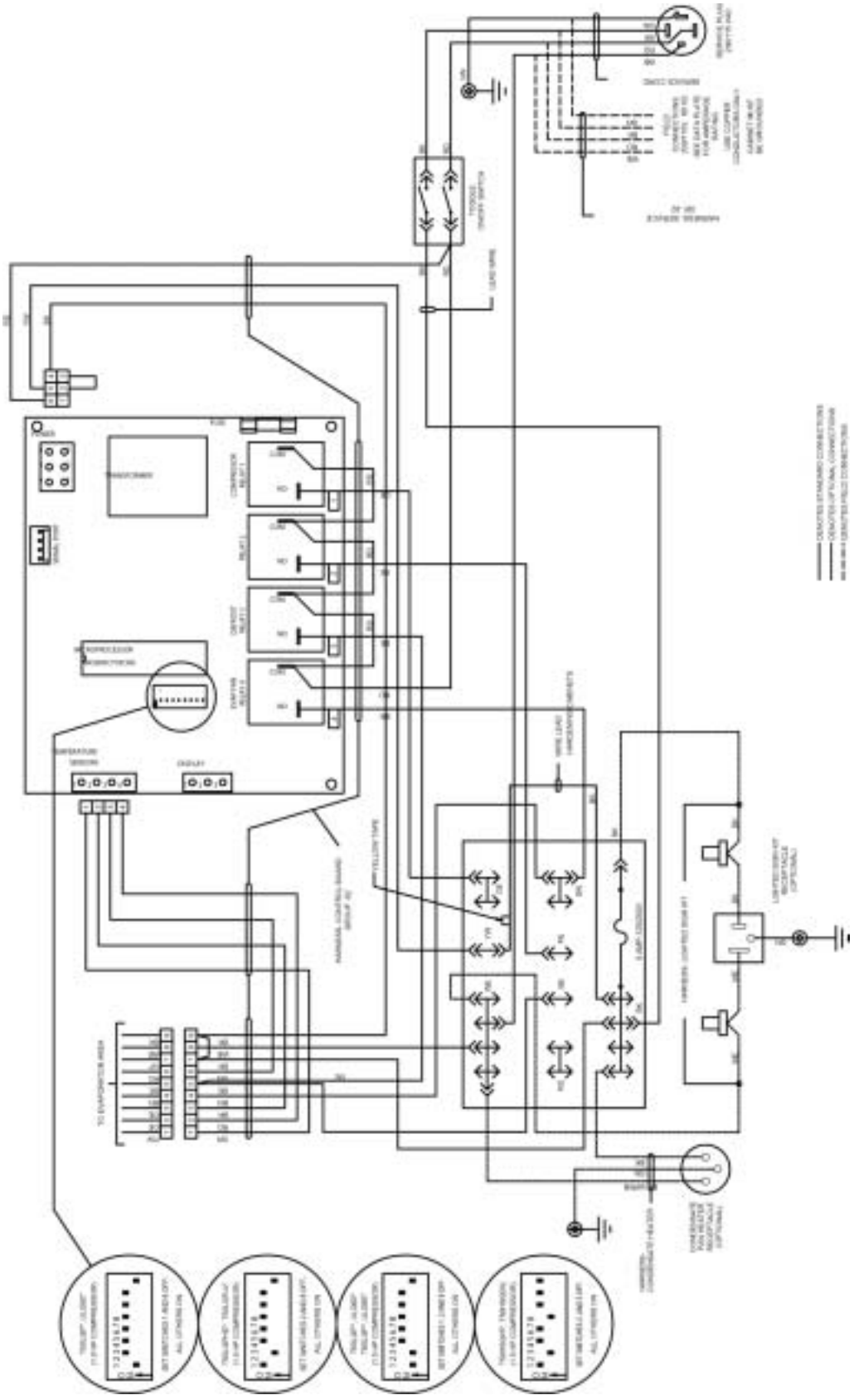
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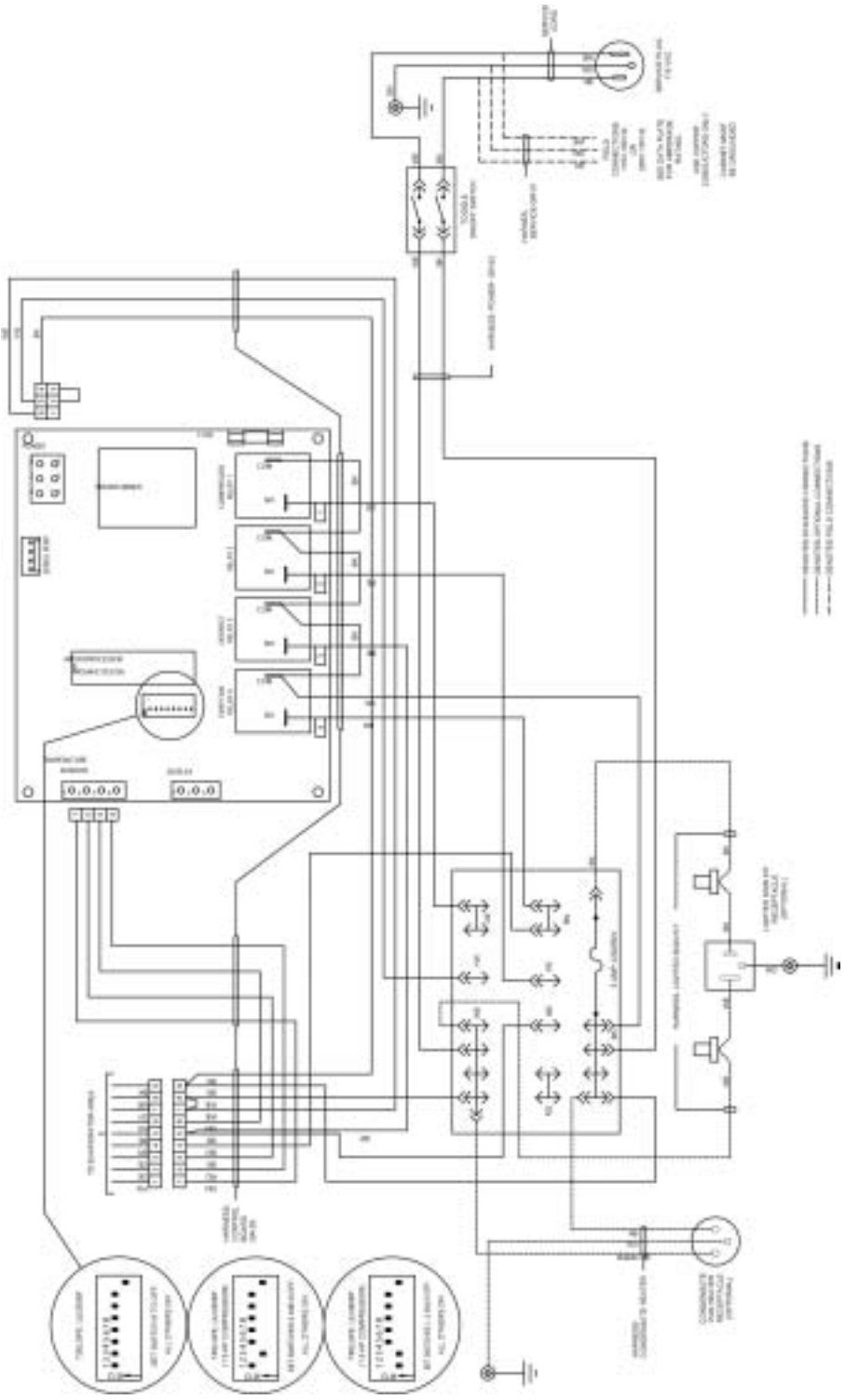
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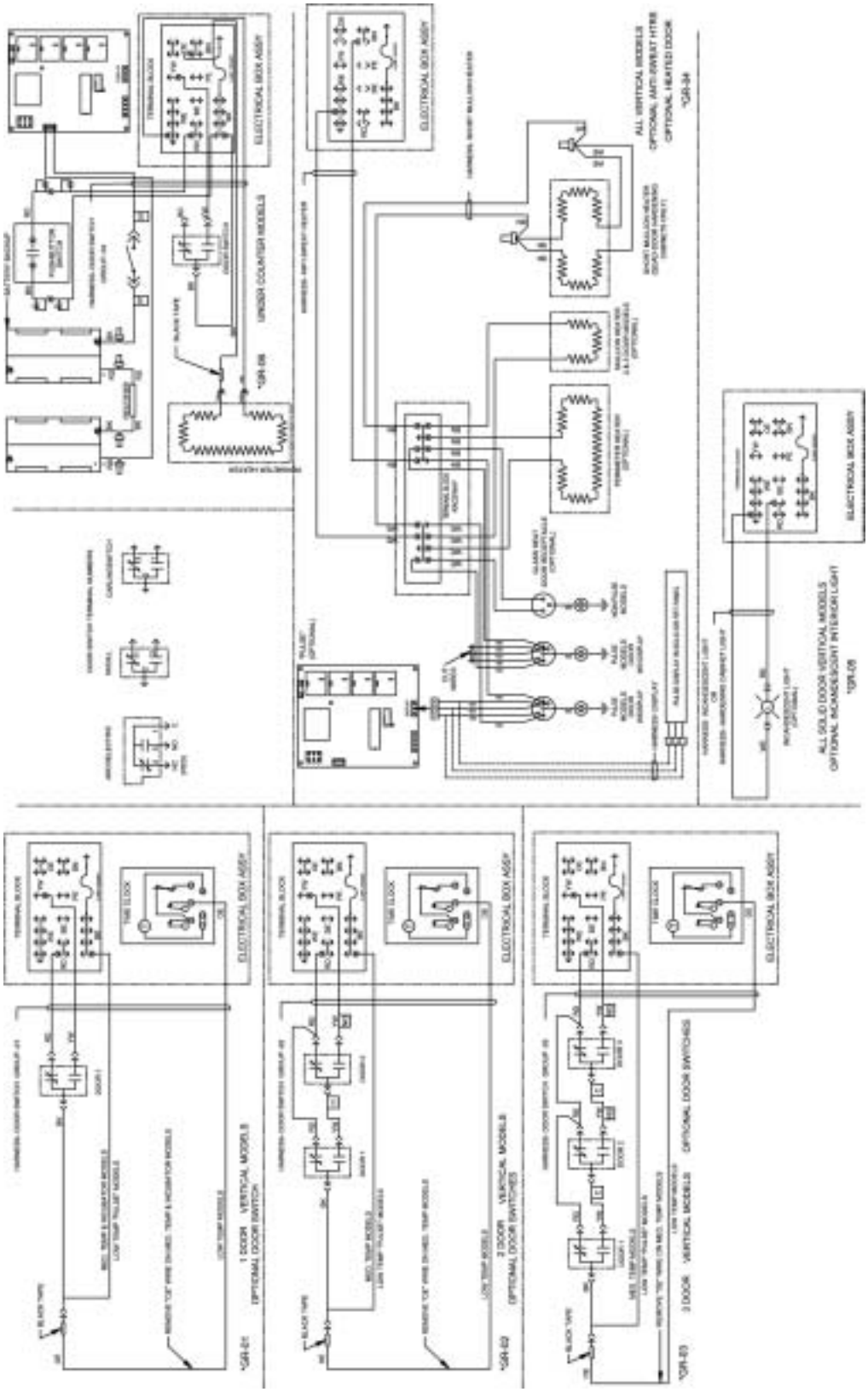
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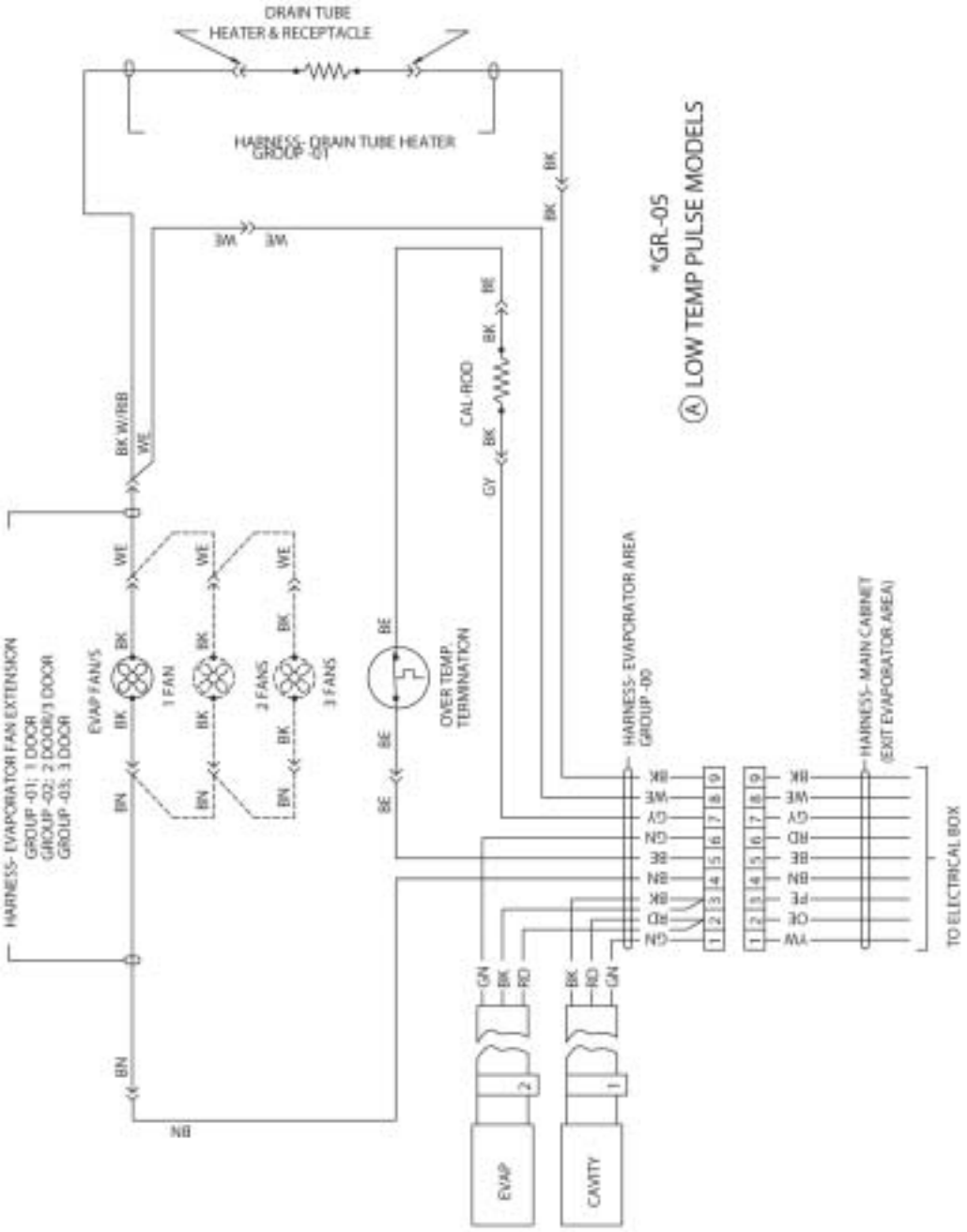
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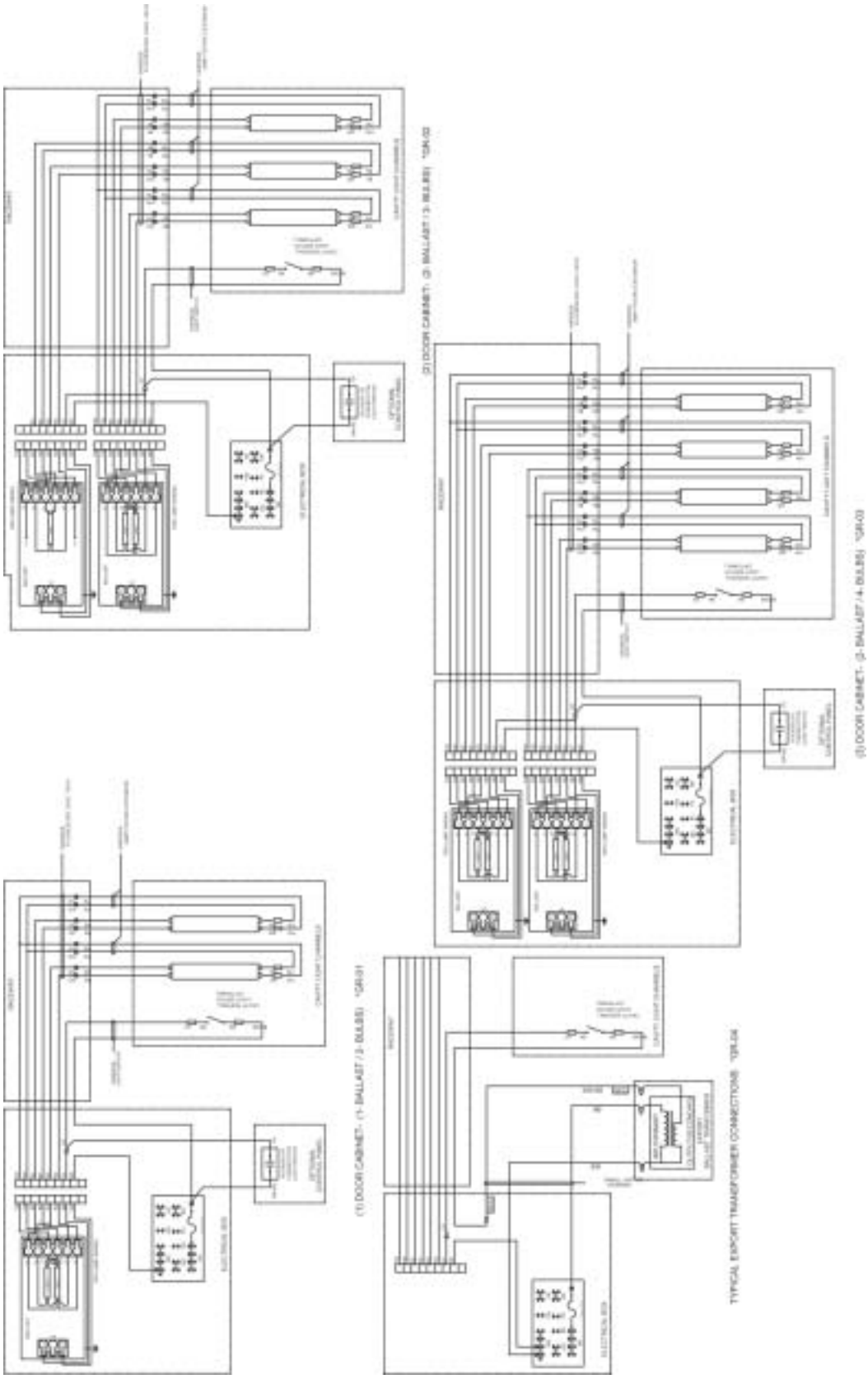
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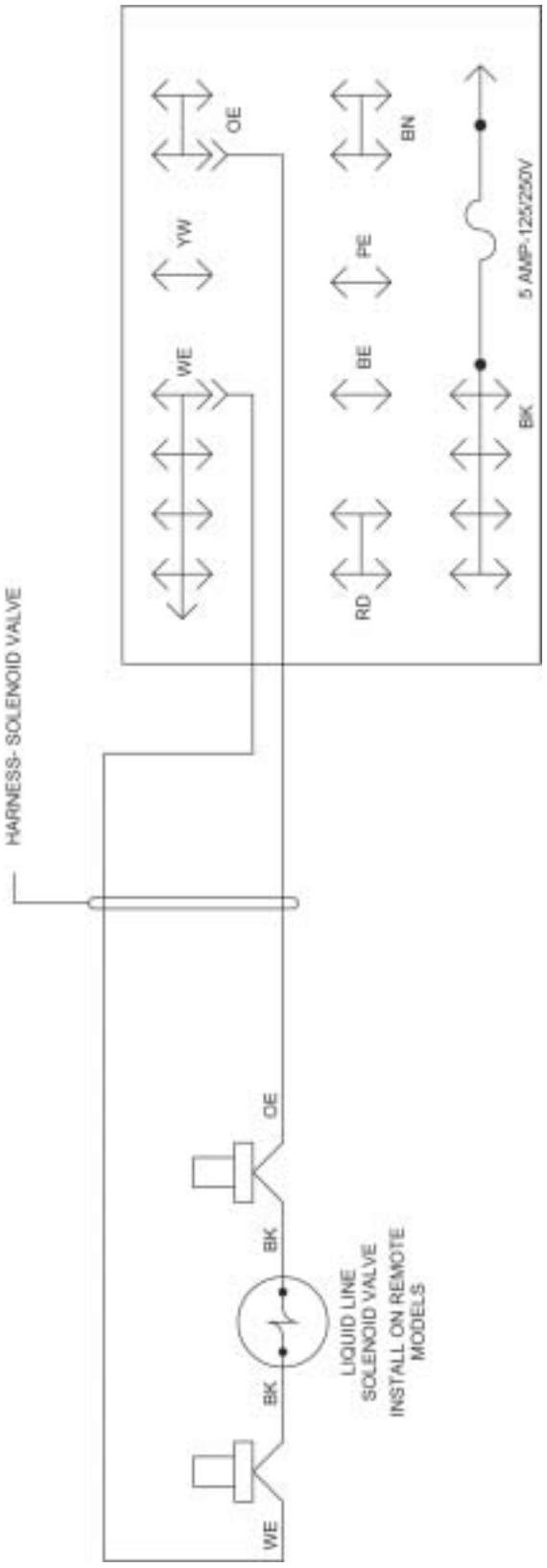
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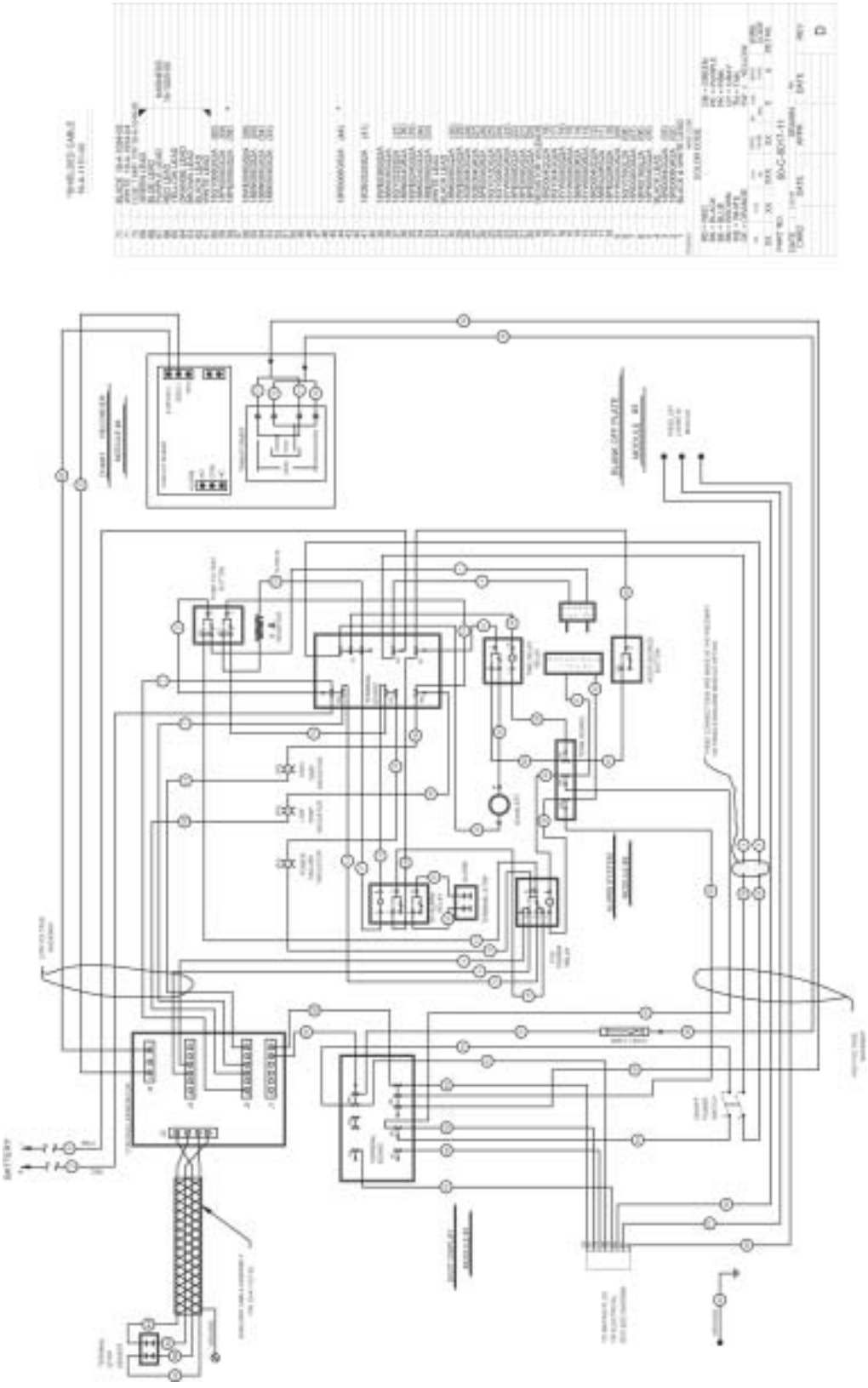
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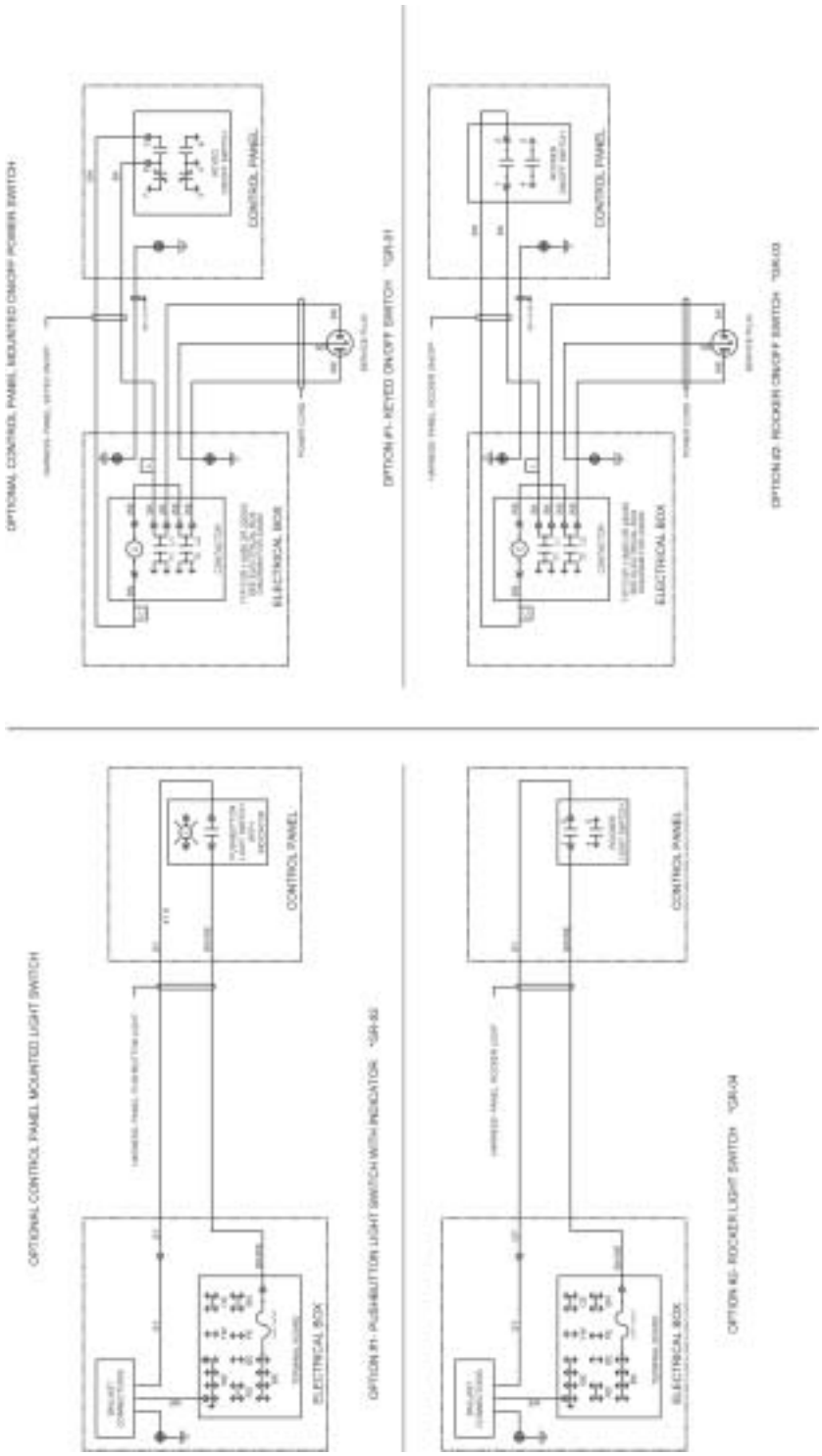
SOLENOID WIRING DIAGRAM - 00-0060-*



CONTROL PANEL WIRING DIAGRAM - 00-0071-11



CONTROL PANEL WIRING DIAGRAM - 00-0058-*



SECTION III

Maintenance

and

Repair

The manufacturer requires compliance to all CGC reclamation laws by service companies engaging in system processing.

