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**KYSOR/WARREN®**

5201 Transport Boulevard  
Columbus, GA 31907  
706-568-1514

# Installation & Operation Manual



**QM2T(E)  
QM3T(E) Wide Island  
Multi-Deck Display Case**



**IMPORTANT – KEEP IN STORE FOR FUTURE USE**

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## Introductions – General Information

This manual has been prepared for our customers and the personnel involved in setting up and maintaining our cases.

The Kysor/Warren case is designed to provide years of trouble free service. The multi-deck, meat cases are designed to merchandise packaged meat or deli products. These cases should be installed and operated according to the instructions contained in this manual to insure proper performance. They are designed for display of products in an air-conditioned store where temperature and humidity are maintained at a **maximum of 75° dry-bulb temperatures and 55% relative humidity.**

The QM(2)3T(E) will accommodate up to 3 levels of product display shelving in addition to the deck pan level. These levels provide excellent visibility and accessibility to the displayed products. These cases offers exceptional display facing area and product pack-out in a case that is only 53” in height. The upper shelves are fully adjustable and can be utilized in either horizontal or sloped position.

Icon Key	
	Caution
	Special Note
	Warning

 **CAUTION:** Failure to maintain maximum design conditions may result in operational issues such as: increased BTU load, high product temperature, coil icing, product frosting, and external sweating.

## Case Description

Model	Description
QM2T	Energy efficient, two-deck, low profile meat or deli merchandiser Wide Twin Island Case. 6’, 8’ or 12’ length.
QM3T	Energy efficient, three-deck, low profile meat or deli merchandiser Wide Twin Island Case. 6’, 8’ or 12’ length.
QM2TE	Energy efficient, two-deck, low profile meat or deli merchandiser Wide Island End Case. 4’ length.
QM3TE	Energy efficient, two-deck, low profile meat or deli merchandiser Wide Island End Case. 4’ length.
QM3TE w/ End	Energy efficient, three-deck, low profile meat or deli merchandiser Wide Twin Island with unitized End Case. 8’ or 12’ length.

## Receiving/Shipping Damage/Lost Items

All equipment should be examined for shipping damage before and during unloading. If there is any damage, the carrier should be notified immediately and an inspection requested. The delivery receipt must be noted that the equipment was received damaged. If damage is of a

concealed nature, you must contact the carrier within three (3) days following delivery. The consignee for all damages must file a claim with the carrier.



Note: All claims for shortages must be within 10 days after receipt of shipment.

## Refrigerant

A variety of refrigerants can be used in the Kysor/Warren cases. Refrigerant type needs to be specified during case order so correct expansion valve will be equipped with the case (i.e., R-404A expansion valve required when the end user specifies R-404A refrigerant). Multiple expansion valves are available, depending on end user refrigerant requirements. Expansion valves are supplied for the refrigerant specified on the original sales order.

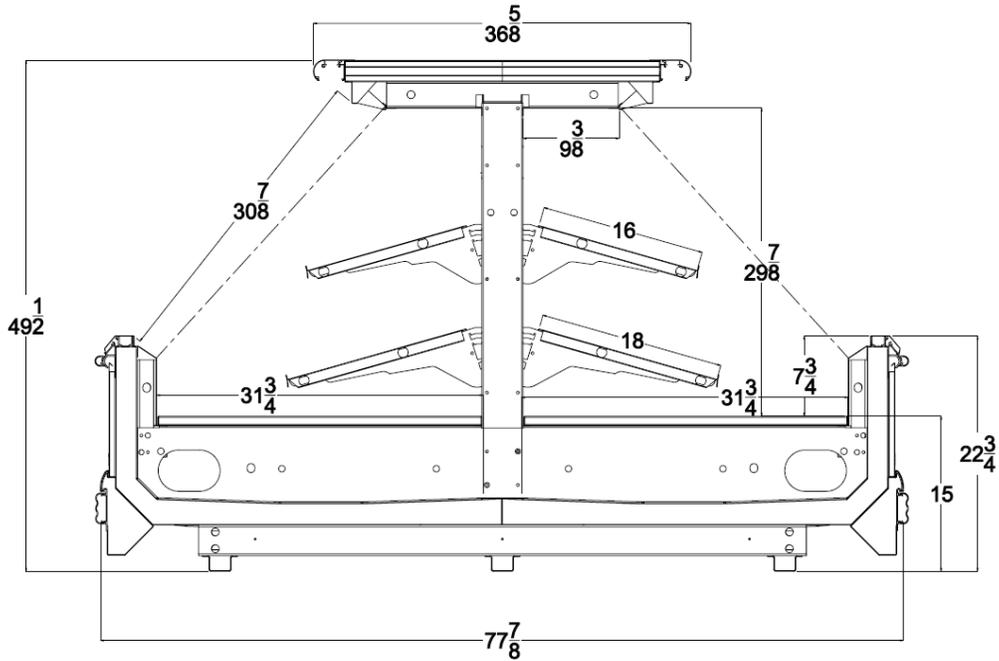
In addition, cases can be modified in the field to allow changing the type of refrigerant used. This requires changing the expansion valve and distributor orifice that is currently equipped in the case. Contact your Kysor/Warren Service Representative for additional information.