WARNING

To avoid the possibility of an electrical shock, turn OFF the thermostat and unplug the power cord of the cabinet before cleaning or touching electrical connections or parts.

MAINTENANCE & REPAIR

PRE-SERVICE CHECK LIST

You may avoid the cost and inconvenience of an unnecessary product call by first reviewing this check list of the most frequently encountered situations that are not the result of defective workmanship or materials.

COMPRESSOR RUNS TOO MUCH

1. A refrigerated cabinet automatically compensates for product loading by running longer and more often. Before calling for service, check running time for at least one hour the first thing in the morning (before store traffic starts).
2. Be sure the doors seal. A faulty gasket seal will cause increased running time.
3. Check the room temperature. The warmer the room, the more the compressor will run.
4. Check the condenser to be sure the face is clean. Dirt and lint will raise pressures and increase running time. Use a brush or vacuum to clean the condenser.
5. Be sure condenser fan operates.
6. Check to see that evaporator fans are running.
7. If product is too hard (cold), try setting the Temperature Control (thermostat) warmer. This will result in warmer cabinet temperature and reduced running time.
8. Check insufficient ventilation to condenser.

CABINET DOES NOT OPERATE

1. Be sure cabinet is plugged in.
2. Check that breakers or fuses are good and all switches in the supply line are ON.
3. Be sure that cabinet Master Power Supply Switch is ON.
4. If you are in an area with voltage problems, try shutting off all non-essential electrical equipment.

LIGHT IS OFF

1. If the cabinet is operating, be sure the lamp is properly seated in sockets.
2. If cabinet is not running, check that Master Power Supply Switch and Light Switch are ON, fuses are okay, no switch in the supply is OFF, and that the cabinet is plugged in.

CUSTOMER COMPLAINT ON STORED PRODUCT

1. Check cleaning solutions used inside cabinet.
2. Check cleaning solutions, paint, or other contaminants used in store maintenance.
3. Sometimes the ingredients used in some products or containers will contaminate other products.
4. Be sure to follow a weekly schedule for cleaning cabinet interior**.**

SERVICE

In the event of a malfunction, damage to the cabinet, or if the cabinet requires service beyond the items in the “Pre-Service Checklist,” contact your local service company or the dealer from whom the cabinet was purchased.

POWER FAILURE

Do not open the cabinet doors unnecessarily if power is cut off due to electrical failure. The cabinet will start up if the power supply returns, but will require sufficient time to reach maximum cold storage performance.

CABINET FAILURE

1. If the cabinet has stopped operating, check that the cabinet is securely plugged in and turned on. Contact a licensed electrician to locate and correct any power supply problems.
2. Do not open the cabinet doors unnecessarily.
3. Provisions for other storage of the product may be required to prevent spoilage.

If you call for service, describe your problem and give the following information to the service representative:

Cabinet Model No. _____

Part No. _____

Serial No. _____

(These numbers are located on a silver serial number rating plate in the upper left side of the cabinet interior.)

TOOLS:

To provide full service diagnostics and repairs on these cabinets, the following tools are needed:

A Multimeter

An Electronic Leak Detector

An Electronic Micron Gauge

A Vacuum Pump capable of pulling to 50 microns

Four Hand Valves

A Compound Gauge Set

A cylinder of nitrogen with a regulator capable of 10 to 400 pounds.

Standard refrigeration hand tools, e.g.: wrenches, tube cutter, swage and flare tools, wire strippers, wire crimp. ers, wire cutters, slot and phillips head screwdrivers.

PRODUCT HISTORY

The first rule in servicing a refrigeration system is to determine if the problem is an electrical or mechanical failure.

First, try to obtain the product's history of operation from the customer. This will help identify the source of the problem.

Good facts from the cabinet user can help identify whether the problem is electrical, within the refrigeration system, or a "misapplication by the user". Get the history of operation and failure by asking these questions:

1) Were there any brown-outs or power outages that they are aware of?
2) Is the cabinet on a dedicated circuit?
3) Has any other equipment in this area had operational problems?
4) When was the last time the cabinet's operation was confirmed as working properly?
5) When was a problem noticed?
6) How long has the equipment run without this problem? (Years? Weeks? Days? Hours?)
7) Was anything tried prior to your arrival?

The refrigeration system should only be entered if it is absolutely necessary. It is critical that a clean, uncontaminated system be maintained.

If a system is unable to reach the proper operating temperature, a test of the unit's mechanical refrigeration components is required.

COMPRESSOR EFFICIENCY TEST

To test the compressor, place compound gauge on the compressor's suction port.

While the compressor is running, close off the suction line so that only the port and valve are part of the compressor's low side.

When the valve is closed and vacuum has started, time how long it takes to pull the compressor's low side to its lowest possible vacuum.

Compressors used on these cabinets should be capable of pulling at least 20 to 22 inches of vacuum in less than 40 seconds.

Next, shut off the compressor and watch the gauge. A one or two inch rise in pressure is acceptable, since a small amount of freon may remain on the low side of the compressor, after which the reading should stabilize.

If the pressure continues to rise, the discharge reeds in the valve head have failed, allowing high pressure gas to return to the compressor.

If the compressor pulls less than 20 inches, the suction reeds have failed.

If the compressor takes longer than 40 seconds to pull to its ultimate low vacuum, one or both cylinders are not functioning as they should. Any reading less than these will require replacement of the compressor.

ENTERING THE SYSTEM

Entering the system should only be done as a last resort. Extreme care must be used no matter what the reason for entering the system. Of course there are times when it cannot be avoided, such as component or compressor replacement, or a leak within the system.

The system must also be entered any time you need to obtain the operating pressures. Again, use extreme caution to avoid any possible contamination.

Cabinets that use hermetic compressors typically do not have valve ports, so therefore process stubs for both suction and discharge sides of the system were added.

Line taps should only be used to obtain pressure readings, and not for the reprocessing of the system. The opening of a line tap is too restrictive for the pressure of vacuum procedures.

On a hermetic compressor system, once you have determined that reprocessing a system is required, recover refrigerant and remove the line taps.

Install hand valves at the process stub ends. Hand valves will be less restrictive to flow because of a larger opening. They will also be easier to use during repair procedures.

EVACUATION

Once the system has been cleaned and components have been replaced, you are ready to initiate the final servicing procedures necessary to achieve proper cabinet operation. Drier should be replaced prior to system processing.

Pull an evacuation to approximately 50 microns.

CHARGING

You should use a charging cylinder to measure in the correct amount of refrigerant. The charging methods are:

1. Add the refrigerant to the system until you reach a balanced pressure. This will give you an approximate static charge.
2. Weigh in the refrigerant using a scale calibrated in ounces.

The cabinet's operation is now ready to be tested. A final check of the refrigeration lines should be made before running the cabinet.

Be sure the refrigeration lines are not kinked or rubbing against each other.

Also check that the door seals properly. An air leak will affect proper operation, and the cabinet's ability to reach its coldest temperature.

Run the cabinet at both 100% run, and a cycling temperature for at least 24 hours. If the temperature and pressures are correct, the system can be considered repaired.

Hermetic systems should now have their process stubs pinched off, hand valves removed and the ends brazed shut.

COMPRESSOR INSTALLATION & MAINTENANCE

TO CHANGE THE COMPRESSOR:

1. Disconnect the power supply to the cabinet.
2. Disconnect the power supply leads at the compressor.
3. Disconnect wires to relay and capacitors.
4. Remove relay and starting capacitor and install on new compressor.
5. Remove defective compressor from condensing unit base.
6. Set new compressor in place.
7. Reconnect relay and capacitor wires.
8. Reconnect power supply lead.
9. Leak test, evacuate, and weigh in charge.

CHANGING DRIER

If flare connected, make sure flares and faces of fittings on new drier are clean and in good condition before installing new drier.

If sweat connected, clean tubing close to original drier before cutting tubing in clean area. Check that ends of the replacement drier are clean, then make brazed connection using as little heat as possible.

Cut tubing only with tube cutters, not hacksaws, to avoid metal filings from entering the system. Driers must be replaced any time you enter the system, except when you are obtaining pressures.

SERVICE VALVES

The compressors on some cabinets have service valves for measuring suction and discharge pressures. Two types are used. The first type is connected directly to the compressor body or shell and back seats to connect gauges to the access port. The second is on the end of a process tube and requires a gauge or charging line with a depressing pin to open valve when the connection is made.

CAUTION: This type valve should be tightly capped except when making the gauge connection.

TO CHECK FOR OPEN WINDINGS

Use a multimeter. Measure ohms between “C” and “R” and between “C” and “S.”

If windings are O.K., multimeter will show a resistance reading between terminals.

If there is no reading, the compressor winding or windings are open and the compressor should be replaced.

TO CHECK FOR GROUNDED COMPRESSOR

Use multimeter. Touch probe from each terminal to an unpainted surface of compressor body. If there is no ground, there will be no change of the meter.

WARNING: Be Careful Not to Touch Uninsulated Parts of the Meter Probes

A reading indicates a ground and the compressor should be replaced.

If there is voltage at the compressor terminals and the compressor tries, but does not run, check voltage at the compressor terminals while attempting to start the compressor. If the voltage at the compressor terminals is below 90% of the nameplate voltage, it is possible the motor may not have developed sufficient torque to start. Check to determine if:

A. Wire sizes are adequate.
B. Electrical connections are tight.
C. The circuit is not overloaded.
D. The power supply is adequate.

A defective relay or capacitor may prevent the compressor starting.

TO CHECK OUT THE RELAY

1. Disconnect the cabinet from the power supply.
2. Remove the wires from the relay.
3. Touch probes to the contact terminals. Meter should show infinity if closed.
4. Touch probes to the terminals of coil. The meter should show a resistance reading.

If items 3 and 4 are O.K., the relay is good. If items 3 and 4 are not as indicated, change the relay.

TO CHECK CAPACITORS

1. Disconnect the cabinet from the power supply.
2. Make sure the capacitors are discharged before touching terminal. (Shunt across the terminal of capacitor with a heavy insulated wire.)
3. Remove the wires from the capacitors.
4. Any capacitor found to be bulging, leaking, or damaged should be replaced.
5. Use a multimeter to check the **run and start** capacitors for shorts or open circuits.

With a good capacitor, the indicator should first move to a reading and then gradually increase to infinity.

If there is no reading change, an open circuit is indicated.

If the multimeter remains on a low resistance reading, a short circuit is indicated.

On run capacitor, touch probes to metal case and each terminal. If meter show any reading, a ground is indicated. All defective capacitors should be replaced.

EVAPORATOR DRAIN PAN REPLACEMENT

The evaporator drain pan is located in the upper interior of the cabinet. It pivots down for ease of accessibility.

1. Disconnect the power of the cabinet.
2. Release R.H. and L.H. quarter-turn fasteners.
3. Drop the front of the pan and swing it down.
4. Disconnect the ground wire.
5. Raise the pan, unhook from back.
6. Remove the drain line from the drain hole.
7. Remove the pan from the cabinet.
8. Reconnect the power to the cabinet.

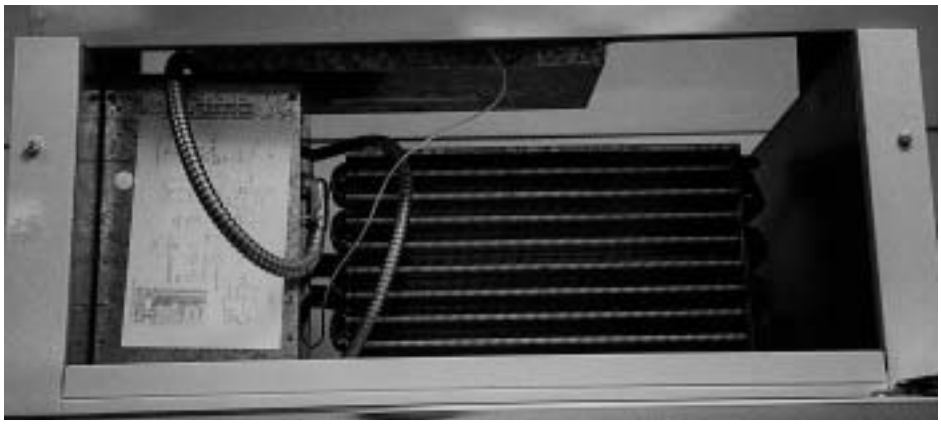




CONDENSER AND ELECTRICAL BOX ACCESS

The electrical box can be accessed by removing the front grill or control panel. There are tabs on each end of control panel top. Remove lock down screws and lift up on panel. By lifting panel, the key slots disengage from the shoulder bushings located on each end of the panel.

TOP MOUNT MODELS



BOTTOM MOUNT MODELS

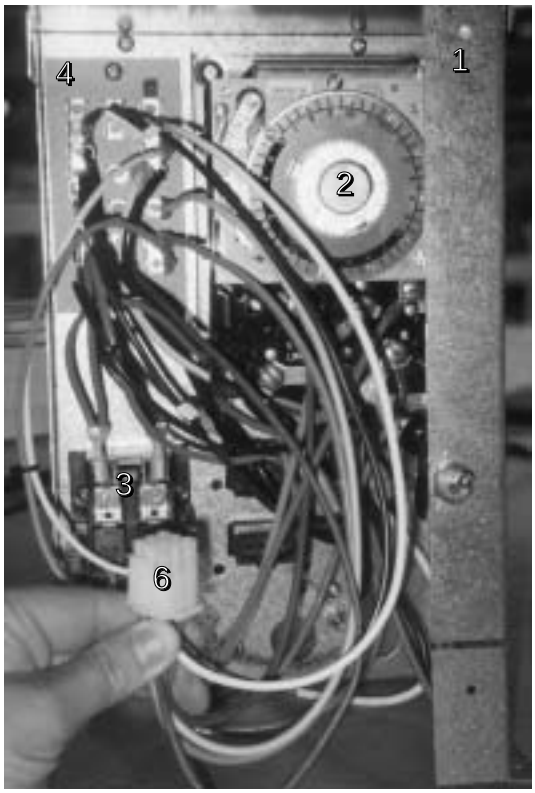


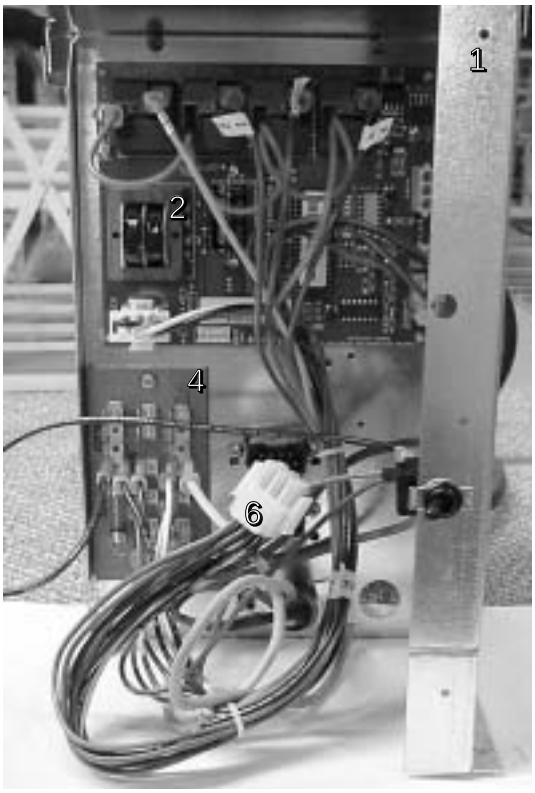
THERMOSTAT REPLACEMENT
Electro-Mechanical Control Systems

1. Remove front grill.
2. Snap off thermostat outer cover.
3. Remove conduit unit & bushing.



1, 2, 3- DOOR ELECTRICAL BOX
Typical Arrangement of Components

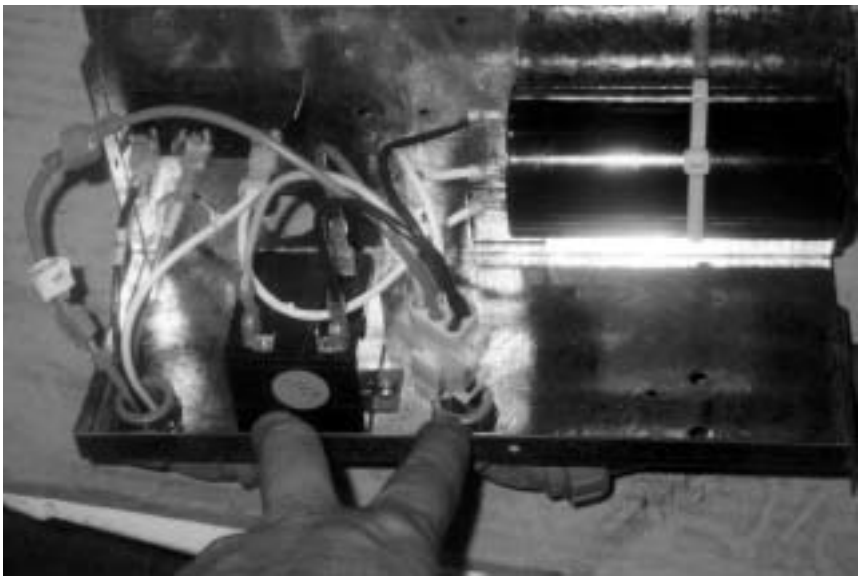




1. Handy Box (Hardware connection point)
2. Defrost Timer / Pulse Control Board
3. Contactor
4. Main Terminal Board
5. Light Ballast (Located at rear)
6. 9 Pin Quick Connect Plug-in

START KIT ELECTRICAL BOX

Run Capacitor not shown.



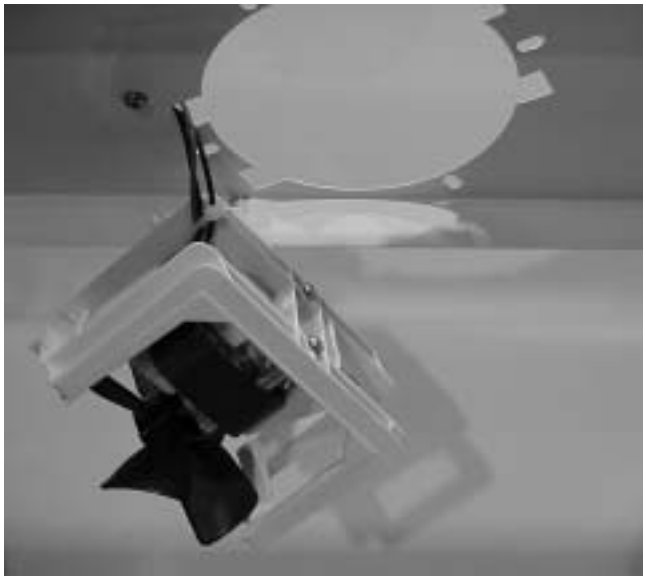
EVAPORATOR FAN MOTOR REPLACEMENT (Rear Fan)

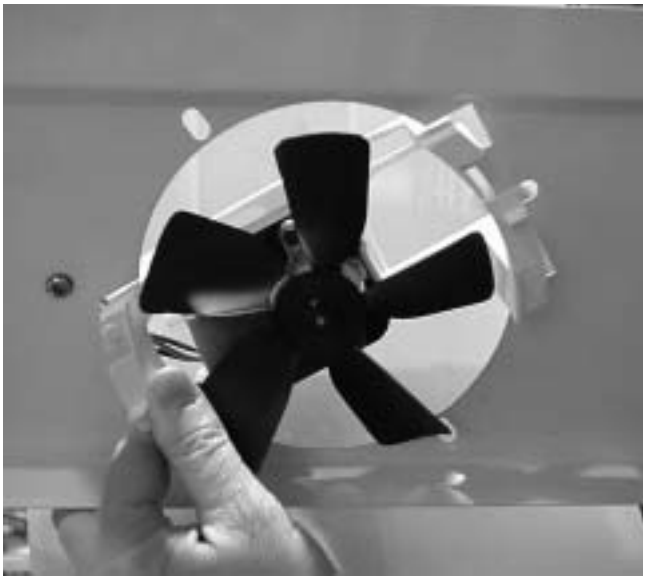


1. Disconnect the power to the cabinet and locate the evaporator fan in the cabinet interior behind the evaporator coil.
2. Remove the fan guard by rotating it counter clockwise to the position shown.
3. Remove the fan and bracket assembly by rotating it to the position shown.
4. Lower the fan assembly and remove the two screws that fasten the motor to the bracket.

Note: To assist the removal of the guard and bracket, press on the detent bumps to guide them out of the obround holes.







FAN DELAY & DEFROST TERMINATION-PULSE SENSORS
Electro-Mechanical System Control

FAN DELAY: FIG 1

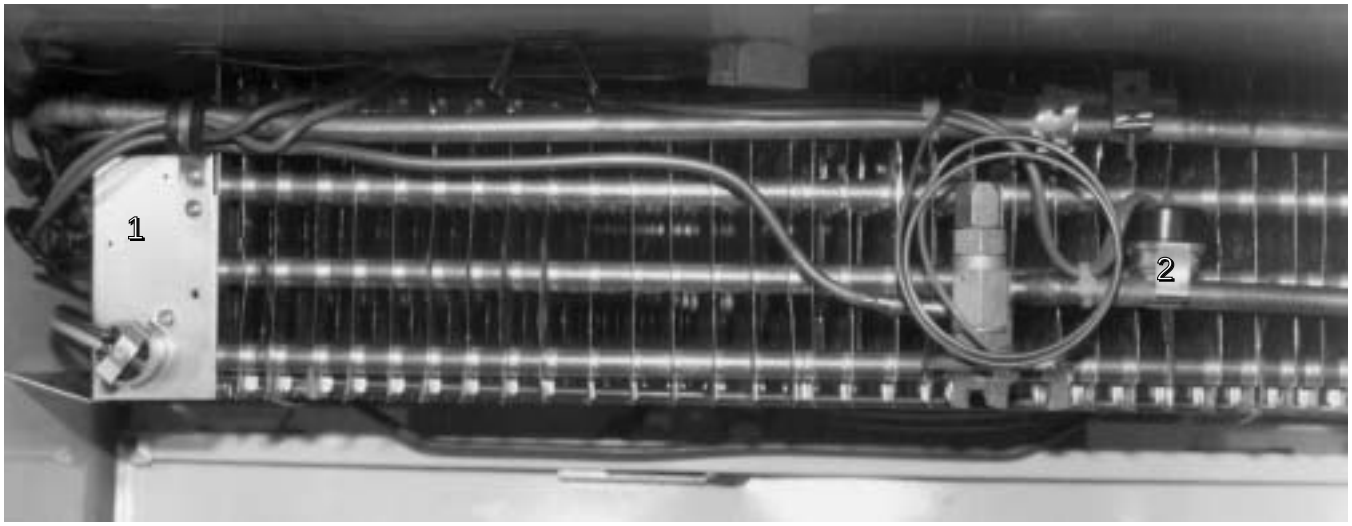
1. Disconnect power supply from cabinet.
2. Turn two (2) quarter turn fasteners located at each end of the evaporator drain pan.
3. Remove the thermodisc and contact bracket from the coil. Remove two (2) screws that hold the delay to the bracket.
4. Disconnect the delay at the wiring bundle.
5. Replace with correct part in reverse order

Evap. Fan Delay: Close 32° / Open 52°

DEFROST TERMINATION CONTROL: FIG. 2

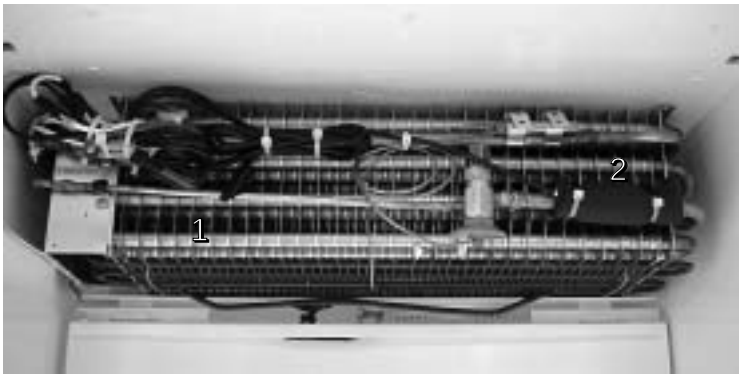
1. CAUTION: Disconnect the power supply from the cabinet.
2. Turn two (2) quarter turn fasteners located at each end of the evaporator drain pan.
3. Remove the thermodisc retainer clip.
4. Cut the wire ties that hold the wire to the copper tubing.
5. Remove the thermodisc and contact bracket to access the wiring bundle.
6. Install with the correct part. Retie at the wiring bundle and resecure the disc to the suction line.

Defrost Termination: Close 30° / Open 60°



SENSOR HARNESS

1. Disconnect power supply from cabinet.
2. Cut plastic wire ties securing the insulation on the #2 sensor and note the sensor position.
3. Note the position of the #1 sensor and cut the remaining plastic wire ties.
4. Unplug the harness from the back wall of the cabinet and remove the harness.
5. Replace with the new harness making sure the plug is fully engaged in the receptacle at the back of the cabinet and the sensors are mounted in the same locations and positions as the previous harness.
6. Bundle the excess wires and tie them securely in place.



DEFROST HEATER REPLACEMENT



Hardening cabinet shown

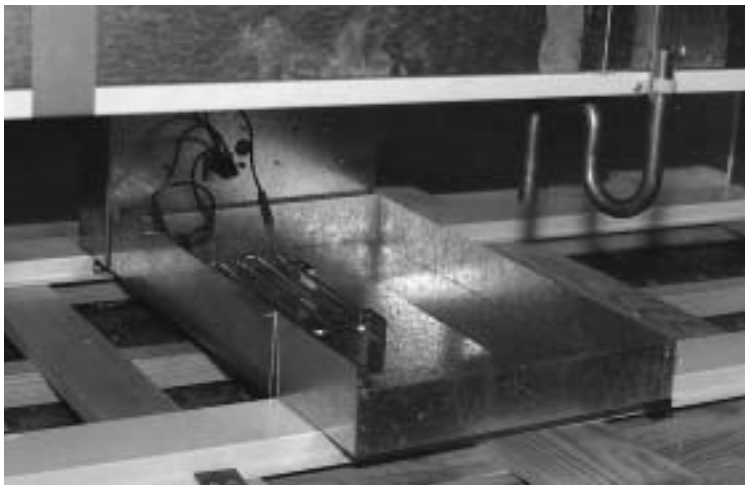
DISCONNECT THE POWER SUPPLY TO THE CABINET.

1. Turn quarter turn fasteners located on each end of the evaporator pan assembly.
2. Evaporator drain pan assembly will hinge down.
3. The defrost heater is located beneath the evaporator coil.
4. Carefully install the new part being careful to not damage the fin coil.
5. Reconnect the wiring and retie with plastic strips.

2- & 3-DOOR CONDENSATE HEATER REPLACEMENT
Bottom Mount Models

1. Disconnect power supply from cabinet.
2. Disconnect the heater lead from the back of the electrical box.
3. Determine if the heater thermodisc is open. If not, remove heater from the bracket tabs.
4. Install with the correct part number, mount, and reconnect.

CAUTION!
WIRES SHOULD BE WIRE-TIED UP AND AWAY FROM THE CONDENSATE PAN!



SHELVING / DRAWER
Installation & Adjustment

To install shelves or drawers in a level position, insert the cantilever plate tabs into the rectangular holes in the desired position on the shelf standard. Lower the rear of the shelf so that the slots in the plate are completely down over the bottom of the holes.

NOTE: Supporting the front of the shelf with one hand while pushing down on the rear of the shelf will help ease installation.



To slope shelves, insert the cantilever plate tabs into the rectangular holes in the desired position on the shelf standard. Lift up on the rear of the shelf so that the top tab is locked behind the top of the rectangular hole. Hold the rear of the shelf up while lowering the front of the shelf until the bottom tab is inserted in the appropriate hole in the shelf standard.



INSTRUCTIONS - SOLID / QUAD DOOR REMOVAL
Installation & Adjustment

No File

CAM HINGE DOORS – OPERATION & REMOVAL (Solid Door Cabinets Only)

HOLD-OPEN FEATURE

The doors can be opened up to a 95° angle and will maintain that position for loading or unloading the storage compartment. Refer to Fig. 1.

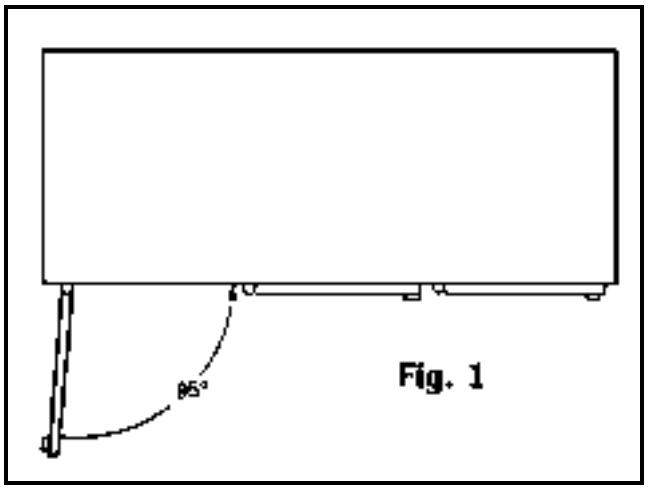


Fig. 1

Door Removal

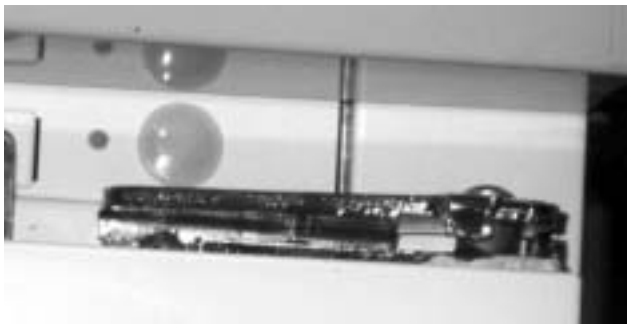
The door can be removed by opening door 180°. Grasp door with one hand. Remove two screws located in top bracket of door opening. Door can be lifted up and away from the BTM Bracket pin.

NOTE: Door closer cartridge is spring loaded.

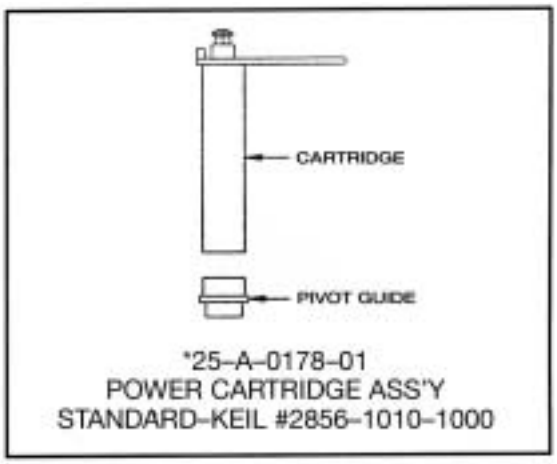
ALIGNING THE DOORS

Proper alignment of the cabinet doors will eliminate hinge binding and provide correct gasket seal.

Top Bracket door opening slotted holes for up and down adjustment.



Spring Cartridge located in door, can be removed by two screws Top of Door.



BTM Bracket Door opening slotted holes are for adjustment Left or Right

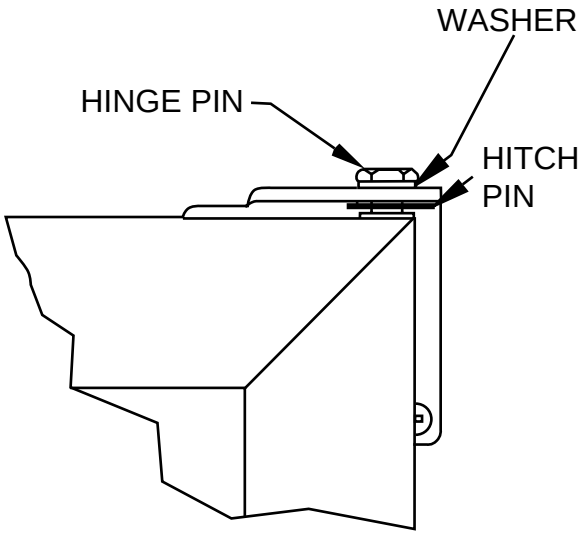


TORSION ROD HINGED DOORS - Maintenance & Removal

GLASS DOOR CABINETS ONLY
MAINTENANCE – ALIGNING DOORS

Proper alignment of the cabinet doors will eliminate hinge binding and provide correct gasket seal.

1. Check the level of the cabinet and door alignment by firmly closing each door. Observe the movement of the other doors. They should open slightly, then close and seal.
2. The hinge wings fastened to the cabinet door have slotted mounting holes for adjustment.
3. Additional adjustment can be made by adding shims between the hinge wing and either the door or the cabinet face.



REMOVING DOORS:

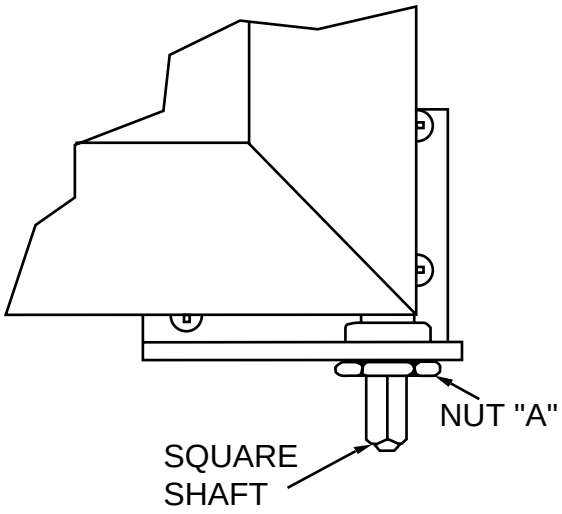
1. Loosen lower hex nut (Nut “A”) and release tension on the torsion rod.
2. Remove the hitch pin from the upper hinge pin.
3. Hold the door steady and unscrew the pin at top of the door. The door can now be lifted out of the lower hinge- bracket

REINSTALLING DOORS:

1. Set lower square shaft on door in lower hinge bracket
2. Insert top hinge pin and tighten to 12 ft./lbs. torque.

NOTE: Washer must be in place so top pin will not loosen and disconnect from door hinge.

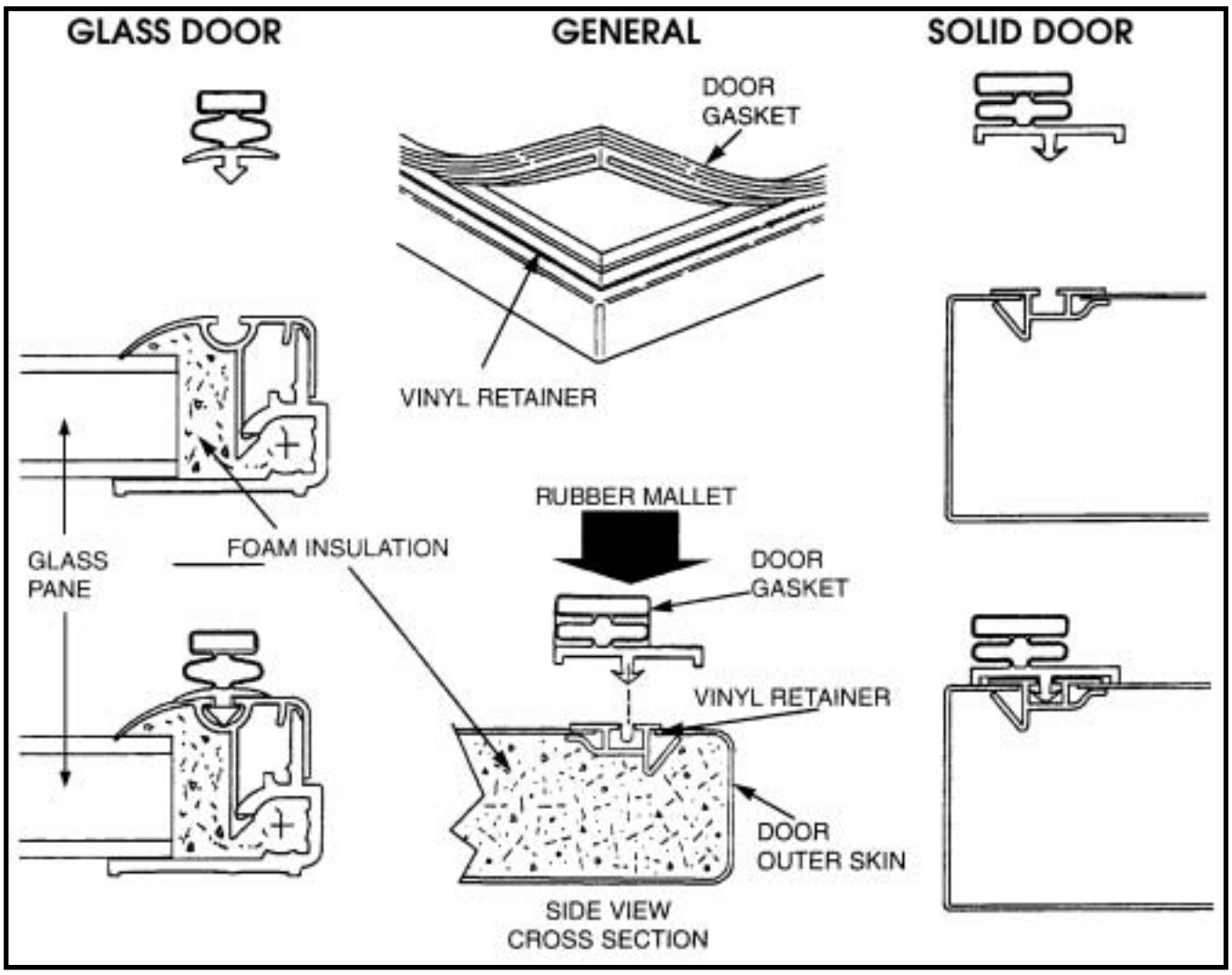
3. Insert hitch pin through hole in upper hinge pin.
4. Run Nut “A” up snug. (You may have to loosen Nut “A” as you tighten tension as noted in Step 5.)
5. Set tension on door by turning square shaft in the direction the door closes. Set tension so that the door will self close when opened approximately 1". (Do not overtighten so door will slam.) Tighten Nut “A” so tension can be maintained.



TORQUE ROD REMOVAL

1. Loosen nut “A” to remove door.
2. Attach vice grips to shaft.
3. Drive torque rod out of door.
4. Install new rod into keyway slot in door frame.
5. Reattach nut after installing door.
6. Turn shaft clockwise then lock nut “A”.
7. Add torque until door will close by itself.

DOOR GASKET REPLACEMENT

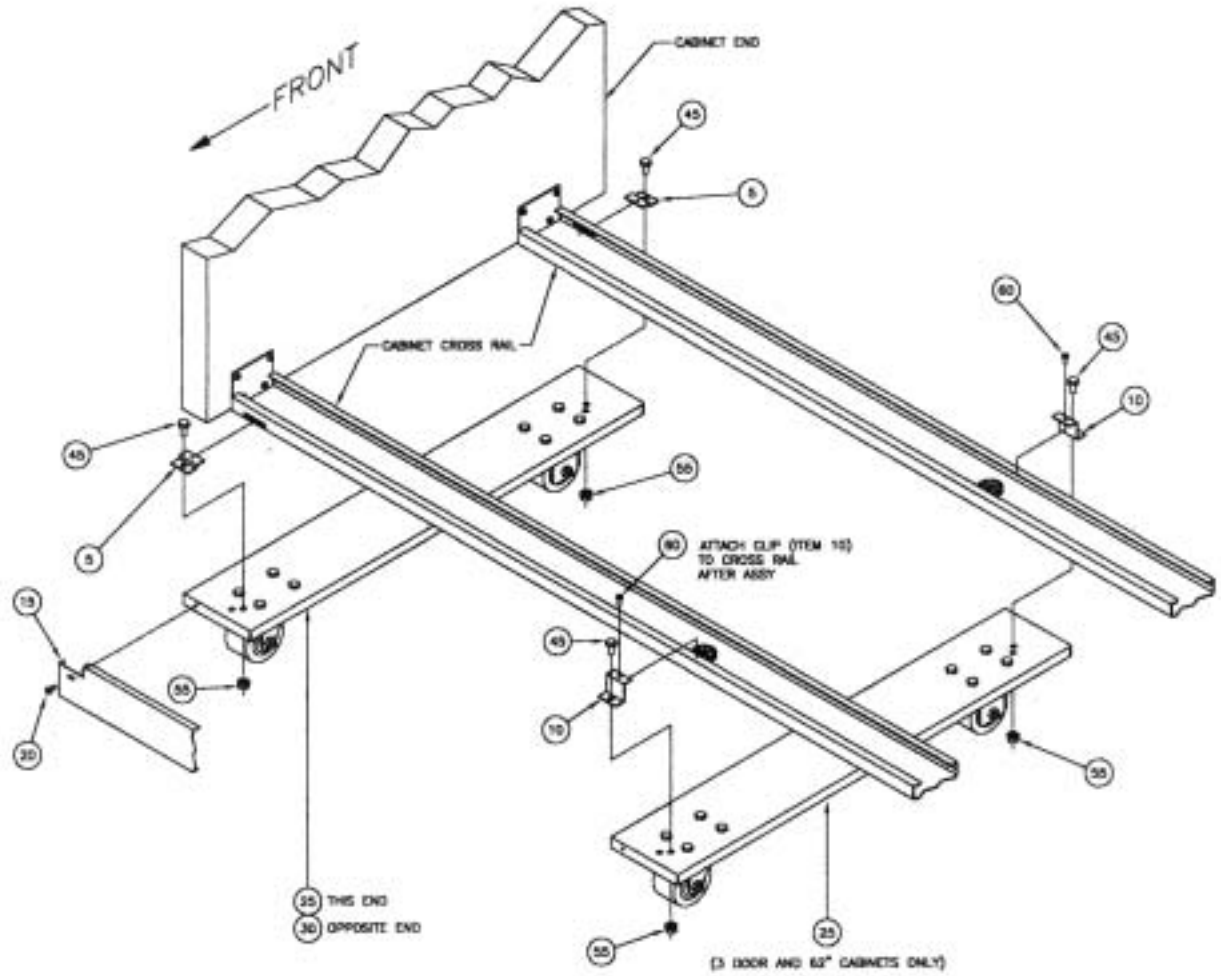


The gasket is replaceable on glass or solid door models. A retainer is molded into the door frame. The door gasket is then tapped into the retainer and secured for airtight door seal.

1. Remove door from cabinet.
2. Lay door front down on a flat, firm, nonscratch surface.
3. Pry up one corner of gasket with a putty knife or screwdriver. Pull gasket from perimeter of door retainer. Clean new gasket and straighten to insure proper fit.
4. Pull gasket from perimeter of door retainer.
5. Clean new gasket and straighten to insure proper fit.
6. Place gasket over retainer in door frame.
7. Using a rubber mallet, tap the gasket into the retainer. (NOTE: Gasket can be soaked in warm water to make pliable.)
8. Place door back onto cabinet.

CASTER INSTALLATION INSTRUCTIONS

ITEM	DESCRIPTION	QTY 1 DOOR 52-2022-00	QTY 2 DOOR 52-2023-00	QTY 3 DOOR 52-2024-00
5	CLAMP- SHORT	4	4	4
10	CLAMP- LONG	-	-	2
15	SKIRT	1	1	1
20	SCREW- #8 SELF TAP	2	2	2
25	CASTER CHANNEL ASSEMBLY (LH)	1	1	2
30	CASTER CHANNEL ASSEMBLY (RH)	1	1	1
45	SCREW- 5/16-18	4	4	6
55	NUT- 5/16-18	4	4	6
60	SCREW- #10 DRILL POINT	-	-	2

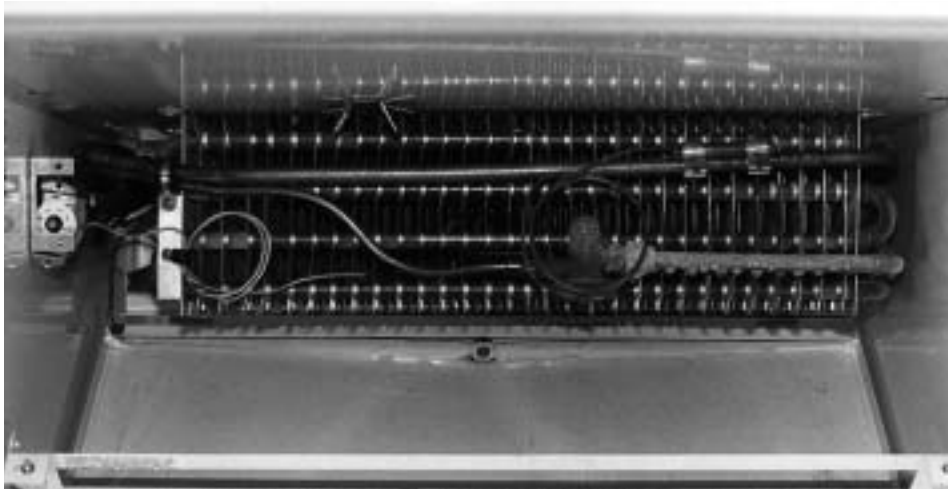


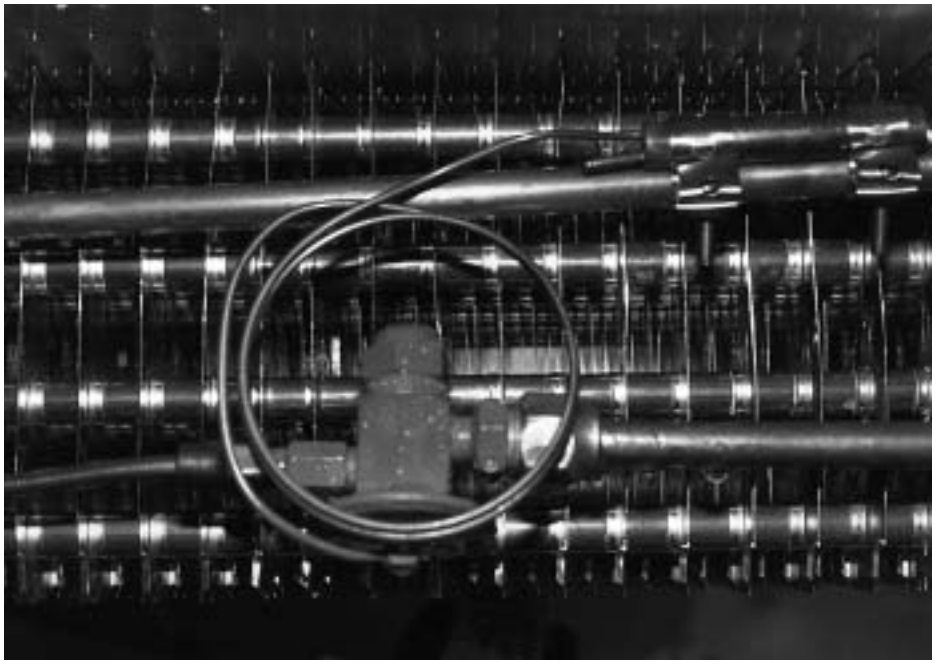
WARNING:

POWER SUPPLY CORD IS REQUIRED ON PERMANENTLY CONNECTED CABINETS WHEN CASTERS ARE INSTALLED.
CONSULT THE NATIONAL ELECTRICAL CODE (NFPA 70) AS WELL AS STATE AND LOCAL REGULATIONS FOR FURTHER REQUIREMENTS.

METERING DEVICE REPLACEMENT

The refrigerant metering device in this cabinet is expansion valve. It is a Sporlan FBV 1/4-C. It is located on the face of the evaporator coil behind the drain pan. (Super heat setting 6° to 8° valve is field adjustable.)





(Non-adjustable Shown)

1. Disconnect power to the cabinet.
2. Remove the evaporator drain pan.
3. Isolate the valve from the remainder of the system.
4. Remove the valve and replace with exact part number new valve.
5. Reposition the sensing bulb in original location.
6. Replace the drain pan.
7. Reconnect power to the cabinet.

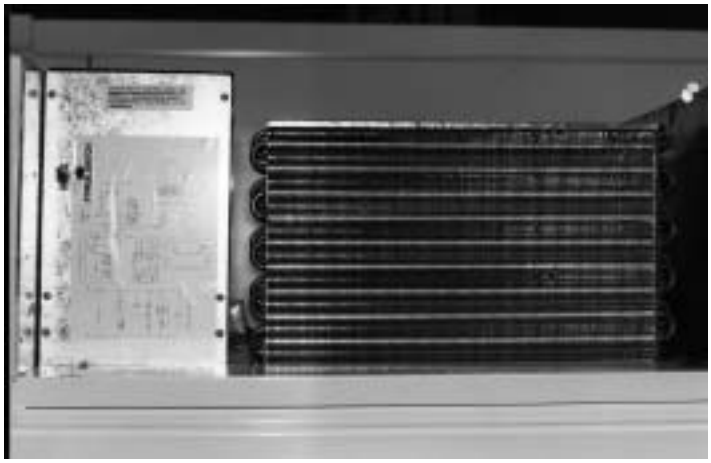
CONDENSER FAN MOTOR REPLACEMENT



The condenser fan motor is located directly behind the condenser coil in the machinery compartment.

1. Disconnect the power to the cabinet.
2. Remove the front top panel.
3. Remove the metal screen fan guard.
4. Disconnect the wire at the junction box.
5. Remove the motor from the fan motor mounting bracket.
6. Replace with correct motor.
7. Reconnect the wires at the junction box.
8. Replace the fan guard screen.
9. Replace the front top panel.
10. Reconnect the power to the cabinet.

MASTER POWER SUPPLY SWITCH REPLACEMENT



The master power supply switch on the top mount cabinets is located behind the front top panel, on the lefthand side of the electrical supply box.

On the bottom mount cabinets, the master power supply switch is located behind the lower front panel on the electrical box assembly.

On scientific cabinets, the power key switch is located on the front panel.

1. Disconnect power to the cabinet.
2. Remove the front panel.
3. Remove the screws holding the electrical box cover.
4. Detach switch leads.
5. Remove the lock nut on exterior of the switch.
6. Replace with new switch.
7. Reattach the electrical leads.
8. Replace the cover with the screws.
9. Replace the front panel.
10. Reconnect the power to the cabinet.

LIGHT SWITCH REPLACEMENT

On commercial models, the light switch is located inside the cabinet. It is on the light channel assembly.

On scientific cabinets, the light switch is located on the front control panel.

1. Disconnect the power to the cabinet.
2. Remove the plastic lamp shield. Remove the lamp bracket from the cabinet.
3. Remove the lock nut on the switch body.
4. Disconnect wire leads.
5. Connect new switch.
6. Replace the lock nut.
7. Replace the lamp shield.
8. Reconnect the power to the cabinet.



BALLAST REPLACEMENT

The ballast is located in the machinery compartment (A), attached to the back of the electrical control box (B).

1. Disconnect the power to the cabinet.
2. Remove the front panel.
3. Remove the cover panel on the electrical wiring box.
4. Disconnect the leads to the ballast.
5. Replace the ballast with correct part.
6. Replace the electrical wiring box cover panel.
7. Replace the front panel.
8. Reconnect the power to the cabinet.



Figure 1

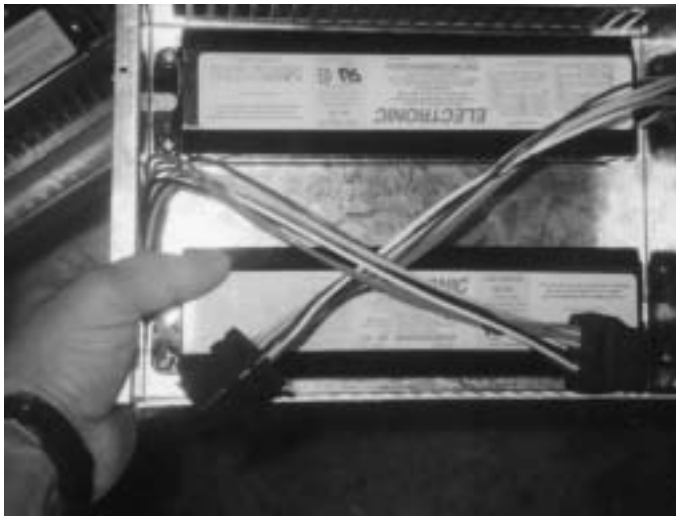


Figure 2

FLUORESCENT BULB REPLACEMENT





1. Remove the plastic outer lamp shield.
2. Grasp the bulb.
3. Raise the bulb up. Pull out of the socket.
4. Remove the lamp shields and the end caps.
5. Place a new bulb in the shield. Attach the end caps.
6. Insert the bulb into the cabinet, push up and snap into place.

CENTER MULLION HEATER REMOVAL

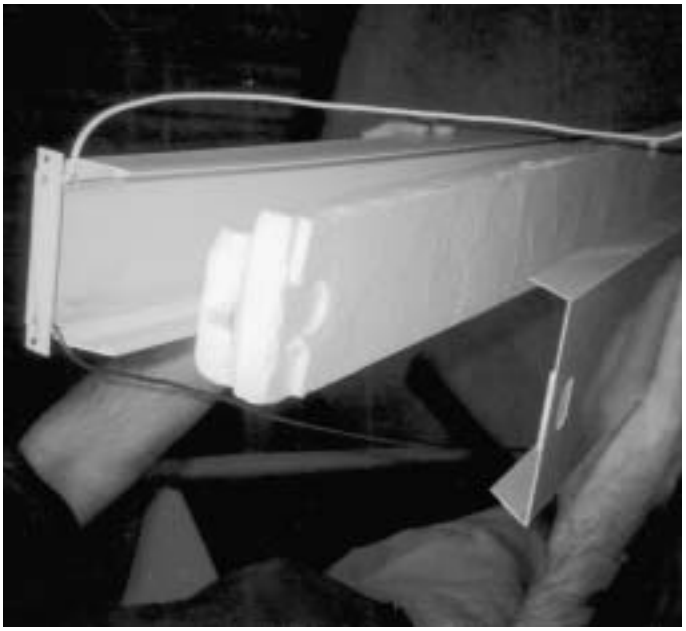
DISCONNECT POWER SUPPLY TO CABINET!

Center mullion heaters not foamed in place on later models. The heater can be accessed from inside the cabinet.

Remove lamp (if applicable).

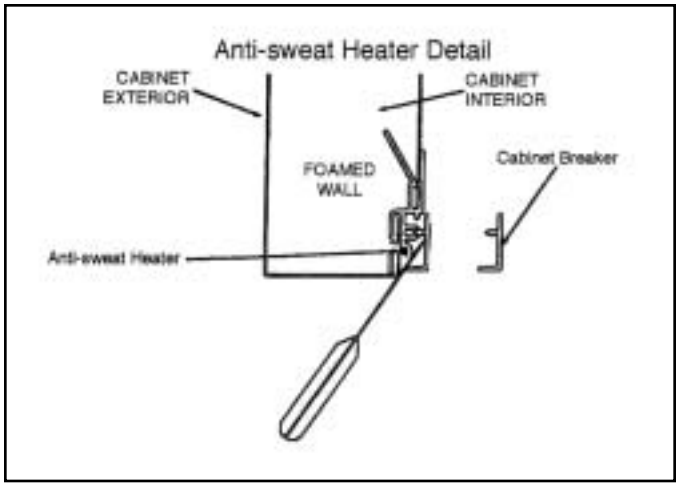
Spread inner plastic extrusion apart. Working down one side and then the other. Slide a putty knife about 3/4" between mullion back panel & the plastic extrusion. Carefully pry back panel from the mullion. This will expose the foam insulation. The mullion extrusion will have to be opened up also in order to get foam insulation out. The heater is taped in place. The heater lead wires exit the mullion and are plugged into a terminal board located just above the door opening in a raceway. Install the new heater in the same manner and reassemble in reverse order (see photos).





PERIMETER HEATER REMOVAL

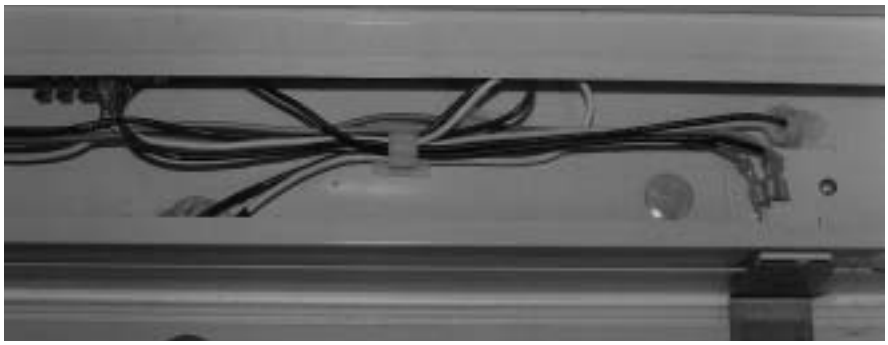
1. Disconnect power to cabinet.
2. Allow trim to warm up.
3. Insert the edge of the putty knife 1/16" under the outer flange of the trim breaker.
4. Rotate handle down to approx. 45°.
5. Bump the putty knife handle until breaker trim releases (see figure 1).
6. Remove all trim in the same manner.
7. Locate perimeter heater exit points.
8. Pull defective heater from groove provided.
9 The perimeter heater is plugged into a terminal board located in the upper of lower raceway depending on the application.
10. Install new heater and reseal wire exit points.
11. Replace trim and seal with a silastic compound.







CABINET RACEWAY - DOOR SWITCH REPLACEMENT



1. Disconnect the power supply to the cabinet.
2. Access the raceway (top or bottom mount) by removing the front panels.
3. Remove the raceway cover.
4. Squeeze the plastic retainer and pop out of raceway.
5. Disconnect the wires form the switch. (Switch has common normally open and normally close contacts).

Terminal board located in this raceway has a number of functions:

1. Power to center mullion heater;
2. Power to perimeter heaters;
3. Power to door receptacles.

TOUCH-UP PAINTING INSTRUCTIONS - SPRAY PAINT

TOUCH-UP PAINT INSTRUCTIONS

1. Send to bare metal on affected area and its edges until the edges are smooth or feathered. This insures that you are spraying onto a clean area that has adhesion.

2. Use and automotive primer (lacquer) over the bare metal.

3. Scuff sand the primered are lightly.

4. Test spray can before using on cabinet surface. Apply in short, even strokes holding can 10" to 12" from surface, and moving rapidly during use. Apply paint in thin layers (4-5 layers minimum) with air drying time in between coats. Scuff sand very lightly between coats. This will remove uneven spots or roughness and will create a high gloss, smooth finish.

5. Use rubbing compound (preferred) or wax over the finished area after a few days of hardening/drying time.

CLEANING & MAINTENANCE

CAUTION:

Make sure cabinet is disconnected from its power source prior to any cleaning or maintenance.

CLEANING THE CABINET EXTERIOR

Wipe the exterior occasionally with a cloth dampened in mild detergent water; rinse, and wipe dry with a soft, dry cloth. ***Do not use abrasive or caustic cleaners or scouring pads.***

CLEANING THE CONDENSER - FIG. 1

1. Periodic cleaning of the condenser, located in the machinery compartment, can be easily accomplished by brushing the coils with a soft brush and/or using a vacuum cleaner with a brush attachment.
2. Be sure that dirt, dust, and collection of other debris do not build up to a point air circulation through the condenser is restricted.
3. Clean the condenser at least twice a year.

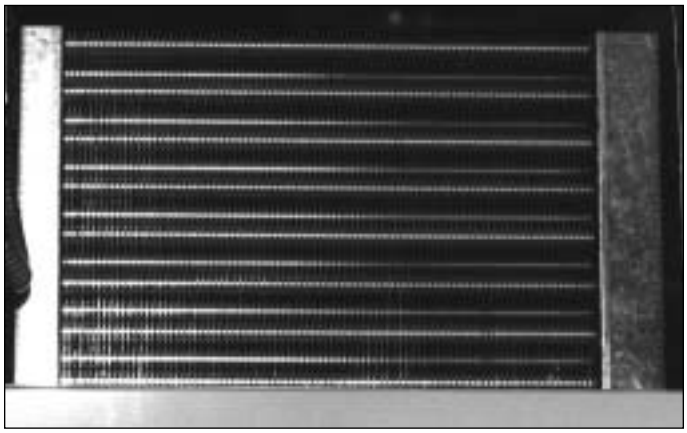


FIG. 1

CLEANING THE STORAGE COMPARTMENT

IMPORTANT: Do not use any objects or cleaners which may leave residues, odors, or particles. Avoid the use of strong chemicals or abrasive cleaners which may damage the interior surfaces and contaminate product within the storage area.

1. Remove product and store in another suitable cabinet, if possible. Be sure to prevent spoilage of the product which may occur if it is left at room temperature.
2. Turn OFF the Master Power Supply Switch.
3. Remove the shelving.
4. Wash the inside surface of the doors and the entire interior storage area with warm water and baking soda solution—about a tablespoon of baking soda per quart of water. Rinse thoroughly with clear water and wipe dry. This procedure can also be used for cleaning the door gaskets.
5. Wash, rinse, and dry the shelving while it is outside of the cabinet, using the same procedure as described for the storage area.
6. Be sure to correctly reinstall the shelving, turn ON the Master Power Supply Switch, check the setting of the Temperature Control, and allow time for cooling of the storage area before storing product.

WARNING

To avoid the possibility of an electrical shock, turn OFF thermostat and unplug the electric cord of the cabinet before cleaning or touching electrical connections or parts.

BT30CWFMS

GROUNDING

This appliance is equipped with a three-prong (grounding) plug for your protection against shock hazards and should be plugged directly into a properly grounded three-prong receptacle. Where a two-prong wall receptacle is encountered, it must be replaced with a properly grounded three-prong receptacle in accordance with the national electrical code and local codes and ordinances. The work should be done by a qualified electrician. (See figure below.) Do not, under any circumstances, cut or remove the round grounding prong from this plug.

WARNING

Consult a qualified electrician if you have any doubt about the grounding of your wall receptacle. Only a qualified electrician can determine the polarization of your wall receptacle, and only a properly installed three-prong receptacle assures the proper polarization of your wall receptacle, and only a properly installed three-prong receptacle assures the proper polarization with the appliance plug.

POWER SUPPLY
CORD WITH 3-PRONG
GROUNDING PLUG





GROUNDING
TYPE WALL
RECEPTACLE

FLAMMABLE MATERIAL STORAGE

To meet requirements for storing flammable material, cabinet has no opening, other than the door, or any electrical components below compressor compartment.

NOTE: Do not modify cabinet or remove flammable material storage label on the front.

DEFROSTING & CLEANING

A complete defrost will be required periodically, depending on the usage of the cabinet. To defrost, perform the following:

1. Unload product from the cabinet.
2. Pull power supply cord from wall receptacle.
3. To hasten process, set pans of warm water on shelves of storage compartment, or let a fan blow into the storage area with the door open.
4. Wipe all the shelving and wall surfaces clean and dry.
5. Remove the shelves and shelf standards, if necessary for thorough cleaning.
6. Return all components. Plug in power supply cord.
7. Once the cabinet has attained desired temperature, reload the cabinet with product.

NOTE:

The door may be hard to open for a short period after closing. Wait a few seconds to allow interior air pressure to balance.

ELECTRICAL & REFRIGERATION SPECIFICATIONS
Low Temp., Solid, 1-Door Freezers BT30CWFMS

SYSTEM COMPONENTS

Compressor Model Number	Americold-HP 121-1-3087
Recommended Operating Temp. Range	+10°F to -20°F
Cabinet Volts	115/60/1
Expansion Device	Cap Tube 8' x .036
Charge Refrig. Type / Oz. / Grams	404A / 14 oz. / 396.9 grams

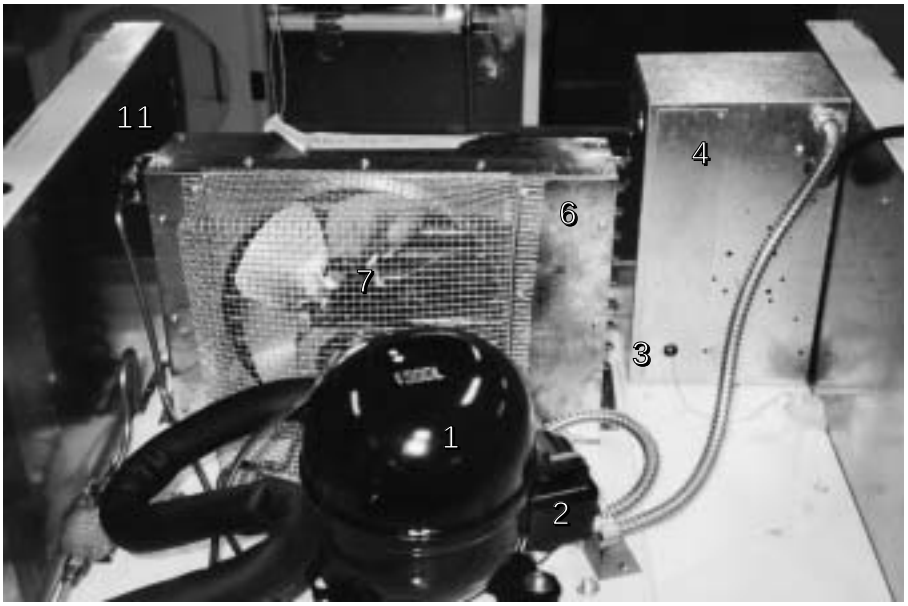
SYSTEM PERFORMANCE

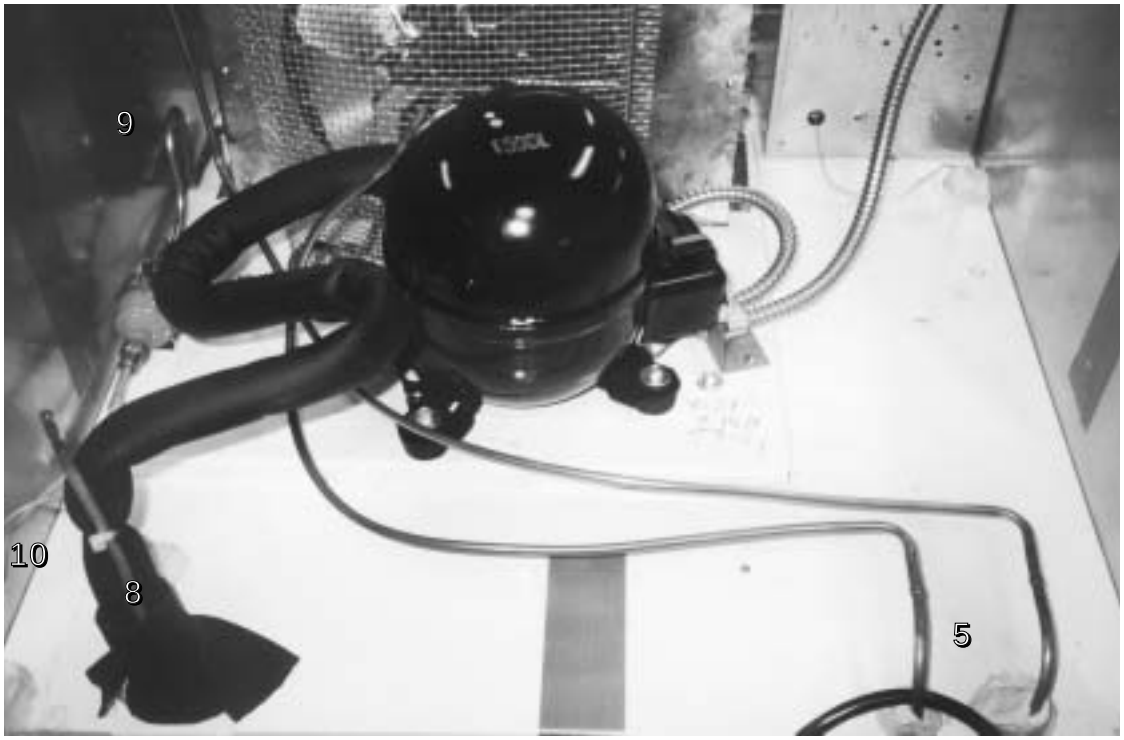
AMBIENT	**70°F / 21.1°C**	**80°F / 27°C**	**90°F / 32.5°C**
Cavity Temp. (F/C)	-9.8°	-9.3°	-9.3°
Suction Pressure (PSIG / Kpa)	7.8	8.7	10.1
Discharge Pressure (PSIG / Kpa)	207.1	236.4	266.3
Compressor Amps	2.9	2.9	3.0
Total Refrigeration Amps	3.0	3.0	3.1

CONDENSING UNIT LAYOUT
Low Temp, Solid, 1-Door Freezers

BT30CWFMS

1. Compressor
2. PTC Relay & Overload
3. Thermostat Capillary
4. Electrical Box
5. Hot Gas Perimeter Loop (Front Face)
6. Condenser
7. Condenser Fan Motor & Blade
8. Cold Wall Process Tube
9. Filter Drier
10. Cap Tube
11. High Side Service Valve



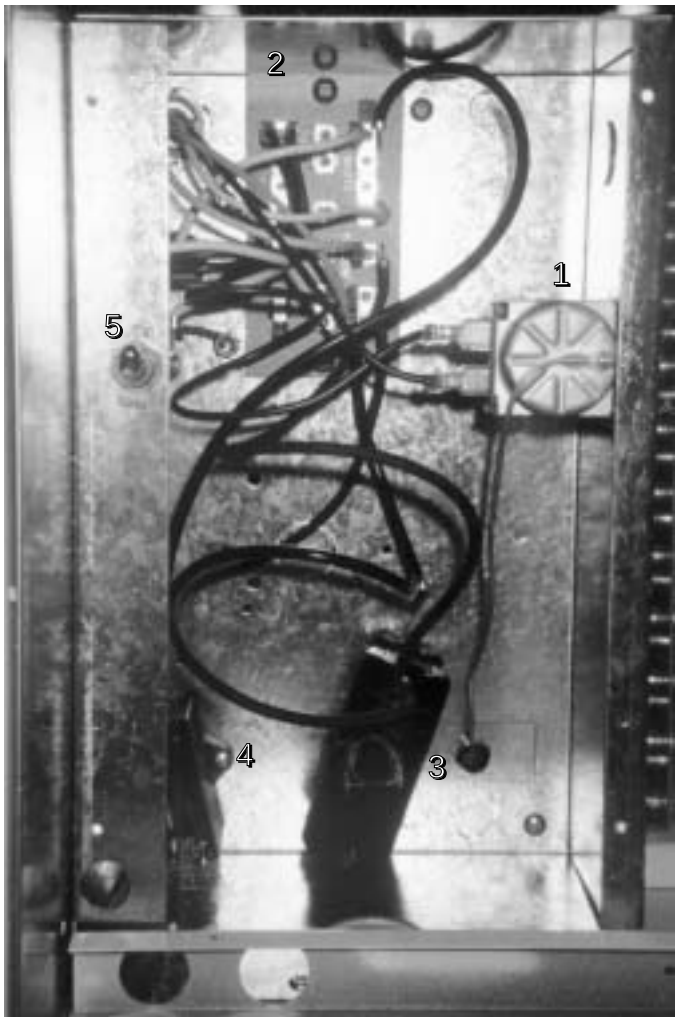


ELECTRICAL BOX COMPONENTS BT30CWFMS

The thermostat is located in the electrical box, just behind the front grill as shown.

The thermostat capillary is routed through the back of the electrical box and inserted in a bulb well that is clamped to the cold wall evaporator. The bulb well is on the top, lefthand side of the unit compartment.

1. Thermostat
2. Terminal Board
3. Start Capacitor
4. Run Capacitor
5. Power Switch





BT30CWEXPR

EXPLOSION PROOF STORAGE

This model is also UL listed for storing Flammable Materials.

DO NOT MODIFY CABINET OR REMOVE LABEL ON THE FRONT WHICH SPECIFIES STORAGE LIMITS

CONTAINER REQUIREMENTS

Refer to the latest edition of the following codes to determine correct container requirements and the definition of flammable or combustible liquids.

National Fire Protection Agency (NFPA) 45 Fire Protection for Laboratories using Chemicals.

National Fire Protection Agency (NFPA) 99 Health Care Facilities Chapter 7, Laboratories in Health Related Institutions.

NFPA Address: Batterymarch Park, Quincy, MA 02269

You must follow these codes when storing flammable materials.

GENERAL INSTALLATION INFORMATION

For satisfactory and safe operation, you must thoroughly understand the operation of this cabinet and conditions that could be dangerous if instructions are not followed.

As the user of this cabinet, you are responsible to understand how it must be installed for proper function and operation. Any operator of the cabinet must be given adequate training before placing the cabinet in operation. You must be aware of **WARNINGS** called out in the manual. You must follow all applicable codes during installation and operation.

The freezer complies with the following:

1. U.L. Listed, Commercial Freezer for Hazardous Locations. Also Listed for Flammable Materials Storage. Control number **47R6.**
2. For use in Class 1, Division 1, groups C and D Hazardous Locations. Operating Temperature Code, **T4A.**
3. Meets Requirements of OSHA 29CFR 1910.307.
4. Accepted for use: The City of New York
   Department of Buildings
   MEA 327-87-E

For your own benefit—take time to read this manual and retain it for future refence.

REMOVING OUTER DOOR

If the assembled cabinet is too wide to move through narrow doorways, the cabinet doors can be removed as follows:

1. Open doors and lift door off the hinge butts. It is not necessary to remove the hinge covers to remove the door.
2. After the legs are on and the cabinet is in final position, set the doors back on the hinge pins.

LOCATING THE CABINET

Select a location most convenient for usage, preferably a clean, dry area, away from sources of heat such as overhead blowers, radiators, ovens, or direct sunlight.

FOR SATISFACTORY OPERATION

1. The cabinet should be free standing with a minimum of four (4") inches between the cabinet rear and the wall. To allow air flow over the compressor and machinery compartment, a minimum of 12" overhead clearance should be provided.
2. Level the cabinet so door will slowly close when held open about four (4") inches and released. This setting assures self closing if the door is closed hard enough to rebound open.

CAUTION: REFRIGERATION LEAKS OR WET INSULATION CAUSED BY DRILLING WILL VOID THE WARRANTY!!!

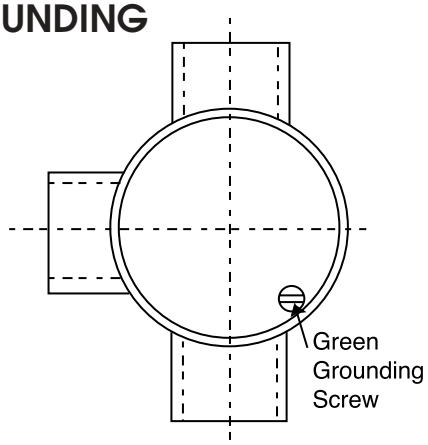
ELECTRICAL SUPPLY REQUIREMENTS

The electrical power supply must be installed according to the latest edition of the NATIONAL ELECTRICAL CODE – specifically Article 510 – Hazardous (Classified Locations - Specific). Appropriate materials and wiring methods must be used in order to comply with the current National Electrical Code for Class 1, Group Cand D area installation. All local and other appropriate codes must be followed.

The installation must be made by a licensed professional electrician and contractor.

POWER SPECIFICATION: 115 Volt, 60 Cycle, 1 Phase
RUNNING AMP: 4.5 MIN. WIRE SIZE: 14 AWG.

GROUNDING



WARNING:

For personal safety, this cabinet must be properly GROUNDED. The ground wire to the cabinet must be installed on the green screw located in the conduit outlet box. (Refer to drawing.)

The conduit outlet box is where the incoming power wires are connected to the cabinet wires.

The incoming ground wire must be properly installed from the power supply. Consult a licensed electrician if you have any doubt about this wire being properly installed.

WARNING:

Be absolutely sure that the surrounding location has been checked for the absence of explosive concentrations before any electrical work is started.

Overcurrent Protection: 15 amps. (If fuses are used use time delay type.)

CAUTION: ***TO PREVENT IGNITION OF HAZARDOUS ATMOSPHERES, DISCONNECT THE PRODUCT FROM THE SUPPLY CABINET CIRCUIT BEFORE OPENING ELECTRICAL BOXES. KEEP ASSEMBLY TIGHTLY CLOSED WHEN IN OPERATION.***

The thermostat dial is calibrated in °F, but doesn't indicate temperatures inside the storage compartment. Typical performance for thermostat control settings are listed below.

Cabinet thermostats are factory preset for 20°F:

Thermostat Setting	**Cavity Temp.**
+25°F	+16°F
+10°F	+4°F

ELECTRICAL & REFRIGERATION SPECIFICATIONS
Low Temp., Solid, 1-Door Freezer BT30CWEXPR

SYSTEM COMPONENTS

Compressor Model Number	Tecumseh-AE 800AT-421-A4
Recommended Operating Temp. Range (F/C)	+10°F to -20°F (-12° C TO -27°C)
Cabinet Volts	115/60/1
Expansion Device	Cap Tube 12' x .031
Charge Refrig. Type / Oz. / Grams	R-134A / 19 oz. / 538.6 grams

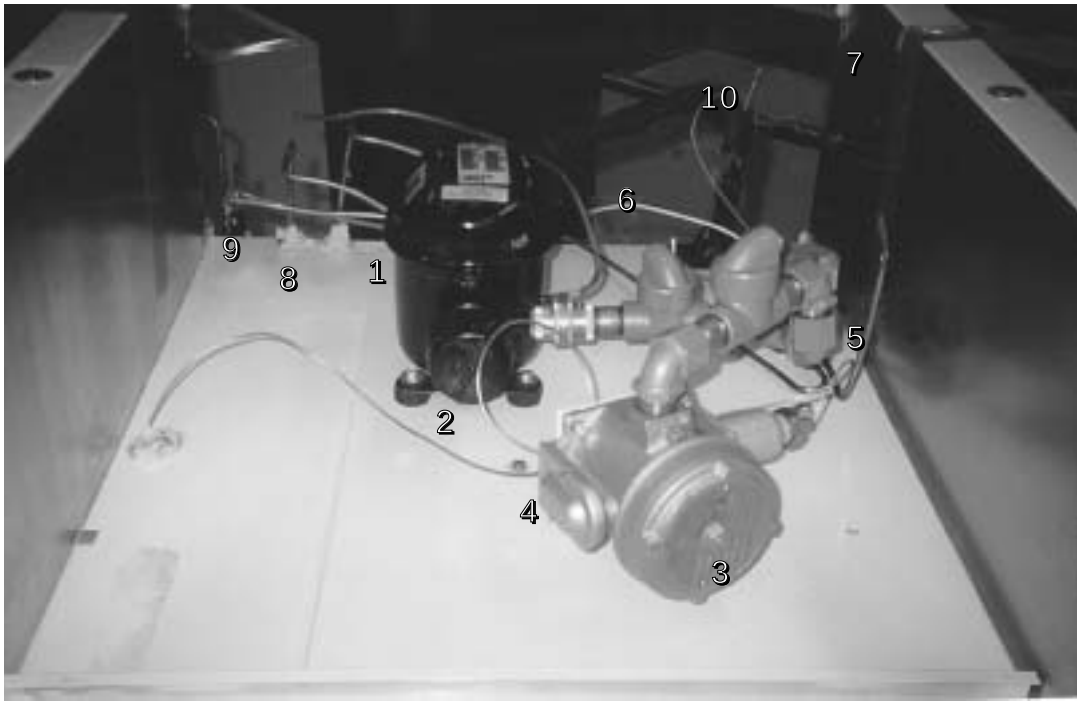
SYSTEM PERFORMANCE

AMBIENT	**70°F / 21.1°C**	**80°F / 27°C**	**90°F / 32.5°C**
Cavity Temp. (F/C)	-5/-21	-5 / -21	+5 / -15
Suction Pressure (PSIG / Kpa)	2.5 / 4	1 / 6	4.2 / 27
Discharge Pressure (PSIG / Kpa)	95 / 655	141 / 972	117 / 1220
Compressor Amps	2.5	2.5	2.6
Total Refrigeration Amps	2.6	2.6	2.7

CONDENSING UNIT LAYOUT
Low Temp, Solid, 1-Door Freezers

BT30CEXPR

1. Compressor
2. PTC Relay & Overload (Sealed Enclosure)
3. Thermostat
4. Thermostat Adjustment (Enclosed)
5. Liquid Line Process Tube (High Side)
6. Compressor Process Tube (Low Side)
7. Cold Wall Process Tube (Low Side)
8. Hot Gas Perimeter Loop
9. Condenser Inlet & Outlet
10. Capillary Tube Inlet



CABINET REAR VIEW

BT30CWEXPR

The condenser is attached to the rear of the cabinet via the hold down brackets as shown.

The condenser consists of a 2-piece series circuit arrangement.

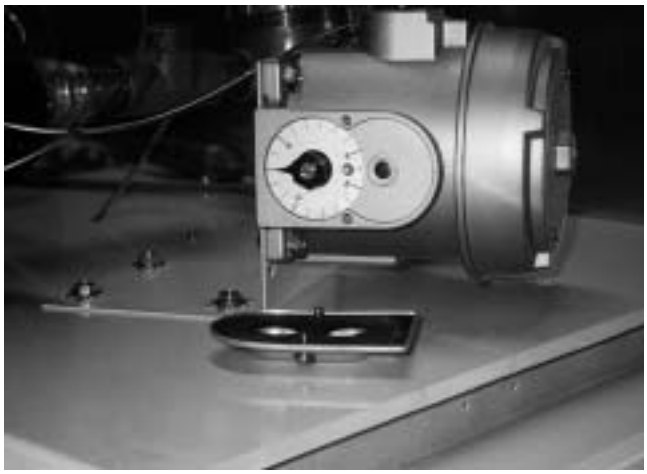


TEMPERATURE CONTROL

The temperature control is located on the unit compartment, behind the front grill.
To change the cabinet temperature:

1. Remove the two screws that hold the cover in place.
2 Adjust the temperature control knob to the desired cavity temperature. Replace the cover.

The thermostat dial is calibrated in degrees Fahrenheit, but does not indicate temperatures inside the storage compartment. Typical performance for thermostat control settings is listed below. Cabinet thermostats are factory preset for 0°F.



SWITCH HOUSING COVER REMOVED

IMPORTANT: ***Use only factory authorized replacement parts and procedures.***

CAUTION:
Always disconnect supply circuits before removing explosion proof cover.

REPLACEMENT OF SWITCHES

Types E121 & F120

1. Remove cover, (2) switch mounting screws, switch and insulator.
2. Disconnect (3) switch wires at switch terminal.
3. Install new switch and wire per **SET POINT ADJUSTMENTS**.
4. Mount switch and insulator inside enclosure and recalibrate per **SET POINT ADJUSTMENTS**.

SET POINT ADJUSTMENTS

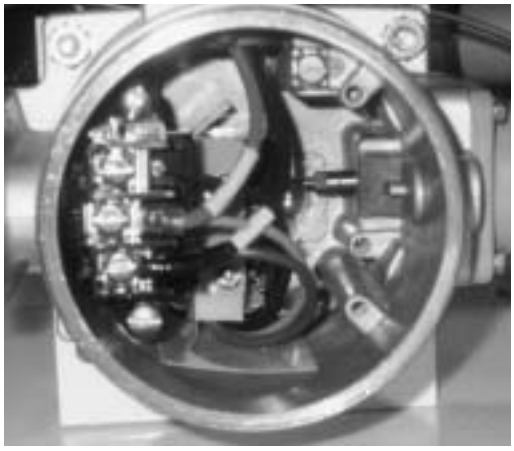
NOTE: For set point adjustments and recalibration, connect control to a calibrated temperature source and stabilize unit.

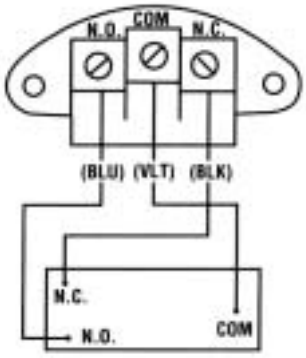
TYPE E121

Adjust set point by turning external knob and pointer to desired setting on scale.

Recalibration—adjusting set point after replacing switch(es) and/or thermal assembly:

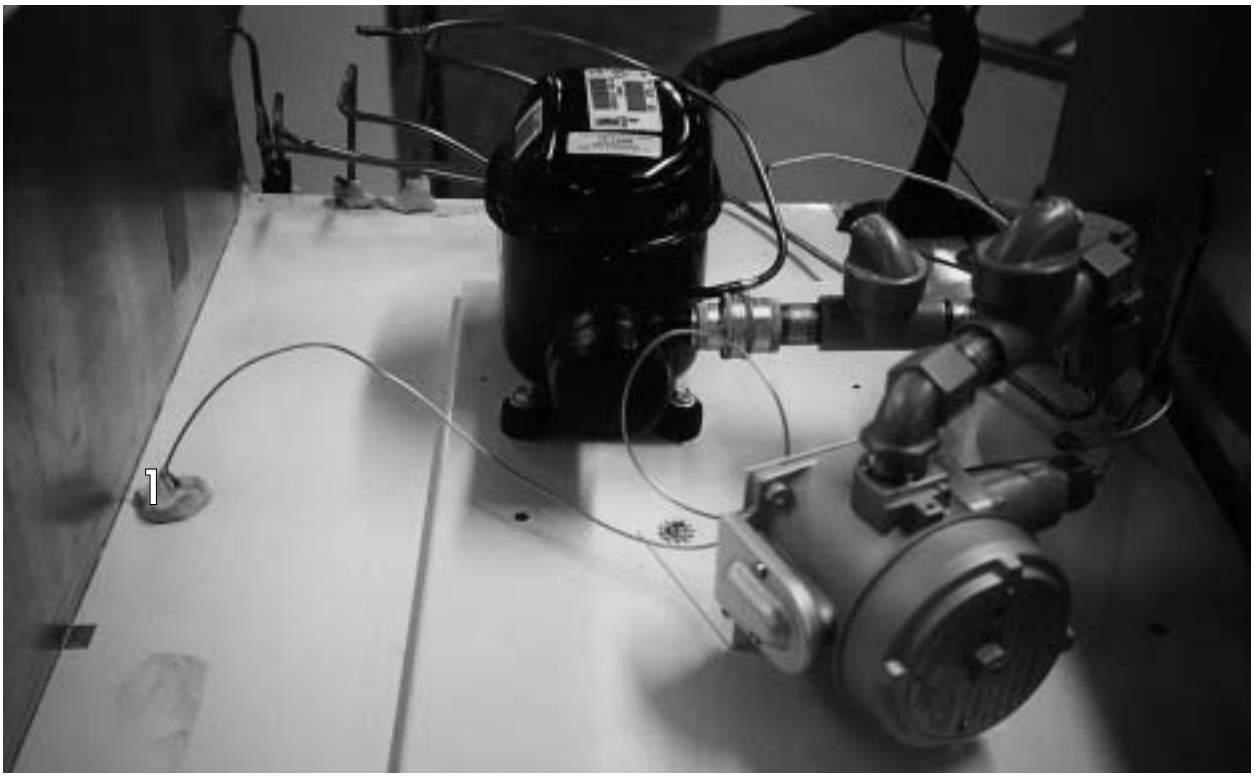
Slowly turn adjustment knob until switch transfers. Compare switch transfer point to actual temperature. If they do not agree, loosen set screws on adjustment knob and align pointer to indicate actual temperature.



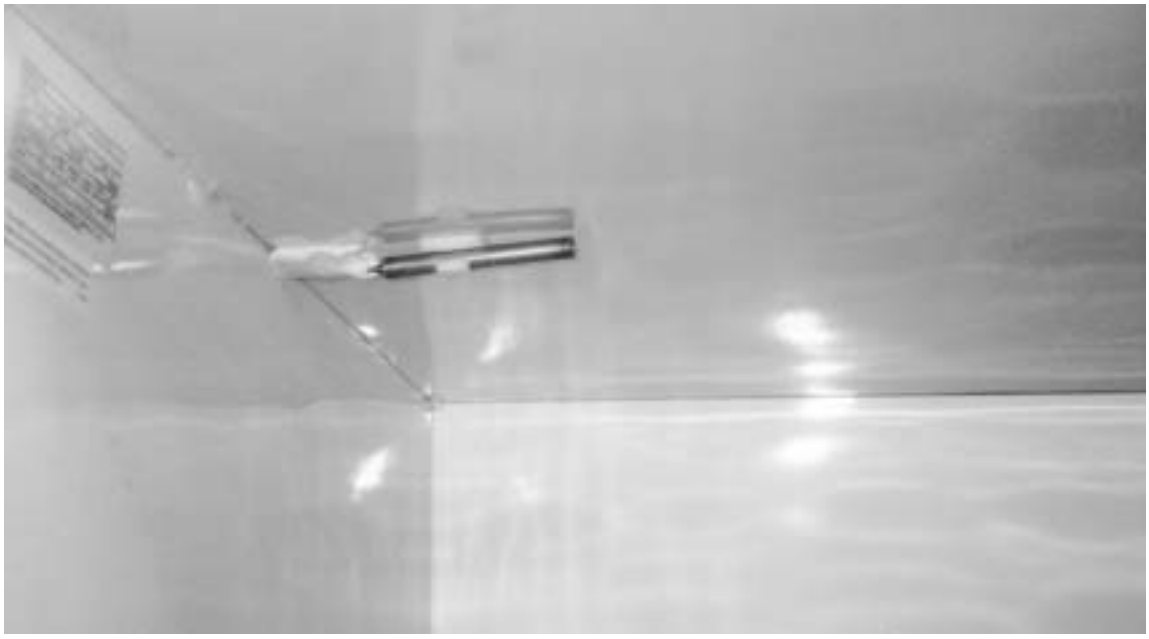


THERMOSTAT BULB PLACEMENT BT30CWEXPR

The Thermostat Bulb is routed through a hole provided on the top, lefthand side of the unit compartment as shown below(1).

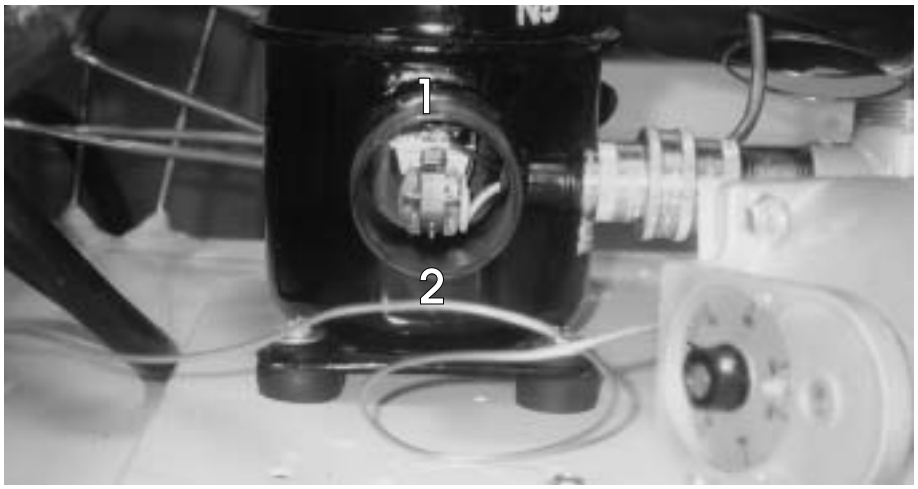


The bulb is located 2" from the side wall and at the center line of the tank top as shown.

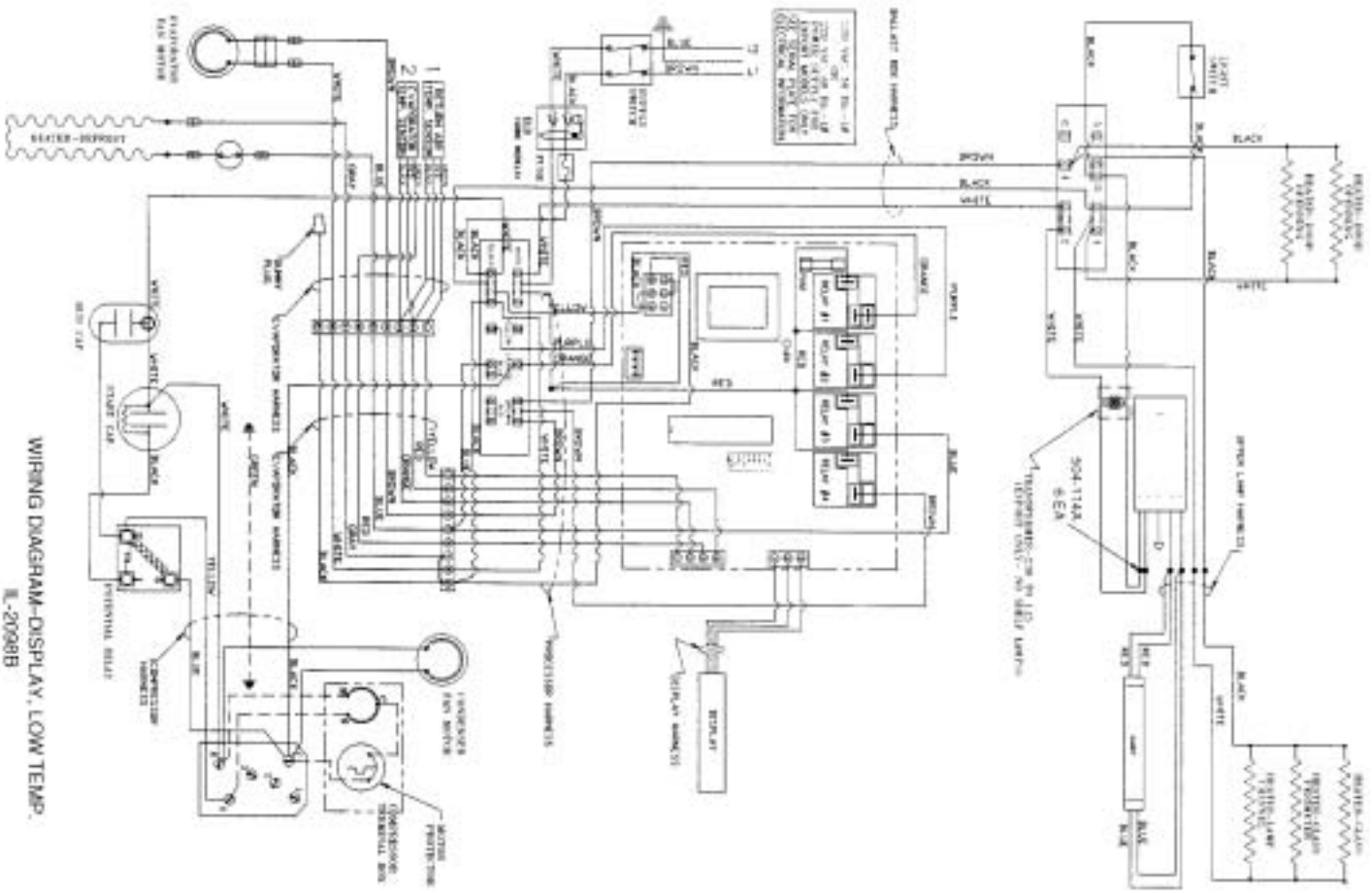


COMPRESSOR RELAY & OVERLOAD BT30CWEXPR

The PTC relay and overload are located within welded pipe assembly as shown below (cap removed).



1. Compressor Overload
   #T.I. 4TM762PHBYY-53
2. Compressor PTC Relay
   #T.I. 8EA402



WIRING DIAGRAM–DISPLAY, LOW TEMP.
IL-20986

TROUBLESHOOTING CHARTS

TROUBLE	COMMON CAUSE	REMEDY
UNIT WILL NOT RUN.	Blown Fuse.	Check power for “live” circuit. If outlet is “dead” but building has power, replace the fuse. Try to determine the cause of the overload or short circuit
	Low Voltage.	Check outlet with voltmeter. Should check 115V plus or minus 10%. If circuit is overloaded, either reduce load or have electrician install separate circuit. If unable to remedy any other way, install auto-transformer.
	Open motor or temperature control.	Jumper across terminals of control. If unit runs and connections are all tight, replace control. Power element may have lost charge or points may be dirty. Repair or replace thermostat.
	Open relay.	Check relay. Replace if necessary.
	Open overload.	Check overload. Replace if necessary
	Open compressor.	Check compressor. Replace if necessary.
	Open service cord.	Check with ohmmeter at unit. If no circuit and current is indicated at outlet, replace or repair.
	Broken lead to compressors or cold control.	Repair or replace broken leads.
	Service cord not plugged in.	Plug in cord.
CABINET TOO WARM.	Thermostat position set too warm, not allowing unit to operate often enough.	Turn knob to colder position.
	Fan motor not running.	Check and replace fan motor if necessary.
	Shortage of refrigerant	Check for leaks. Repair, evacuate and recharge system.
	Not enough air circulation around cabinet.	Relocate cabinet or provide clearance to allow sufficient circulation.
	Dirty condenser or obstructed condenser ducts.	Clean the condenser and the ducts.
	Thermostat control capillary not properly installed.	Refer back to removal/installation instructions detailed in this manual.

TROUBLE	COMMON CAUSE	REMEDY
CABINET RUNS CONTINUOUSLY.	Not enough air circulation around cabinet or circulation is restricted.	Relocate cabinet or provide proper clearances around cabinet. Remove restriction.
	Cooling large quantities of product or heavy loading.	Explain to customer that heavy loading causes long running time.
	Refrigerant charge undercharged or overcharged.	Check, evacuate and recharge with proper charge.
	Room temperature too warm.	Ventilate room as much as possible.
	Thermostat defective.	Check control. If it allows unit to operate all the time, replace control.
NOISY OPERATION.	Loose flooring or floor not firm.	Tighten flooring or brace floor.
	Tubing contacting cabinet or other tubing.	Move tubing gently!
	Cabinet not level.	Level cabinet.
	Compressor mechanically grounded.	Replace compressor mounts.
	Fan hitting drain pan or mechanically grounding.	Move fan.
	Shipping bands rubbing.	Make sure all shipping bands have been cut and removed.
	Loose fan blades or motor.	Tighten fan blades and/or motor.
	Loose parts or refrigeration or electrical lines out of place.	Tighten all loose fittings. Move misplaced lines.
UNIT CYCLES ON OVERLOAD.	Short relay.	Replace relay
	Weak overload protector.	Replace overload protector.
	Low voltage.	Check outlet with voltmeter. Underload voltage should be 115V plus or minus 10%. Check for several cabinets on same circuit or extremely long or underseed cord being used.
	Short compressor.	Check with meter and also ground before replacing.
CABINET LIGHTS WILL NOT WORK.	Light switch off or defective.	Try new bulb or bulbs. Inspect lampholders for signs of bad connections.
COMPRESSOR WILL NOT RUN.	Incorrect voltage.	Check voltage to compressor terminal board. Voltage must be plus or minus 10% of nameplate voltage.

TROUBLE	COMMON CAUSE	REMEDY
UNIT RUNS TOO MUCH.	Abnormally high, heavy use of cabinet.	Heavy usage requires more operation Check usage and correct or explain.
	Shortage of refrigerant. Unit must run longer and will operate at a lower than normal suction pressure.	Put in the normal charge and check for leaks.
	Overcharge of refrigerant. Excessively cold or frosted suction liner results in lost refrigeration effort.	Remove excess charge.
	Restricted air flow over condenser or air or non-condensable gases in system.	Correct the condition.
	High room temperature.	Check for temperature variance. Correct condition.
	Compressor inefficient.	Replace.
	Thermostat setting too cold.	Raise setting.
UNIT SHORT CYCLES.	Cycling on overload because of high/low line voltage with variance more or less than 10% from 115 volts. May also be caused by head pressures too high.	Check voltage, head pressure and air passages. Repair and correct condition.
PRODUCT TOO COLD.	Thermostat set too cold.	Set warmer. (Setting #1 is the warmest; #7 is the coldest.)
	Thermostat bulb contact bad.	If the bulb contact is bad, the bulb temperature will lag behind the sleeve temperature, causing the unit to run longer and make the cabinet too cold. Make sure bulb makes good contact with the bulb well.
	Room temperature abnormally low.	Correct conditions.
PRODUCT TOO WARM.	Thermostat set too warm.	Set colder. (setting #1 is the warmest; #7 the coldest.
	Thermostat contact points dirty or burned.	Clean or replace thermostat.
	Thermostat out of adjustment.	Readjust or change thermostat.
	Excessive service load or abnormally high room temperature.	Educate customer about problems that are caused by improper loading and excessive room temperature fluctuations.
	Excessive frost accumulation.	Defrost the cabinet.

COMPRESSOR – TROUBLESHOOTING CHARTS

TROUBLE	COMMON CAUSE	REMEDY
WON'T START. NO HUM.	Open line circuit.	Check wiring, fuses, receptacle.
	Protector open.	Wait for reset—check current.
	Control contacts open.	Check control, check pressures.
	Open circuit in stator.	Replace stator or compressor.
WON'T START. HUMS INTERMITTENTLY. (cycling on protector)	Improperly wired.	Check wiring against diagram.
	Low line voltage.	Check main line voltage, determine location of voltage drop.
	Open starting capacitor.	Replace starting capacitor.
	Relay contacts not closing.	Check by operating manually. Replace relay if defective.
	Open circuit in start winding.	Check stator leads. If leads are all right, replace compressor.
	Stator winding grounded (normally will blow fuse.)	Check stator leads. If leads are all right replace compressor.
	High discharge pressure.	Eliminate cause of excessive pressure. Make sure discharge shut-off and receiver valves are open if applicable.
	Tight compressor.	Check oil level – correct binding condition, if possible. If not, replace compressor.
	Weak starting capacitor or one weak capacitor of a set.	Replace.
COMPRESSOR STARTS – MOTOR WON'T GET OFF STARTING WINDING.	Low line voltage.	Bring up voltage.
	Improperly wired.	Check wiring against diagram.
	Defective relay.	Check operation – replace relay if defective.
	Running capacitor shorted.	Check resistances. Replace capacitor if defective.
	Starting and running windings shorted.	Check capacitance – replace if defective.
	Starting capacitor weak or one of a set open.	Check capacitance. Replace if defective.
	High discharge pressure.	Check discharge shutoff valves. Check pressure.
	Tight compressor.	Check oil level. Check binding. Replace compressor if necessary.

TROUBLE	COMMON CAUSE	REMEDY
COMPRESSOR STARTS & RUNS BUT CYCLES ON PROTECTOR.	Low line voltage.	Bring up voltage.
	Additional current passing through protector.	Check for added fan motors and pumps connected to wrong side of protector.
	Suction pressure too high.	Check compressor for proper application.
	Discharge pressure too high.	Check ventilation, restrictions and overcharge.
	Protector weak.	Check current - replace protector if defective.
	Running capacitor defective.	Check capacitance. Replace if defective.
	Stator partially shorted or grounded.	Check resistances; check for ground. Replace if defective.
	Inadequate motor cooling.	Correct cooling system.
	Compressor tight.	Check oil level. Check for binding condition.
	Unbalanced line (three-phase).	Check voltage of each phase. If not equal, correct condition of unbalance.
	Discharge valve leaking or broken.	Replace valve plate.
STARTING CAPACITORS BURNT OUT.	Short cycling.	Reduce number of starts to 20 or less per hour.
	Prolonged operation on starting winding.	Reduce starting load (install crankcase pressure limit valve), increase voltage if low – replace relay if defective.
	Relay contacts sticking.	Clean contacts or replace relay.
	Improper relay or incorrect relay setting.	Replace relay.
	Improper capacitor.	Check parts list for proper capacitor rating: mfd. and voltage.
	Capacitor terminals shorted by water.	Install capacitors so terminals won't be wet.
RUNNING CAPACITORS BURNT OUT.	Excessive line voltage.	Reduce line voltage to not over 10% above rating of motor.
	High line voltage and light load.	Reduce voltage if over 10% excessive.
	Capacitor voltage rating too low.	Install capacitors with recommended voltage rating
	Capacitor terminals shorted by water	Install capacitors so terminals won't be wet.
RELAYS BURNT OUT.	Low line voltage.	Increase voltage to not less than 10% above motor rating.
	Excessive line voltage.	Reduce voltage to not more than 10% above motor rating.
	Incorrect running capacitor.	Replace with correct capacitor.
	Short cycling.	Reduce number of starts per hour.
	Relay vibrating.	Mount relay rigidly.
	Incorrect relay.	Use relay recommended for specific motor compressor.

FLUORESCENT LAMP – TROUBLESHOOTING CHARTS

The manufacturer uses standard fluorescent lamps in ail of its applications. Standard one- and two-lamp ballast circuits are used.

Replacement lamps should be purchased over the counter from a local electrical wholesaler.

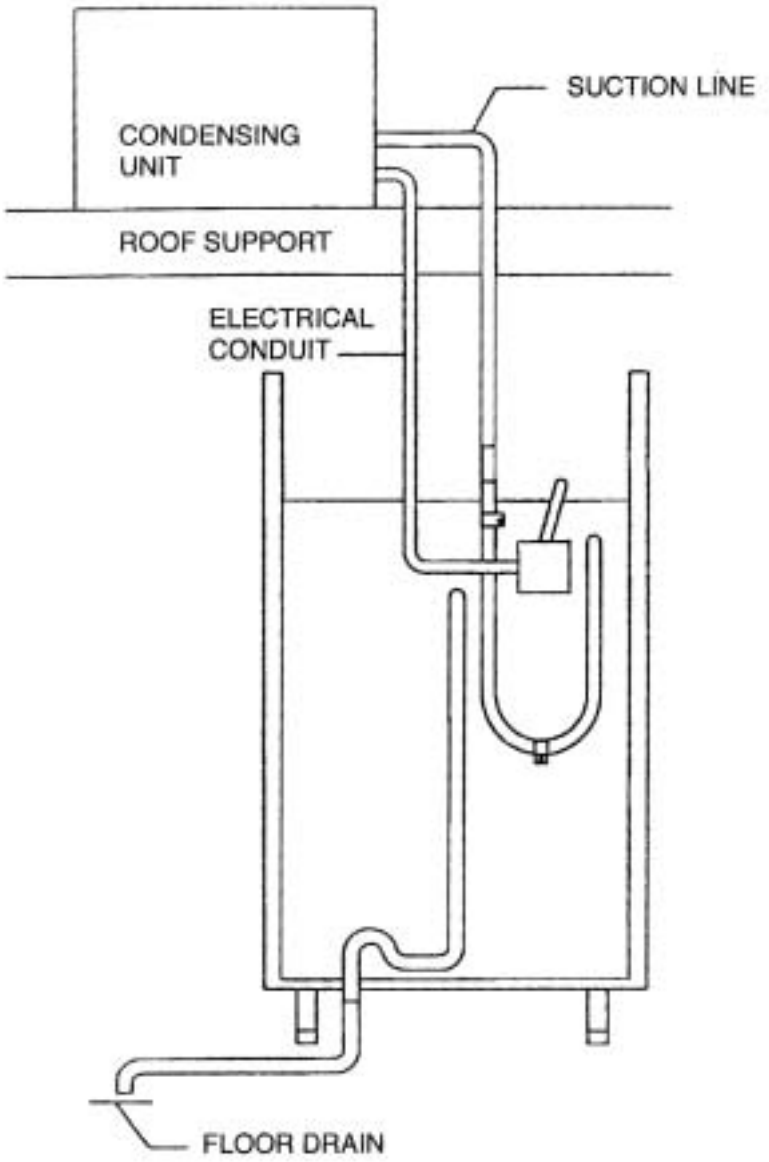
The table below indicates general problems that may be encountered with fluorescent lighting applications, possible causes, and corrective maintenance suggestions.

TROUBLE	COMMON CAUSE	REMEDY
NORMAL END OF LIFE. Lamp won't operate. Flashes momentarily and goes out or blinks on and off. Ends probably blackened.	Normal failure. Active material on cathodes exhausted.	Replace lamp promptly.
SHORT LIFE.	Wrong lamp type used.	Replace with lamp type marked in owner's manual.
	Wrong type of starter.	Replace with correct starter.
	Ballast not supplying the specified electrical values.	Replace with correct ballast for rating for lamp size.
	Wrong type of ballast used.	Replace ballast with proper type.
	Too low or too high voltage.	Check primary voltage with range specified on ballast name plate.
	Poor circuit contact (likely at lampholders).	Lampholders should be rigidly mounted and lamp securely seated.
	Ballast improperly or incompletely connected.	Study ballast label wiring diagram and check connections.
	Too many lamp starts.	Average life for most lamps is dependent on number of starts and hours of operation.
END BLACKENING. Dense blackening at one end or both, extending 2"-3" from base.	Normal end of life.	Replace lamp promptly.
	Mercury deposit – generally within 1" of lamp end.	Should evaporate as lamp is operated.
	Poor circuit contact likely at the lampholder.	Lampholders should be rigidly mounted and lamp securely seated.
	Ballast improperly or incompletely connected.	Study ballast wiring instructions and check connections.
	Wrong type lamp used.	Replace with correct lamp type.
	Wrong type of starter or defective starter causing on/off blinking or prolonged flashing at each start.	Replace with proper starter.
	Ballast installed not supplying the specified electrical values.	Replace with ballast of correct rating for lamp size.
	Line voltage too low or too high.	Check line voltage with range specified on ballast plate.
	Ballast improperly or incompletely connected.	Study ballast label wiring instructions and check connections.

TROUBLE	COMMON CAUSE	REMEDY
NO STARTING EFFORT OR SLOW STARTING.	Open lamp cathode circuit due to broken cathode, air leak, or by open weld.	If open, circuit is shown by continuity test or viewing end of bulb against a pinhole of light. Replace lamp.
	Wrong lamp type used.	Replace with lamp type indicated in owner's manual.
	Starter at end of life.	Replace starter.
	Starter sluggish.	Replace starter.
	Ballast installed not supplying the specified electrical values.	Replace with correct ballast of correct rating for lamp size.
	Temperature cold air contact to bulb.	Correct installation of lamp protection tubes, or shields to prevent cold air effects.
	Circuit voltage.	Check voltage and correct if possible.
DECREASED LIGHT OUTPUT. Full illumination of bulbs requires correct assembly of all components of lighting system.	Temperature operation, cold air affects lamp performance.	Properly install jacketed lamps where applicable.
	Circuit voltage.	Check voltage and correct if possible.
	Ballast improperly or incompletely connected.	Study ballast label wiring instructions and check connections.
	Dust or dirt on lamp or fixture.	Clean.
BLINKING ON/OFF: Accompanied by shimmering effect during "lighted" period.	Normal failure. Active material on cathodes exhausted.	Replace lamp promptly.
	Possible lamp fault in some lampholders.	Replace lamp. Investigate further if successive lamps blink or flicker during "lighted" period.
	Wrong type of starter or defective starter.	Replace with proper starter.
	Ballast installed not supplying the specified electrical circuit.	Replace with correct ballast with correct rating for lamp size.
	Circuit voltage.	Check voltage and correct if possible.
	Loose circuit contact.	Lampholders should be rigidly mounted and lamp securely seated.
OVERHEATED BALLAST.	Wrong lamp type used.	Replace with correct lamp number located in owner's manual.
	Wrong ballast used. Wrong voltage rating.	Replace ballast.
	Circuit voltage.	Check voltage and correct to design specifications.
	Ballast improperly or incompletely connected.	Study ballast label. Correct if installed wrong.

REMOTE CABINET WIRING & PIPING INFORMATION

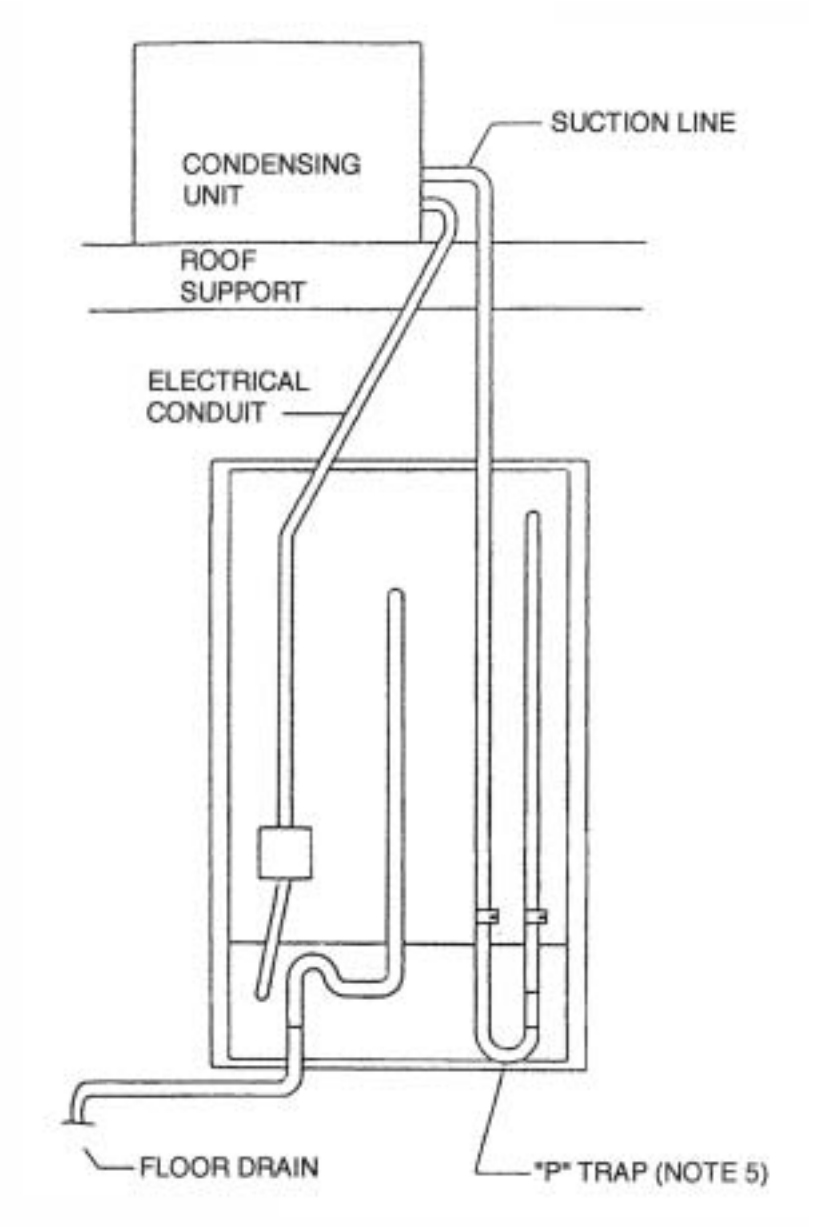
TYPICAL REMOTE UPRIGHT INSTALLATION (Top Mount)



NOTE:

1. All refrigeration and electrical materials between condensing unit and cabinets are to be supplied by the installing contactor.
2. Suction lines must be insulated with 1/2" thick aramflex or equal their entire length.
3. Refrigeration lines should be run as short and direct as possible.
4. To aid oil drainage, horizontal suction lines should be pitched downward at least 1/2" per 10 feet of run.
5. To insure oil return, a “P” trap must be installed in the suction line a the foot of every riser.
6. Liquid line not shown - Do not run liquid line inside insulation with suction line.

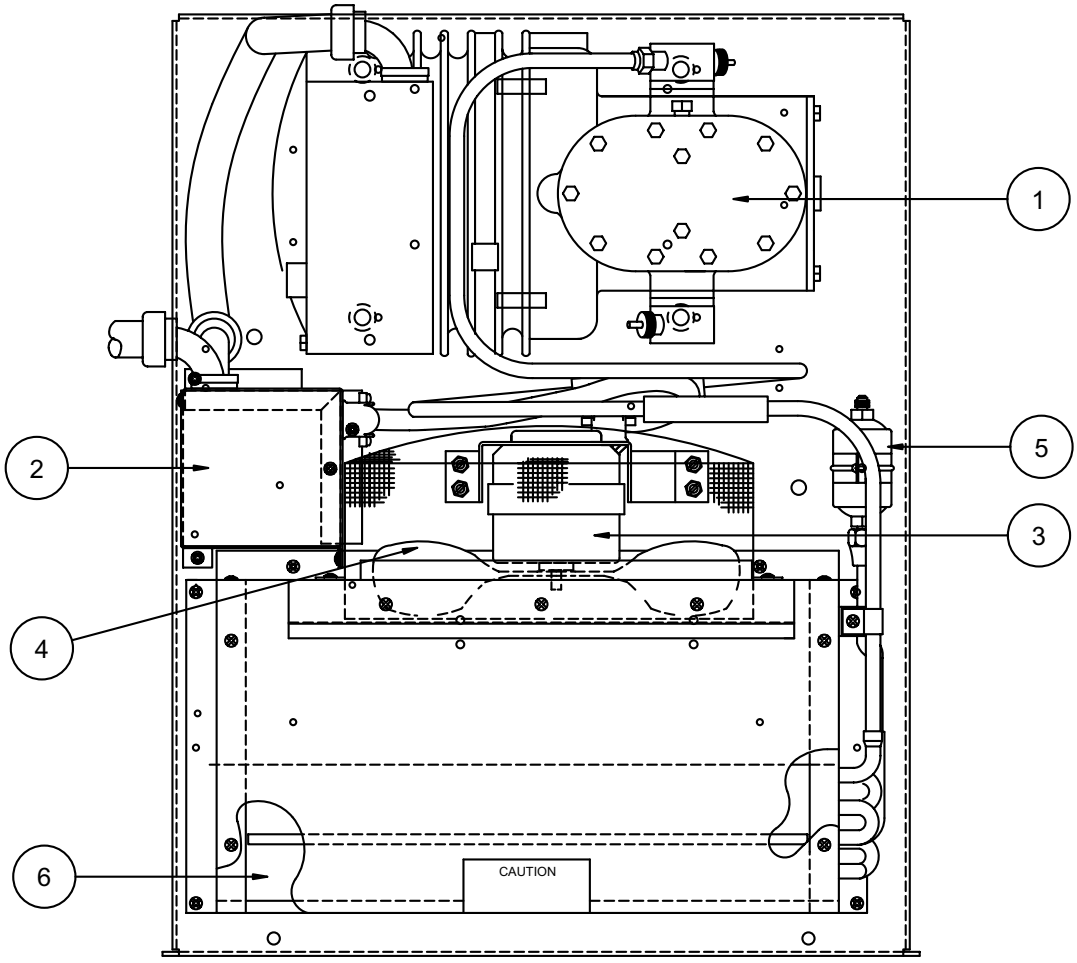
TYPICAL REMOTE UPRIGHT INSTALLATION (Bottom Mount)



NOTE:

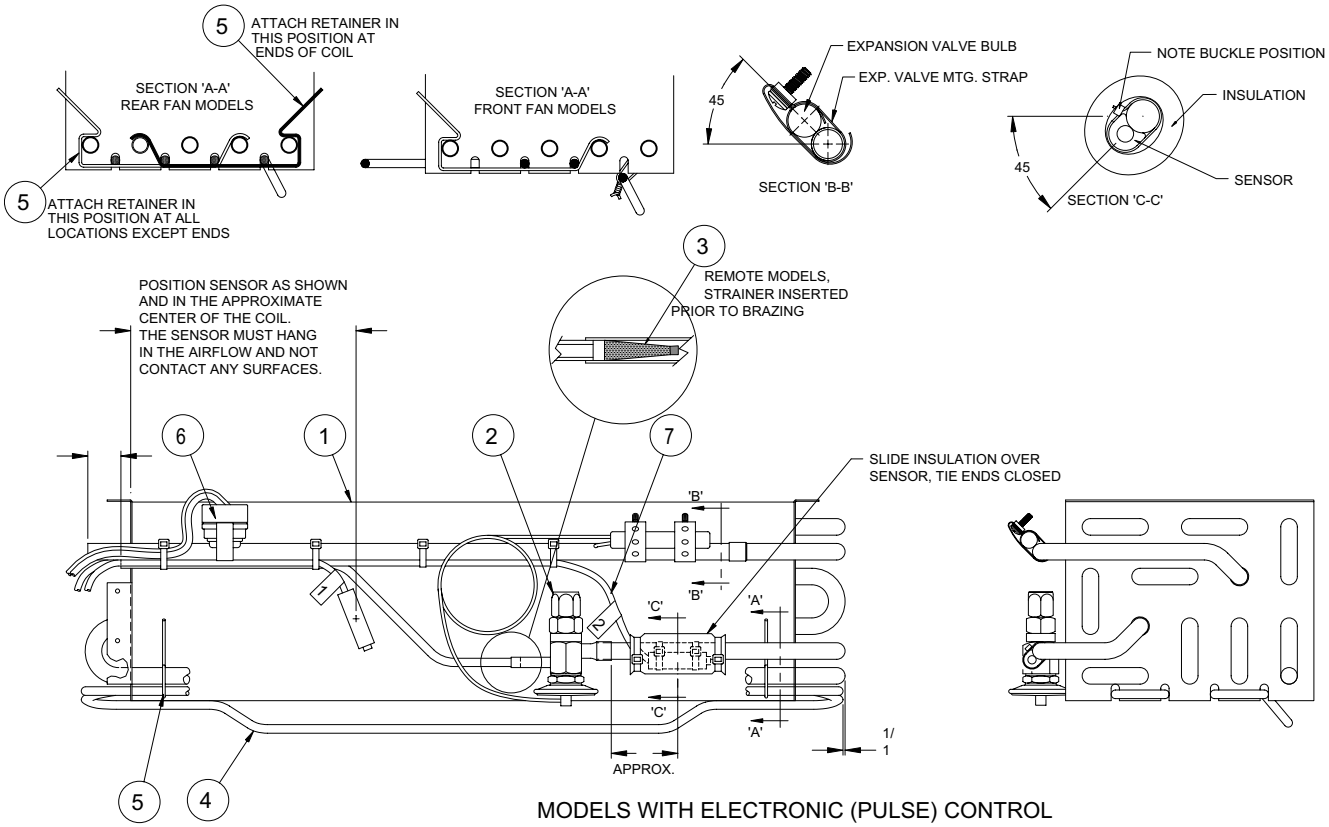
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4. To aid oil drainage, horizontal suction lines should be pitched downward at least 1/2" per 10 feet of run.
5. To insure oil return, a “P” trap must be installed in the suction line a the foot of every riser.
6. Liquid line not shown - Do not run liquid line inside insulation with suction line.

CONDENSING UNIT ASSEMBLY - Component Identification

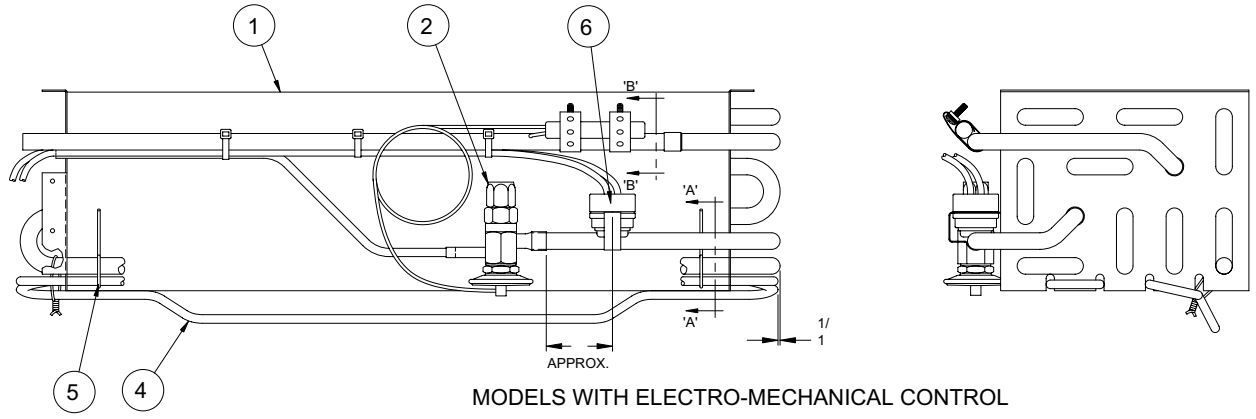


ITEM	DESCRIPTION
1	COMPRESSOR
2	START COMPONENT ASS'Y,
3	FAN MOTOR
4	FAN BLADE
5	FILTER/DRIER
6	CONDENSER COIL

EVAPORATOR COIL ASSEMBLY - Component Identification



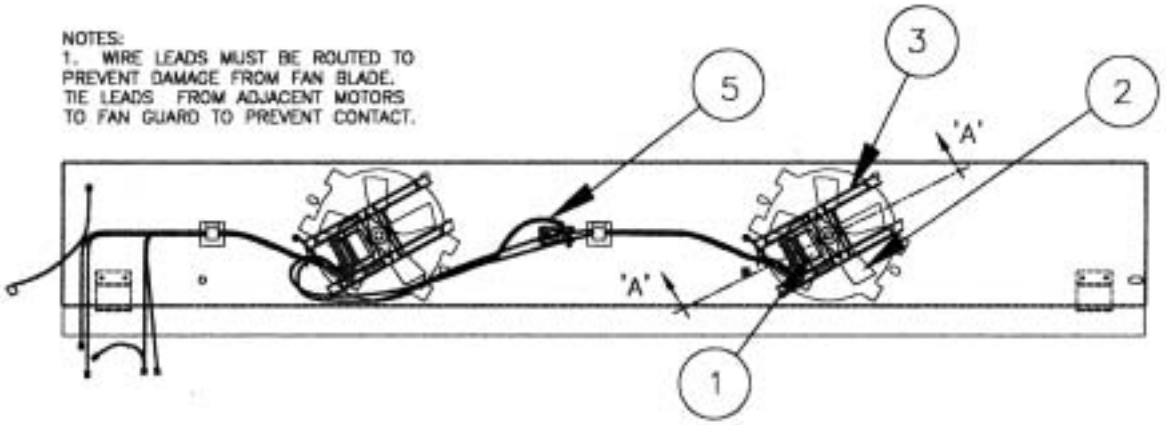
MODELS WITH ELECTRONIC (PULSE) CONTROL

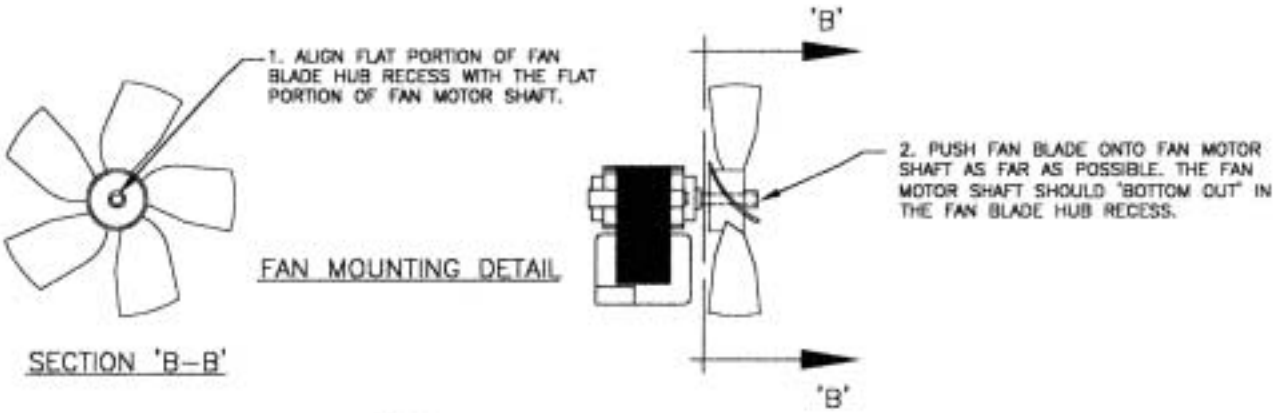


MODELS WITH ELECTRO-MECHANICAL CONTROL

SEQ	DESCRIPTION
1	EVAPORATOR COIL
2	EXPANSION VALVE
3	STRAINER, INLET TXV
4	HEATER, DEFROST
5	RETAINER, HEATER
6	THERMOSTAT, DEFROST TERMINATION
7	HARNESS, EVAPORATOR SENSOR

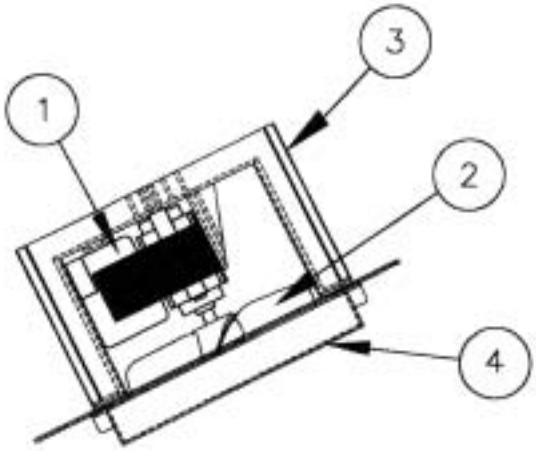
EVAPORATOR FAN ASSEMBLY - Component Identification





FAN MOUNTING DETAIL

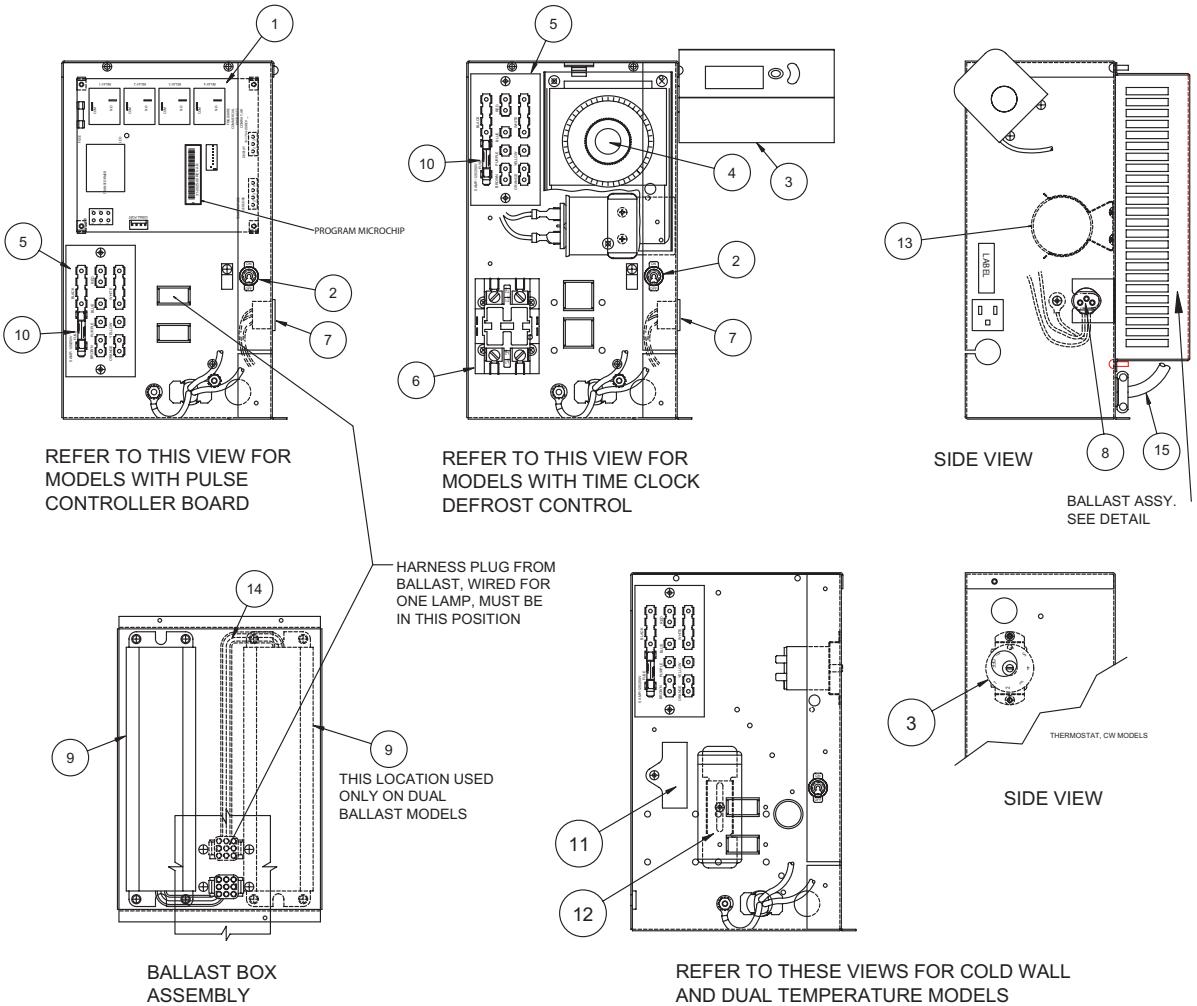
SECTION 'B–B'



VIEW 'A' – 'A'

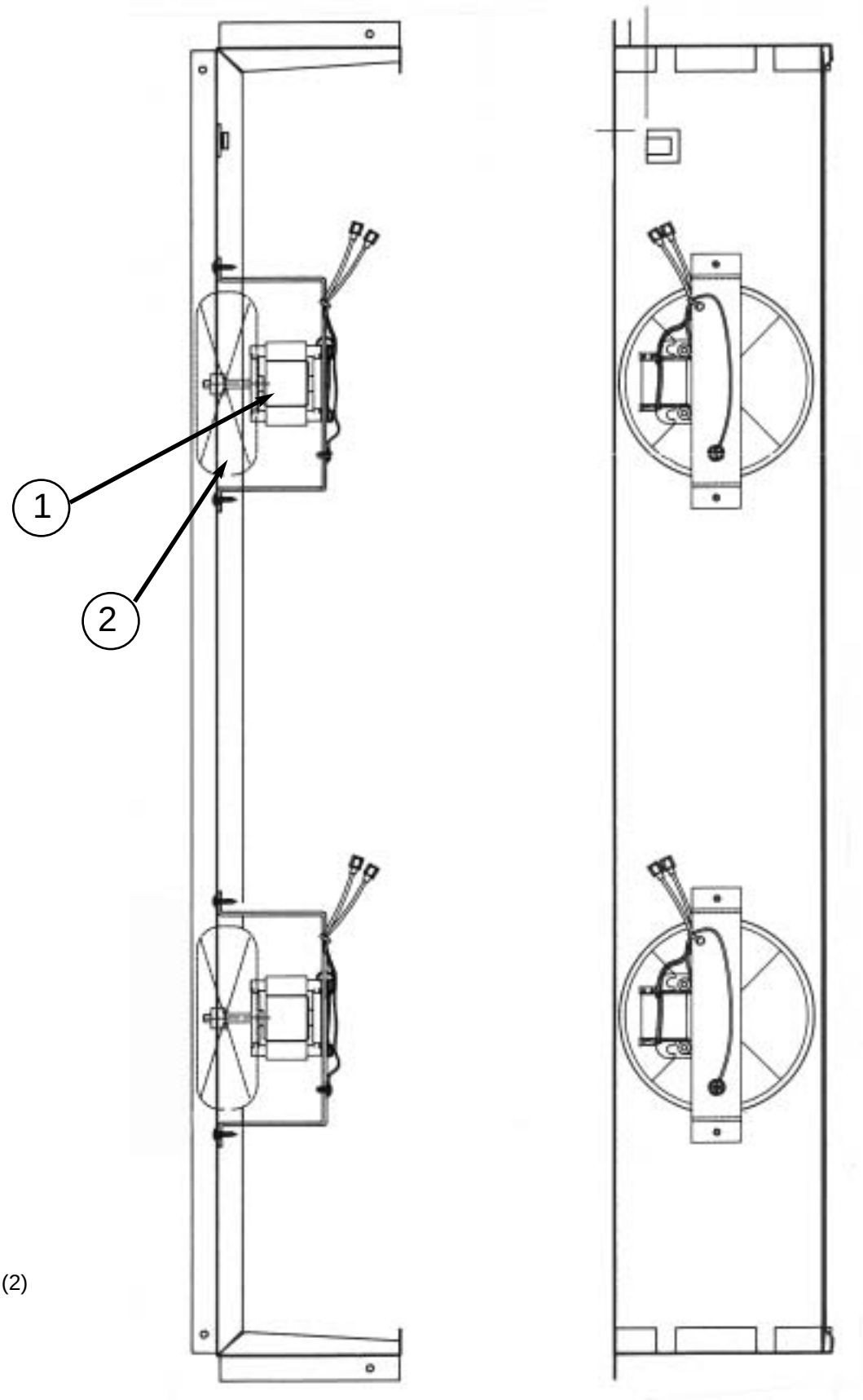
SEQ	DESCRIPTION
1	FAN MOTOR
2	FAN BLADE
3	MOTOR MOUNT
4	GRILL
5	HARNESS, DRAIN HEATER

ELECTRICAL BOX - Component Identification



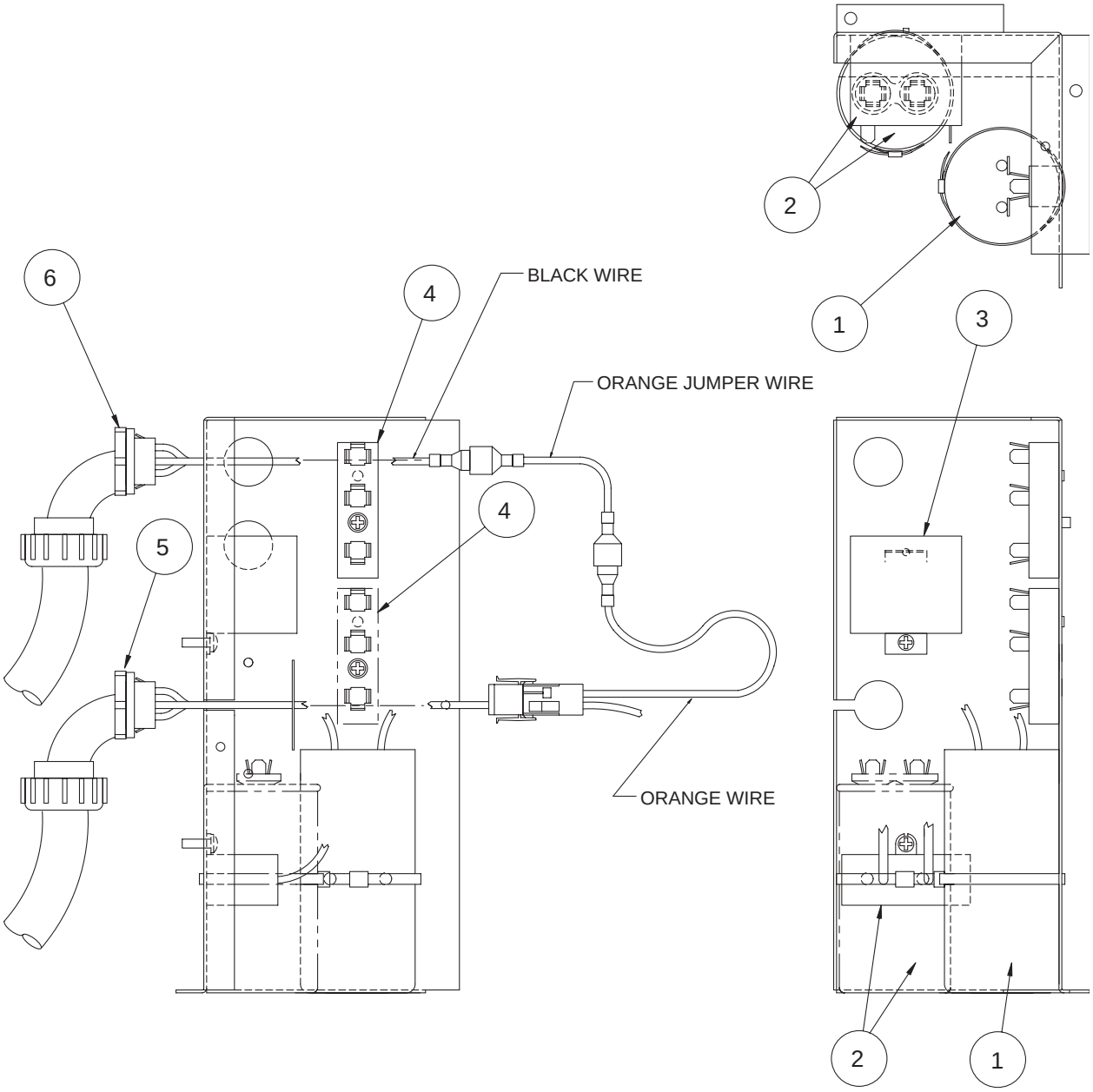
SEQ	DESCRIPTION
1	CONTROLLER BOARD, PULSE
2	TOGGLE SWITCH, POWER
3	THERMOSTAT
4	DEFROST TIMER
5	TERMINAL BOARD
6	RELAY, POWER (SCIENTIFIC MODELS)
7	RECEPTACLE
8	HARNESS, DRAIN PAN (BTM MT MODELS)
9	BALLAST
10	FUSE
11	RUN CAPACITOR
12	START CAPACITOR
13	CAPACITOR, RUN 55 MFD/370 60
14	HARNESS, BALLAST
15	POWER CORD

EVAPORATOR FAN ASSEMBLY - Component Identification
Hardening, Low-Tempature Models (Front Fan)



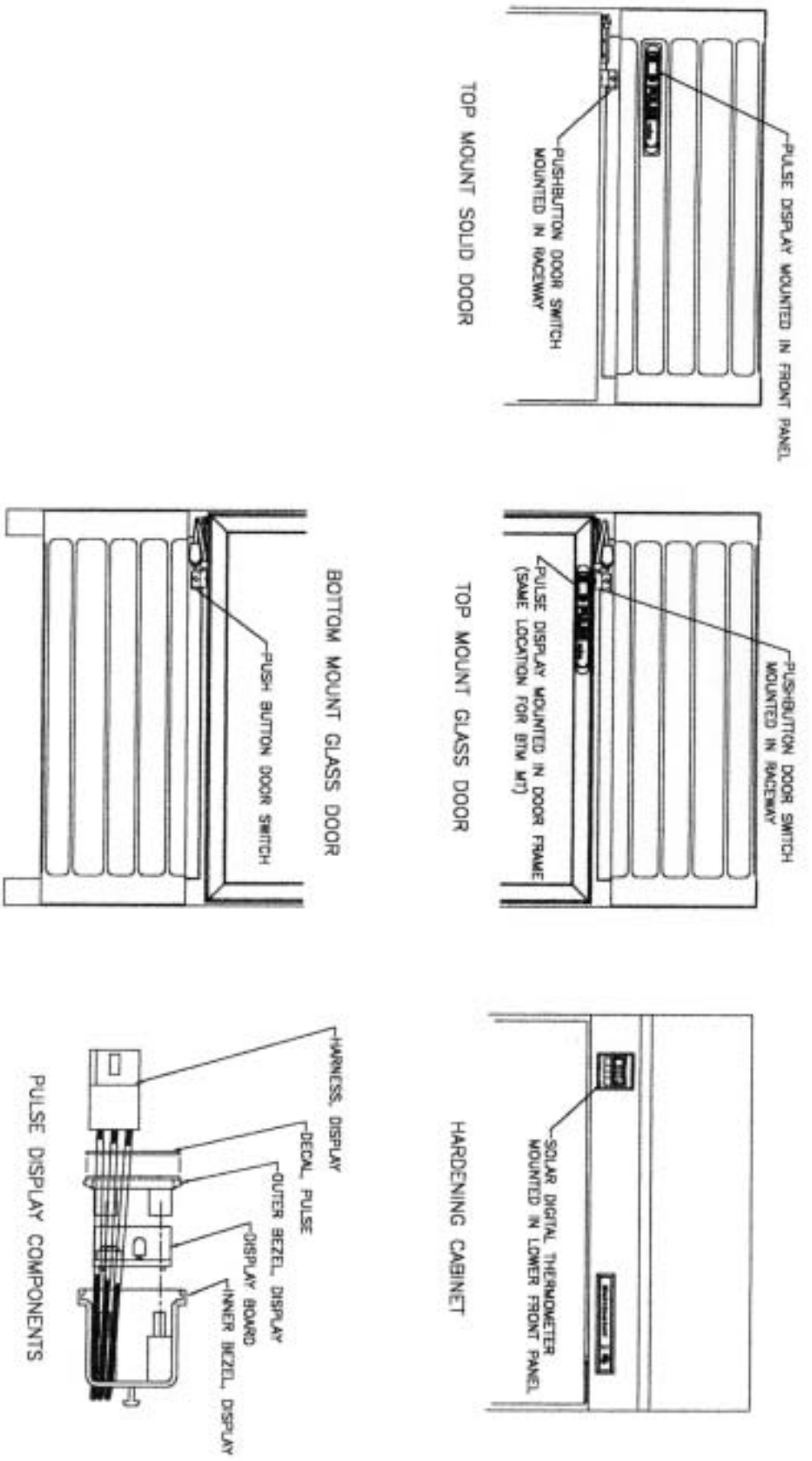
1. Fan Motor
2. Fan Blade (2)

START COMPONENT ASSEMBLY- Component Identification



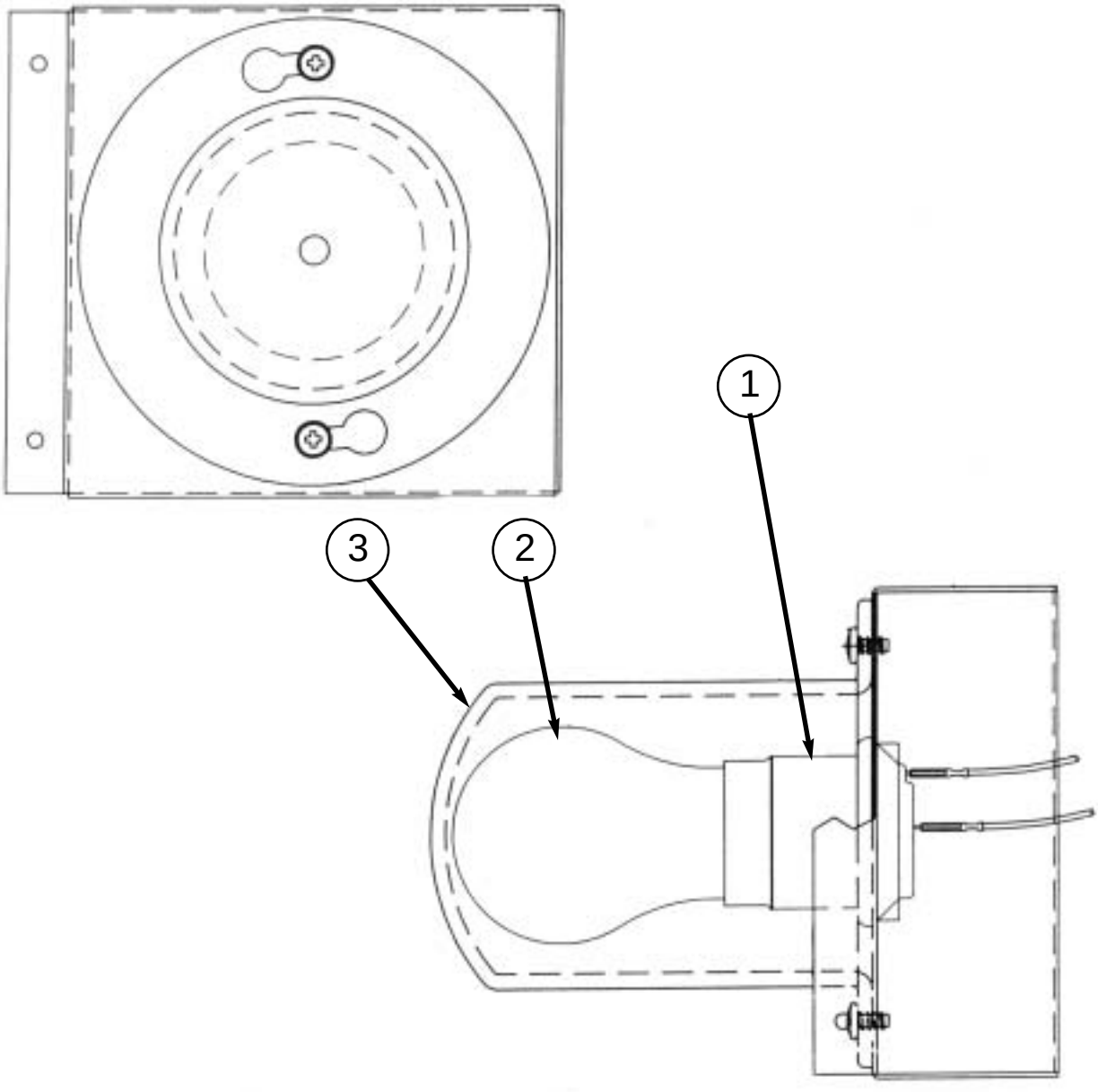
ITEM	DESCRIPTION
1	CAPACITOR, START
2	CAPACITOR, RUN
3	RELAY, START
4	TERMINAL BLOCK
5	HARNESS, COMPRESSOR
6	HARNESS, ELECTRICAL BOX

FRONT PANEL - Component Identification

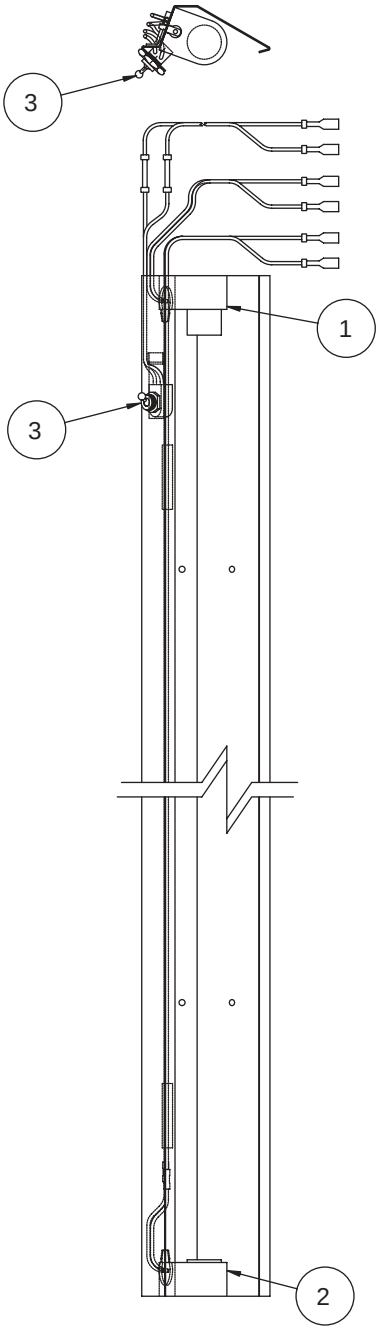


INCANDESCENT LIGHT ASSEMBLY- Component Identification

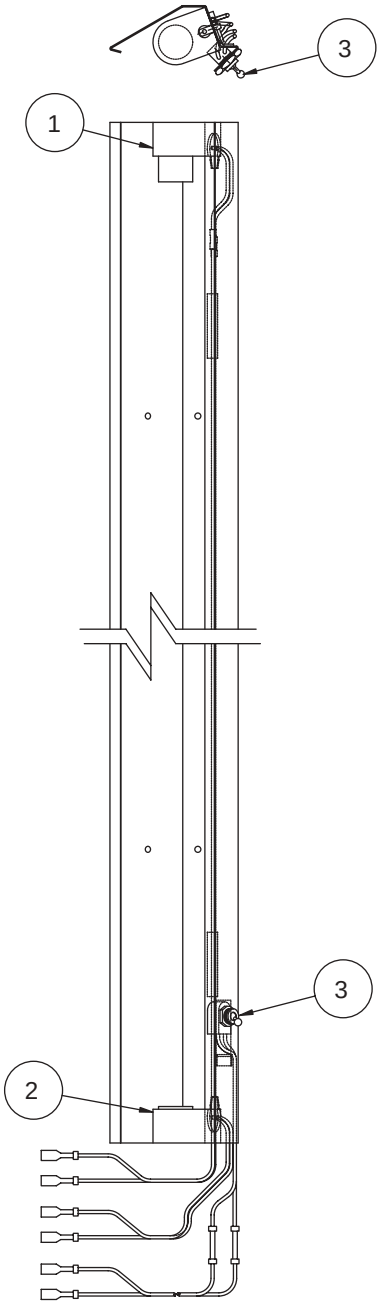
1. Lamp Socket
2. Incandescent Bulb
3. Light Guard



SIDE LAMP BRACKET ASSEMBLY - Component Identification



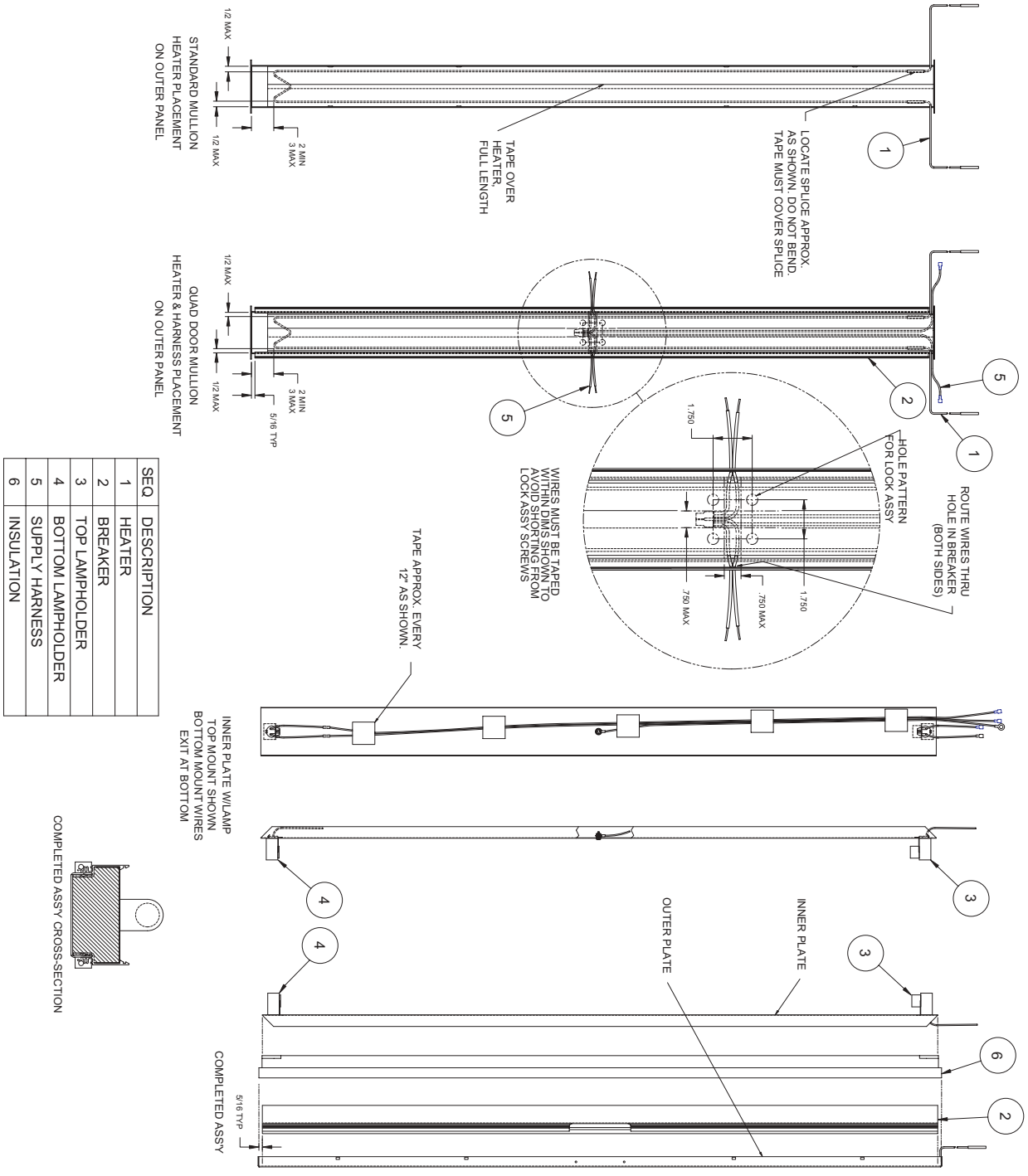
ASSEMBLY SHOWN IS LEFT SIDE FOR TOP MOUNT MODELS. ON BOTTOM MOUNT MODELS WIRES EXIT AT THE BOTTOM AND THE SWITCH IS MOUNTED IN THE RIGHT SIDE ASSEMBLY. ON SCIENTIFIC MODELS, SWITCH IS MOUNTED IN THE CONTROL PANEL.



ASSEMBLY SHOWN IS RIGHT SIDE FOR BOTTOM MOUNT MODELS. ON TOP MOUNT MODELS WIRES EXIT AT THE TOP AND THE SWITCH IS MOUNTED IN THE LEFT SIDE ASSEMBLY. ON SCIENTIFIC MODELS, SWITCH IS MOUNTED IN THE CONTROL PANEL.

SEQ	DESCRIPTION
1	LAMPHOLDER, TOP (SPRING LOADED PLUNGER)
2	LAMPHOLDER, BOTTOM (STATIONARY)
3	SWITCH, TOGGLE

MULLION/LIGHT ASSEMBLY- Component Identification



SEQ	DESCRIPTION
1	HEATER
2	BREAKER
3	TOP LAMPHOLDER
4	BOTTOM LAMPHOLDER
5	SUPPLY HARNESS
6	INSULATION

PARTS LIST

PARTS LIST - ONE DOOR LOW TEMPERATURE								
Description	**T30LGP-5**	**ULG30BS-5**	**T30LGPE-5**	**ULG30BF-5**	**T30LSP-5**	**T30LSPHD-5**	**BT30FS-4**	**ST30FSBB-4**
Compressor	16-0323-00	16-0323-00	16-0298-00	16-0298-00	16-0310-00	16-0322-00	16-0310-00	16-0310-00
Start Relay	17-0163-00	17-0163-00	17-0167-00	17-0167-00	17-0286-00	17-0163-00	17-0286-00	17-0286-00
Start Capacitor	17-0165-00	17-0165-00	17-0168-00	17-0168-00	17-0291-00	17-0164-00	17-0291-00	17-0291-00
Run Capacitor	17-0166-00	17-0166-00	19-2678-00	19-2678-00	17-0288-00		17-0288-00	17-0288-00
Motor Protector, Compr					17-0316-00		17-0316-00	17-0316-00
Condenser Coil	18-0546-01	18-0546-01	18-0546-01	18-0546-01	18-0546-01	51-0709-03	18-0546-01	18-0546-01
Fan Motor, Cond	19-0933-00	19-0933-00	19-0934-00	19-0934-00	19-0933-00	19-0933-00	19-0933-00	19-0933-00
Fan Blade, Cond	19-0101-00	19-0101-00	19-0101-00	19-0101-00	19-0101-00	19-0101-00	19-0101-00	19-0101-00
Filter/Drier	18-1106-00	18-1106-00	18-1106-00	18-1106-00	18-1106-00	18-1106-00	18-1106-00	18-1106-00
Heat Exchange	50-3776-01	51-0987-00	50-3776-01	51-0987-00	50-3771-03	50-3812-01	50-3771-03	50-3771-03
Evaporator Coil	18-0713-00	18-0713-00	18-0713-00	18-0713-00	18-0713-00	18-0713-00	18-0713-00	18-0713-00
Expansion Valve	18-0386-10	18-0386-10	18-0386-10	18-0386-10	18-0386-10	18-0386-10	18-0386-10	18-0386-10
Heater, Defrost	19-0952-01	19-0952-01	19-0952-04	19-0952-04	19-0952-01	19-0952-01	19-0952-01	19-0952-01
Thermostat, Def. Term.	19-1706-00	19-1706-00	19-1706-00	19-1706-00	19-1706-00	19-1706-00	19-1071-00	19-1071-00
Thermostat, Fan Delay							19-0954-00	19-0954-00
Harness, Evap	19-1652-05	19-1652-05	19-1652-05	19-1652-05	19-1652-05	19-1652-05	19-1652-01	19-1652-01
Fan Motor, Evap	19-1221-00	19-1221-00	19-1224-00	19-1224-00	19-1221-00	19-1221-00	19-1221-00	19-1221-00
Fan Blade, Evap	19-1223-00	19-1223-00	19-1223-00	19-1223-00	19-1223-00	19-1223-00	19-1223-00	19-1223-00
Motor Mount, Evap	10-1478-00	10-1478-00	10-1478-00	10-1478-00	10-1478-00	10-1478-00	10-1478-00	10-1478-00
Grill, Evap Fan	10-1479-00	10-1479-00	10-1479-00	10-1479-00	10-1479-00	10-1479-00	10-1479-00	10-1479-00
Harness, Drain Heater	19-1655-00	19-1655-00	19-1655-00	19-1655-00	19-1655-00	19-1655-00	19-1655-00	19-1655-00
Heater, Drain Tube	19-1240-01	19-1240-01	19-1240-02	19-1240-02	19-1240-01	19-1240-01	19-1240-01	19-1240-01
Controller Board, Pulse	19-1704-02	19-1704-02	19-1704-02	19-1704-02	19-1704-02	19-1704-02		
Defrost Timer							24-0513	24-0513
Switch, Power	19-0103-00	19-0103-00	19-0103-00	19-0103-00	19-0103-00	19-0103-00	19-1006-00	19-1006-00
Relay, Power							19-1005-00	19-1005-00
Thermostat, Cabinet							19-1031-00	19-1007-00
Power Cord	19-0967-00	19-0967-00	19-0967-00	19-0967-00	19-0620-00	19-0967-00	19-0620-00	19-0620-00
Harness, Ebox to Main	19-1707-04	19-1707-04	19-1707-03	19-1707-03	19-1707-04	19-1707-04	19-1675-01	19-1675-01
Heater, Cond Pan	19-1688-00		19-1688-01	19-1688-01	19-1688-00	19-1688-00	19-1688-00	19-1688-00
Ballast	19-1725-00	19-1725-00	19-1725-00	19-1725-00				
Harness, Ballast	19-1730-00	19-1730-00	19-1730-00	19-1730-00				
Transformer, Ballast			19-1694-00	19-1694-00				
Fuse, Lights	19-0970-00	19-0970-00	19-0970-00	19-0970-00				
Lampholder, Top	19-0957-01	19-0957-01	19-0957-01	19-0957-01			503-248D	503-248D
Lampholder, Bottom	19-0957-02	19-0957-02	19-0957-02	19-0957-02				
Switch, Light	19-0729-00	19-0729-00	19-0729-00	19-0729-00				
Lamp	19-1040-00	19-1040-00	19-1040-00	19-1040-00			22-0213	22-0213
Safety Shield, Lamp	10-0983-00	10-0983-00						
Cover, Lamp	10-0809-00	10-0809-00					44-1034	44-1034
Heater, Perimeter	19-0966-02	19-0966-02	19-0966-04	19-0966-04	19-0966-02	19-0966-02	19-0966-02	19-0966-02
Breaker Trim, Side	10-1485-02	10-1485-02	10-1485-02	10-1485-02	10-1485-02	10-1485-02	10-1485-02	10-1485-02
Breaker Trim, Top/Btm	10-1485-03	10-1485-03	10-1485-03	10-1485-03	10-1485-03	10-1485-03	10-1485-03	10-1485-03
Display Board, Pulse	19-1705-01	19-1705-01	19-1705-01	19-1705-01	19-1705-01	19-1705-01		
Thermometer, Solar							19-1050-03	
Switch, Door	19-0969-00	19-0969-00	19-0969-00	19-0969-00	19-0969-00	19-0969-00	19-0969-00	19-0969-00
Hinge, Lower LH		03-1232-01		03-1232-01				
Hinge, Lower RH	03-1232-02		03-1232-02		25-0178-09	25-0178-09	25-0178-09	25-0178-09
Hinge, Upper LH		03-1232-03		03-1232-03				
Hinge, Upper RH	03-1231-04		03-1231-04		25-0178-03	25-0178-03	25-0178-03	25-0178-03
Door Assy, LH		51-1516-03		51-1516-15				
Door Assy, RH	51-1517-04		51-1517-14		51-0172-02	51-0172-13	51-0172-02	51-0172-02
Door Closer	50-3159-00	50-3159-00	50-3159-00	50-3159-00	25-0178-01	25-0178-01	25-0178-01	25-0178-01
Gasket, Door	10-0976-02	10-0976-02	10-0976-02	10-0976-02	10-0882-05	10-0882-05	10-0882-05	10-0882-05
Handle, Door	25-0518-00	25-0409-00	25-0518-00	25-0409-00	25-5055-00	25-5055-00	25-5055-00	25-5055-00
Lock, Door					25-0226-00	25-0226-00	25-0226-00	25-0226-00
Shelf, Cantilever	15-0267-00	15-0267-00	15-0267-00	15-0267-00	15-0267-00	15-0267-00	15-0325-00	
Shelf, Bottom	15-0197-03	15-0197-03	15-0197-03	15-0197-03	15-0197-03	15-0197-03	15-0197-03	
Drawer Ass'y								50-3145-03
Leg, Adjustable	33-0504-01		33-0504-01		33-0504-01	33-0504-01	33-0504-01	33-0504-01
Front/Control Panel Assy	50-0176-01	50-0176-01	50-0176-01	50-0176-01	50-0176-08	50-0176-08	51-0174-04	50-2999-49

PARTS LIST - TWO DOOR LOW TEMPERATURE							
Description	**T50LGP-5**	**T50LGPHD-5**	**ULG50BC-5**	**T50LGPE-5**	**ULG50BF-5**	**T50LSP-5**	**BT50FS-4**
Compressor	16-0324-00	16-0325-00	16-0324-00	16-0324-00	16-0324-00	16-0322-00	16-0322-00
Start Relay	17-0167-00	17-0267-00	17-0167-00	17-0167-00	17-0167-00	17-0163-00	17-0163-00
Start Capacitor	17-0168-00	17-0365-00	17-0168-00	17-0168-00	17-0168-00	17-0164-00	17-0164-00
Run Capacitor	19-2678-00	17-0266-00	19-2678-00	19-2678-00	19-2678-00		
Condenser Coil	18-0546-02	18-0546-02	18-0546-02	18-0546-02	18-0546-02	18-0546-01	18-0546-01
Fan Motor, Cond	19-0934-00	19-0934-00	19-0934-00	19-0934-00	19-0934-00	19-0933-00	19-0933-00
Fan Blade, Cond	19-0410-00	19-0410-00	19-0410-00	19-0410-00	19-0410-00	19-0101-00	19-0101-00
Filter/Drier	18-1106-00	18-1106-00	18-1106-00	18-1106-00	18-1106-00	18-1106-00	18-1106-00
Heat Exchange	50-3776-00	50-3776-00	51-0987-00	50-3776-00	51-0987-00	50-3812-02	50-3812-02
Evaporator Coil	18-0714-01	18-0714-01	18-0714-01	18-0714-01	18-0714-01	18-0713-00	18-0713-00
Expansion Valve	18-0386-10	18-0386-10	18-0386-10	18-0386-10	18-0386-10	18-0386-10	18-0386-10
Heater, Defrost	19-0952-02	19-0952-02	19-0952-02	19-0952-02	19-0952-02	19-0952-01	19-0952-01
Thermostat, Def. Term.	19-1706-00	19-1706-00	19-1706-00	19-1706-00	19-1706-00	19-1706-00	19-1071-00
Thermostat, Fan Delay							19-0954-00
Harness, Evap	19-1652-05	19-1652-05	19-1652-05	19-1652-05	19-1652-05	19-1652-05	19-1652-01
Fan Motor, Evap	19-1221-00	19-1221-00	19-1221-00	19-1224-00	19-1224-00	19-1221-00	19-1221-00
Fan Blade, Evap	19-1223-00	19-1223-00	19-1223-00	19-1223-00	19-1223-00	19-1223-00	19-1223-00
Motor Mount, Evap	10-1478-00	10-1478-00	10-1478-00	10-1478-00	10-1478-00	10-1478-00	10-1478-00
Grill, Evap Fan	10-1479-00	10-1479-00	10-1479-00	10-1479-00	10-1479-00	10-1479-00	10-1479-00
Harness, Drain Heater	19-1655-00	19-1655-00	19-1655-00	19-1655-00	19-1655-00	19-1655-00	19-1655-00
Heater, Drain Tube	19-1240-01	19-1240-01	19-1240-01	19-1240-02	19-1240-02	19-1240-01	19-1240-01
Controller Board, Pulse	19-1704-02	19-1704-02	19-1704-02	19-1704-02	19-1704-02	19-1704-02	
Defrost Timer							24-0513
Switch, Power	19-0103-00	19-0103-00	19-0103-00	19-0103-00	19-0103-00		19-1006-00
Relay, Power							19-1005-00
Thermostat, Cabinet							19-1031-00
Power Cord	19-0084-00	19-0084-00	19-0084-00	19-0967-00	19-0967-00	19-0967-00	19-0967-00
Harness, Ebox to Main	19-1707-02	19-1707-02	19-1707-02	19-1707-03	19-1707-03	19-1707-04	19-1675-01
Harness, Cond Heater			19-0977-01		19-0977-01		
Heater, Cond Pan	19-1688-00	19-1688-00	19-1688-00	19-1688-01	19-1688-01	19-1688-00	19-1688-00
Ballast	19-1725-00	19-1725-00	19-1725-00	19-1725-00	19-1725-00		
Harness, Ballast	19-1730-00	19-1730-00	19-1730-00	19-1730-00	19-1730-00		
Transformer, Ballast				19-1694-00	19-1694-00		
Fuse, Lights	19-0970-00	19-0970-00	19-0970-00	19-0970-00	19-0970-00		
Lampholder, Top	19-0957-01	19-0957-01	19-0957-01	19-0957-01	19-0957-01		503-248D
Lampholder, Bottom	19-0957-02	19-0957-02	19-0957-02	19-0957-02	19-0957-02		
Switch, Light	19-0729-00	19-0729-00	19-0729-00	19-0729-00	19-0729-00		
Lamp	19-1040-00	19-1040-00	19-1040-00	19-1040-00	19-1040-00		22-0213
Safety Shield, Lamp	10-0983-00	10-0983-00	10-0983-00	10-0983-00	10-0983-00		
Cover, Lamp	10-0809-00	10-0809-00	10-0809-00	10-0809-00	10-0809-00		44-1034
Heater, Perimeter	19-0966-01	19-0966-01	19-0966-01	19-0966-03	19-0966-03	19-0966-01	19-0966-01
Heater, Mullion						19-1657-01	19-1657-01
Breaker Trim, Side	10-1485-02	10-1485-02	10-1485-02			10-1485-02	10-1485-02
Breaker Trim, Top/Btm	10-1485-04	10-1485-04	10-1485-04			10-1485-04	10-1485-04
Display Board, Pulse	19-1705-01	19-1705-01	19-1705-01	19-1705-01	19-1705-01	19-1705-01	
Thermometer, Solar							19-1050-03
Switch, Door	19-0969-00	19-0969-00	19-0969-00	19-0969-00	19-0969-00	19-0969-00	19-0969-00
Hinge, Lower LH	03-1232-01	03-1232-01	03-1232-01	03-1232-01	03-1232-01	25-0178-02	25-0178-02
Hinge, Lower RH	03-1232-02	03-1232-02	03-1232-02	03-1232-02	03-1232-02	25-0178-03	25-0178-03
Hinge, Upper LH	03-1231-03	03-1231-03	03-1231-03	03-1231-03	03-1231-03	25-0178-08	25-0178-08
Hinge, Upper RH	03-1231-04	03-1231-04	03-1231-04	03-1231-04	03-1231-04	25-0178-09	25-0178-09
Door Assy, LH	51-1517-01	51-1517-01	51-1516-01	51-1517-12	51-1516-13	51-0172-05	51-0172-05
Door Assy, RH	51-1517-21	51-1517-21	51-1516-25	51-1517-32	51-1516-37	51-0172-06	51-0172-06
Door Closer	50-3159-00	50-3159-00	50-3159-00	50-3159-00	50-3159-00	25-0178-01	25-0178-01
Gasket, Door	10-0976-01	10-0976-01	10-0976-01	10-0976-01	10-0976-01	10-0882-06	10-0882-06
Handle, Door	25-0518-00	25-0518-00	25-0409-00	25-0518-00	25-0409-00	25-5055-00	25-5055-00
Lock, Door						25-0226-00	25-0226-00
Shelf, Cantilever	15-0267-00	15-0267-00	15-0267-00	15-0267-00	15-0267-00	15-0267-00	15-0267-00
Shelf, Bottom	15-0197-03	15-0197-03	15-0197-03	15-0197-03	15-0197-03	15-0197-03	15-0197-03
Leg, Adjustable	33-0504-01	33-0504-01		33-0504-01		33-0504-01	33-0504-01
Front/Control Panel Assy	50-0176-02	50-0176-02	50-0176-02	50-0176-02	50-0176-02	50-0176-09	51-0174-05

PARTS LIST - THREE DOOR LOW TEMPERATURE						
Description	**T80LGP-5**	**ULG80BC-5**	**T80LGPE-5**	**ULG80BF-5**	**T80LSP-5**	**BT80FS-4**
Compressor	16-0326-00	16-0326-00	16-0326-00	16-0326-00	16-0323-00	16-0323-00
Start Relay	17-0267-00	17-0267-00	17-0267-00	17-0267-00	17-0163-00	17-0163-00
Start Capacitor	17-0265-00	17-0265-00	17-0265-00	17-0265-00	17-0165-00	17-0165-00
Run Capacitor	17-0266-00	17-0266-00	17-0266-00	17-0266-00	17-0166-00	17-0166-00
Condenser Coil	18-0547-00	18-0547-00	18-0547-00	18-0547-00	18-0546-01	18-0546-01
Fan Motor, Cond	19-0934-00	19-0934-00	19-0934-00	19-0934-00	19-0933-00	19-0933-00
Fan Blade, Cond	19-0410-00	19-0410-00	19-0410-00	19-0410-00	19-0101-00	19-0101-00
Filter/Drier	18-1106-00	18-1106-00	18-1106-00	18-1106-00	18-1106-00	18-1106-00
Heat Exchange	50-3776-00	51-0987-00	50-3776-00	51-0987-00	50-3776-00	50-3776-00
Evaporator Coil	18-0714-02	18-0714-02	18-0714-02	18-0714-02	18-0714-01	18-0714-01
Expansion Valve	18-0386-11	18-0386-11	18-0386-11	18-0386-11	18-0386-10	18-0386-10
Heater, Defrost	19-0953-00	19-0953-00	19-0953-00	19-0953-00	19-0952-03	19-0952-03
Thermostat, Def. Term.	19-1706-00	19-1706-00	19-1706-00	19-1706-00	19-1706-00	19-1071-00
Thermostat, Fan Delay						19-0954-00
Harness, Evap	19-1652-05	19-1652-05	19-1652-05	19-1652-05	19-1652-05	19-1652-01
Fan Motor, Evap	19-1221-00	19-1221-00	19-1224-00	19-1224-00	19-1221-00	19-1221-00
Fan Blade, Evap	19-1223-00	19-1223-00	19-1223-00	19-1223-00	19-1223-00	19-1223-00
Motor Mount, Evap	10-1478-00	10-1478-00	10-1478-00	10-1478-00	10-1478-00	10-1478-00
Grill, Evap Fan	10-1479-00	10-1479-00	10-1479-00	10-1479-00	10-1479-00	10-1479-00
Harness, Drain Heater	19-1655-00	19-1655-00	19-1655-00	19-1655-00	19-1655-00	19-1655-00
Heater, Drain Tube	19-1240-01	19-1240-01	19-1240-02	19-1240-02	19-1240-01	19-1240-01
Controller Board, Pulse	19-1704-02	19-1704-02	19-1704-02	19-1704-02	19-1704-02	
Defrost Timer						24-0513
Switch, Power	19-0103-00	19-0103-00	19-0103-00	19-0103-00	19-0103-00	19-1006-00
Relay, Power						19-1005-00
Thermostat, Cabinet						19-1031-00
Power Cord	19-0084-00	19-0084-00	19-0967-00	19-0967-00	19-0967-00	19-0967-00
Harness, Ebox to Main	19-1707-02	19-1707-02	19-1707-03	19-1707-03	19-1707-04	19-1675-01
Harness, Cond Heater		19-0977-01		19-0977-01		
Heater, Cond Pan	19-1688-00	19-1688-00	19-1688-01	19-1688-01	19-1688-00	19-1688-00
Ballast	19-1725-00	19-1725-00	19-1725-00	19-1725-00		
Harness, Ballast	19-1730-00	19-1730-00	19-1730-00	19-1730-00		
Transformer, Ballast			19-1694-00	19-1694-00		
Fuse, Lights	19-0970-00	19-0970-00	19-0970-00	19-0970-00		
Lampholder, Top	19-0957-01	19-0957-01	19-0957-01	19-0957-01		503-248D
Lampholder, Bottom	19-0957-02	19-0957-02	19-0957-02	19-0957-02		
Switch, Light	19-0729-00	19-0729-00	19-0729-00	19-0729-00		
Lamp	19-1040-00	19-1040-00	19-1040-00	19-1040-00		22-0213
Safety Shield, Lamp	10-0983-00	10-0983-00	10-0983-00	10-0983-00		
Cover, Lamp	10-0809-00	10-0809-00	10-0809-00	10-0809-00		44-1034
Heater, Perimeter	19-0966-01	19-0966-01	19-0966-03	19-0966-03	19-0966-01	19-0966-01
Heater, Mullion					19-1657-01	19-1657-01
Breaker Trim, Side	10-1485-02	10-1485-02	10-1485-02	10-1485-02	10-1485-02	10-1485-02
Breaker Trim, Top/Btm	10-1485-04	10-1485-04	10-1485-04	10-1485-04	10-1485-04	10-1485-04
Breaker Trim, Top/Btm Ctr	10-1485-05	10-1485-05	10-1485-05	10-1485-05	10-1485-05	10-1485-05
Display Board, Pulse	19-1705-01	19-1705-01	19-1705-01	19-1705-01	19-1705-01	
Thermometer, Solar						19-1050-03
Switch, Door	19-0969-00	19-0969-00	19-0969-00	19-0969-00	19-0969-00	19-0969-00
Hinge, Lower LH	03-1232-01	03-1232-01	03-1232-01	03-1232-01	25-0178-02	25-0178-02
Hinge, Upper LH	03-1231-03	03-1231-03	03-1231-03	03-1231-03	25-0178-08	25-0178-08
Door Assy, LH w/Display	51-1517-01	51-1516-01	51-1517-12	51-1516-13	51-0172-05	51-0172-05
Door Assy, LH w/o Display	51-1517-20	51-1516-24	51-1517-31	51-1516-36		
Door Closer	50-3159-00	50-3159-00	50-3159-00	50-3159-00	25-0178-01	25-0178-01
Gasket, Door	10-0976-01	10-0976-01	10-0976-01	10-0976-01	10-0882-06	10-0882-06
Handle, Door	25-0518-00	25-0409-00	25-0518-00	25-0409-00	25-5055-00	25-5055-00
Lock, Door					25-0226-00	25-0226-00
Shelf, Cantilever	15-0267-00	15-0267-00	15-0267-00	15-0267-00	15-0267-00	15-0267-00
Shelf, Bottom	15-0197-03	15-0197-03	15-0197-03	15-0197-03	15-0197-03	15-0197-03
Leg, Adjustable	33-0504-01	33-0504-01	33-0504-01	33-0504-01	33-0504-01	33-0504-01
Front/Control Panel Assy	50-0176-03	50-0176-03	50-0176-03	50-0176-03	50-0176-10	51-0174-06

PARTS LIST - HARDENING CABINETS (LOW TEMPERATURE FREEZERS)						
Description	**T30HSP-4**	**BTL30FS-4**	**STL30FSBB-4**	**T50HSQL-4**	**T50HSQHP-4**	**BTQ50FSHD-4**
Compressor	16-0322-00	16-0322-00	16-0322-00	16-0323-00	16-0325-00	16-0325-00
Start Relay	17-0163-00	17-0163-00	17-0163-00	17-0163-00	17-0267-00	17-0267-00
Start Capacitor	17-0164-00	17-0164-00	17-0164-00	17-0165-00	17-0265-00	17-0265-00
Run Capacitor				17-0166-00	17-0266-00	17-0266-00
Condenser Coil	18-0546-01	18-0546-01	18-0546-01	18-0546-01	18-0546-02	18-0546-02
Fan Motor, Cond	19-0933-00	19-0933-00	19-0933-00	19-0933-00	24-0396	24-0396
Fan Blade, Cond	19-0101-00	19-0101-00	19-0101-00	19-0101-00	19-0410-00	19-0410-00
Filter/Drier	18-1106-00	18-1106-00	18-1106-00	18-1106-00	18-1106-00	18-1106-00
Heat Exchange	50-3812-01	50-3812-01	50-3812-01	50-3776-00	50-3776-00	50-3776-00
Evaporator Coil	18-0713-00	18-0713-00	18-0713-00	18-0714-01	18-0714-01	18-0714-01
Expansion Valve	18-0386-10	18-0386-10	18-0386-10	18-0386-10	18-0386-11	18-0386-11
Heater, Defrost	19-0534-01	19-0534-01	19-0534-01	19-0534-03	19-0534-02	19-0534-02
Thermostat, Def. Term.	19-1071-00	19-1071-00	19-1071-00	19-1071-00	19-1071-00	19-1071-00
Thermostat, Fan Delay	19-0954-00	19-0954-00	19-0954-00	19-0954-00	19-0954-00	19-0954-00
Harness, Evap	19-1652-01	19-1652-01	19-1652-01	19-1652-01	19-1652-01	19-1652-01
Fan Motor, Evap	19-1221-00	19-1221-00	19-1221-00	19-1221-00	19-1221-00	19-1221-00
Fan Blade, Evap	19-1225-00	19-1225-00	19-1225-00	19-1225-00	19-1225-00	19-1225-00
Harness, Drain Heater	19-1655-00	19-1655-00	19-1655-00	19-1655-00	19-1655-00	19-1655-00
Heater, Drain Tube	19-1240-01	19-1240-01	19-1240-01	19-1240-01	19-1240-01	19-1240-01
Defrost Timer	24-0513	24-0513	24-0513	24-0513	19-0624-00	19-0624-00
Switch, Power	19-0103-00	19-1006-00	19-1006-00	19-0103-00	19-0103-00	19-1006-00
Relay, Power		19-1005-00	19-1005-00		19-1005-00	19-1005-00
Thermostat, Cabinet	19-1007-00	19-1007-00	19-1007-00	19-1007-00	19-1007-00	19-1007-00
Power Cord	19-0620-00	19-0620-00	19-0620-00	19-0967-00		
Harness, Ebox to Main	19-1675-01	19-1675-01	19-1675-01	19-1675-01	19-1675-01	19-1675-01
Heater, Cond Pan	19-1688-00	19-1688-00	19-1688-00	19-1688-00	19-1688-00	19-1688-00
Lampholder, Top		503-248D	503-248D			
Lamp		22-0213	22-0213			
Cover, Lamp		44-1034	44-1034			
Heater, Perimeter	19-0966-02	19-0966-02	19-0966-02	19-0966-05	19-0966-05	19-0966-05
Heater, Vert Mullion				19-1657-01	19-1657-01	19-1657-01
Heater, Horiz Mullion				19-0531-01	19-0531-01	19-0531-01
Breaker Trim, Side	10-1485-02	10-1485-02	10-1485-02	10-1485-07	10-1485-07	10-1485-07
Breaker Trim, Top/Btm	10-1485-03	10-1485-03	10-1485-03	10-1485-04	10-1485-04	10-1485-04
Thermometer, Solar	19-1050-02	19-1050-03		19-1050-02	19-1050-02	19-1050-03
Hinge, Lower LH				25-0178-06	25-0178-06	25-0178-06
Hinge, Lower RH	25-0178-09	25-0178-09	25-0178-09	25-0178-07	25-0178-07	25-0178-07
Hinge, Upper LH				25-0178-02	25-0178-02	25-0178-02
Hinge, Upper RH	25-0178-03	25-0178-03	25-0178-03	25-0178-03	25-0178-03	25-0178-03
Hinge, Center LH				25-0178-04	25-0178-04	25-0178-04
Hinge, Center RH				25-0178-05	25-0178-05	25-0178-05
Hinge Leaf, Inner Door	30-2117	30-2117	30-2117			
Hinge Leaf, Inner Door	30-2118	30-2118	30-2118			
Door Assy, RH	51-0172-02	51-0172-02	51-0172-02			
Door Assy, Inner RH	51-1059-01	51-1059-01	51-1059-01			
Door Assy, Lwr LH/Upr RH				51-0171-01	51-0171-01	51-0171-01
Door Assy, Lwr RH/Upr LH				51-0171-02	51-0171-02	51-0171-02
Door Closer	25-0178-01	25-0178-01	25-0178-01	25-0178-01	25-0178-01	25-0178-01
Gasket, Door	10-0882-05	10-0882-05	10-0882-05	10-0882-04	10-0882-04	10-0882-04
Handle, Door	25-5055-00	25-5055-00	25-5055-00	08-0516-00	08-0516-00	08-0516-00
Lock, Door	25-0226-00	25-0226-00	25-0226-00	50-1104-01	50-1104-01	50-1104-01
Shelf, Cantilever	15-0267-00	15-0325-00		15-0267-00	15-0267-00	
Shelf, Bottom	15-0197-03	15-0197-03		15-0197-03	15-0197-03	
Drawer Assy			50-3145-03			
Leg, Adjustable	33-0504-01	33-0504-01	33-0504-01	33-0504-01	33-0504-01	33-0504-01
Front/Control Panel Assy	03-1620-01	51-0174-04	50-2999-49	03-1620-02	03-1620-02	51-0174-05

PARTS LIST - REMOTE CONDENSING UNIT LOW TEMPERATURE							
	T30LGPRBR-5	**T50LGPR-5**	**ULG50RD-5**	**T80LGPR-5**	**ULG80RD-5**	**ULS30US-5**	**T50LSPR-5**
Heat Exchange	50-0149-00	50-0149-00	50-0148-00	50-0149-00	50-0148-00	50-0149-00	50-0149-00
Solenoid Valve	19-3037-00	19-3037-00	19-3037-00	19-3037-00	19-3037-00	19-3037-00	19-3037-00
Evaporator Coil	18-0713-00	18-0714-01	18-0714-01	18-0714-02	18-0714-02	18-0713-00	18-0713-00
Expansion Valve	18-0386-10	18-0386-10	18-0386-10	18-0386-11	18-0386-11	18-0386-10	18-0386-10
Heater, Defrost	19-0952-01	19-0952-02	19-0952-02	19-0953-00	19-0953-00	19-0952-01	19-0952-01
Thermostat, Def. Term.	19-1706-00	19-1706-00	19-1706-00	19-1706-00	19-1706-00	19-1706-00	19-1706-00
Strainer, TXV Inlet	18-0389-00	18-0389-00	18-0389-00	18-0389-00	18-0389-00	18-0389-00	18-0389-00
Harness, Evap	19-1652-05	19-1652-05	19-1652-05	19-1652-05	19-1652-05	19-1652-05	19-1652-05
Fan Motor, Evap	19-1221-00	19-1221-00	19-1221-00	19-1221-00	19-1221-00	19-1221-00	19-1221-00
Fan Blade, Evap	19-1223-00	19-1223-00	19-1223-00	19-1223-00	19-1223-00	19-1223-00	19-1223-00
Motor Mount, Evap	10-1478-00	10-1478-00	10-1478-00	10-1478-00	10-1478-00	10-1478-00	10-1478-00
Grill, Evap Fan	10-1479-00	10-1479-00	10-1479-00	10-1479-00	10-1479-00	10-1479-00	10-1479-00
Harness, Drain Heater	19-1655-00	19-1655-00	19-1655-00	19-1655-00	19-1655-00	19-1655-00	19-1655-00
Heater, Drain Tube	19-1240-01	19-1240-01	19-1240-01	19-1240-01	19-1240-01	19-1240-01	19-1240-01
Controller Board, Pulse	19-1704-02	19-1704-02	19-1704-02	19-1704-02	19-1704-02	19-1704-02	19-1704-02
Switch, Power	19-0103-00	19-0103-00	19-0103-00	19-0103-00	19-0103-00	19-0103-00	19-0103-00
Harness, Ebox to Main	19-1707-04	19-1707-02	19-1707-02	19-1707-02	19-1707-02	19-1707-04	19-1707-04
Heater, Cond Pan	19-1688-00	19-1688-00		19-1688-00		19-1688-00	19-1688-00
Ballast	19-1725-00	19-1725-00	19-1725-00	19-1725-00	19-1725-00		
Harness, Ballast	19-1730-00	19-1730-00	19-1730-00	19-1730-00	19-1730-00		
Fuse, Lights	19-0970-00	19-0970-00	19-0970-00	19-0970-00	19-0970-00		
Lampholder, Top	19-0957-01	19-0957-01	19-0957-01	19-0957-01	19-0957-01		
Lampholder, Bottom	19-0957-02	19-0957-02	19-0957-02	19-0957-02	19-0957-02		
Switch, Light	19-0729-00	19-0729-00	19-0729-00	19-0729-00	19-0729-00		
Lamp	19-1040-00	19-1040-00	19-1040-00	19-1040-00	19-1040-00		
Safety Shield, Lamp	10-0983-00	10-0983-00	10-0983-00	10-0983-00	10-0983-00		
Cover, Lamp	10-0809-00	10-0809-00	10-0809-00	10-0809-00	10-0809-00		
Heater, Perimeter	19-0966-02	19-0966-01	19-0966-01	19-0966-01	19-0966-01	19-0966-02	19-0966-01
Heater, Vert Mullion							19-1657-01
Breaker Trim, Side	10-1485-02	10-1485-02	10-1485-02	10-1485-02	10-1485-02	10-1485-02	10-1485-02
Breaker Trim, Top/Btm	10-1485-03	10-1485-04	10-1485-04	10-1485-04	10-1485-04	10-1485-03	10-1485-04
Breaker Trim, Top/Btm Ctr				10-1485-05	10-1485-05		
Display Board, Pulse	19-1705-01	19-1705-01	19-1705-01	19-1705-01	19-1705-01	19-1705-01	19-1705-01
Switch, Door	19-0969-00	19-0969-00	19-0969-00	19-0969-00	19-0969-00	19-0969-00	19-0969-00
Hinge, Lower LH		03-1232-01	03-1232-01	03-1232-01	03-1232-01		25-0178-08
Hinge, Lower RH	03-1232-02	03-1232-02	03-1232-02			25-0178-09	25-0178-09
Hinge, Upper LH		03-1231-03	03-1231-03	03-1231-03	03-1231-03		25-0178-02
Hinge, Upper RH	03-1231-04	03-1231-04	03-1231-04			25-0178-03	25-0178-03
Door Assy, LH w/Display		51-1516-01	51-1517-01	51-1517-01	51-1516-01		
Door Assy, LH				51-1517-20	51-1516-24		51-0172-05
Door Assy, RH	51-1517-07	51-1516-25	51-1517-21			51-0172-02	51-0172-06
Door Closer	50-3159-00	50-3159-00	50-3159-00	50-3159-00	50-3159-00	25-0178-01	25-0178-01
Gasket, Door	10-0976-02	10-0976-01	10-0976-01	10-0976-01	10-0976-01	10-0882-05	10-0882-06
Handle, Door	30-0080	25-0518-00	25-0409-00	25-0518-00	25-0409-00	25-5055-00	25-5055-00
Lock, Door						25-0226-00	25-0226-00
Shelf, Cantilever	15-0267-00	15-0267-00	15-0267-00	15-0267-00	15-0267-00	15-0267-00	15-0267-00
Shelf, Bottom	15-0197-03	15-0197-03	15-0197-03	15-0197-03	15-0197-03	15-0197-03	15-0197-03
Leg, Adjustable	33-0504-01	33-0504-01		33-0504-01		33-0504-01	33-0504-01
Front Panel Assy		50-0176-02	50-0176-02	50-0176-03	50-0176-03	50-0176-08	50-0176-09

PARTS LIST - COLD WALL FREEZERS		
Description	**BT30CWFMS-2**	**BT30CW-EXPR**
Compressor	16-0310-00	16-0263-00
Start Relay	17-0286-00	
Start Capacitor	17-0291-00	
Run Capacitor	17-0288-00	
Motor Protector, Compr	17-0316-00	
Condenser Coil	18-1214-01	18-1214-01
Filter/Drier	12-3024	12-3024
Heat Exchange	50-4056-02	50-4056-03
Capillary Tube	10-9003	10-9025
Switch, Power	19-0103-00	
Thermostat, Cabinet	19-1222-00	23-5176
Power Cord	19-0620-00	
Breaker Trim, Side	10-1485-02	10-1485-02
Breaker Trim, Top/Btm	10-1485-03	10-1485-03
Thermometer, Solar	19-1050-03	
Hinge, Lower RH	25-0178-09	25-0178-09
Hinge, Upper RH	25-0178-03	25-0178-03
Door Assy, RH	51-0172-02	51-0172-02
Door Closer	25-0178-01	25-0178-01
Gasket, Door	10-0882-05	10-0882-05
Handle, Door	25-5055-00	25-5055-00
Lock, Door	25-0226-00	25-0226-00
Shelf, Cantilever	15-0325-00	15-0325-00
Shelf, Bottom	15-0197-03	15-0197-03
Leg, Adjustable	33-0504-01	33-0504-01
Front/Control Panel Assy	51-0174-10	51-0174-12



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