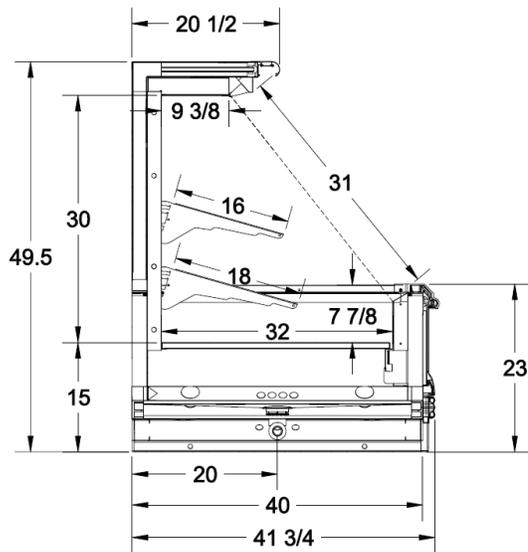
Note: Refer to Case Data Control Settings for refrigeration requirements.

# Cross-Section and Plan View

## QM2T Twin Island – Cross-Section

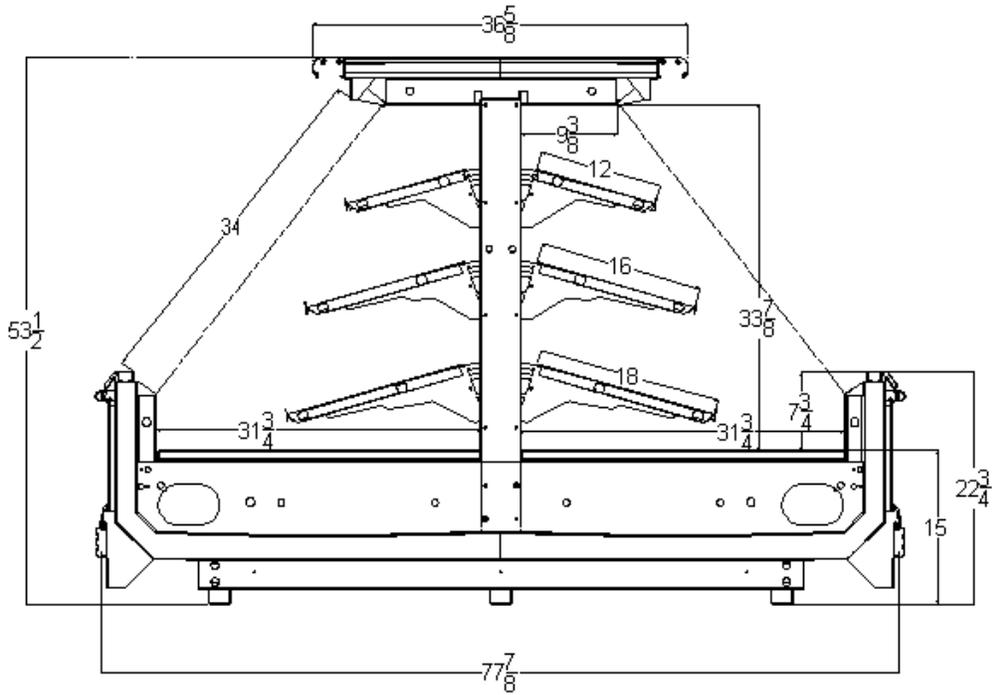


## QM2TE Island End Case – Cross-Section



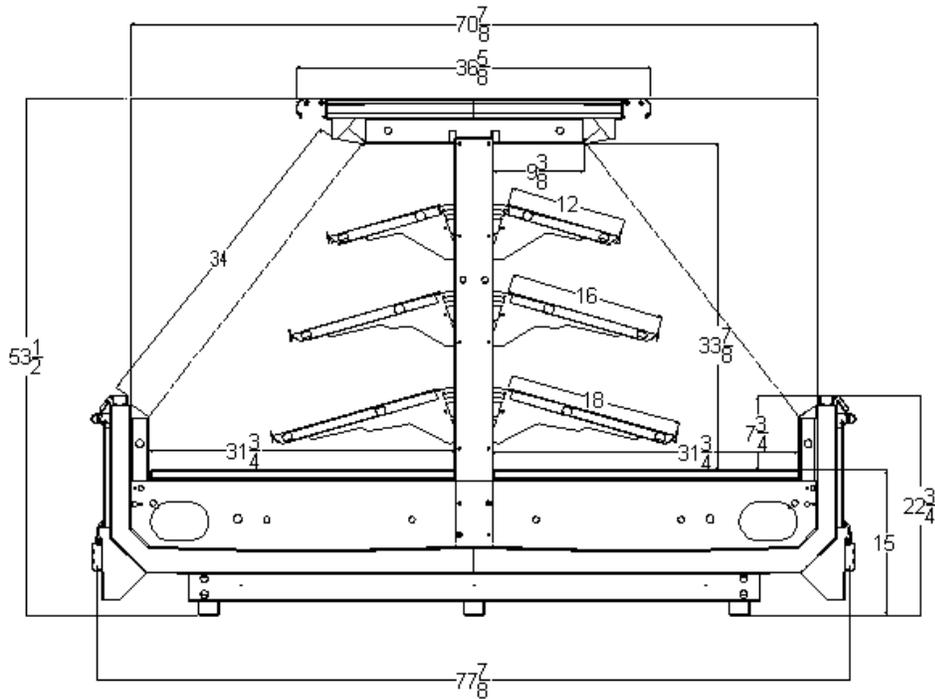
## QM3T Twin Island – Cross-Section

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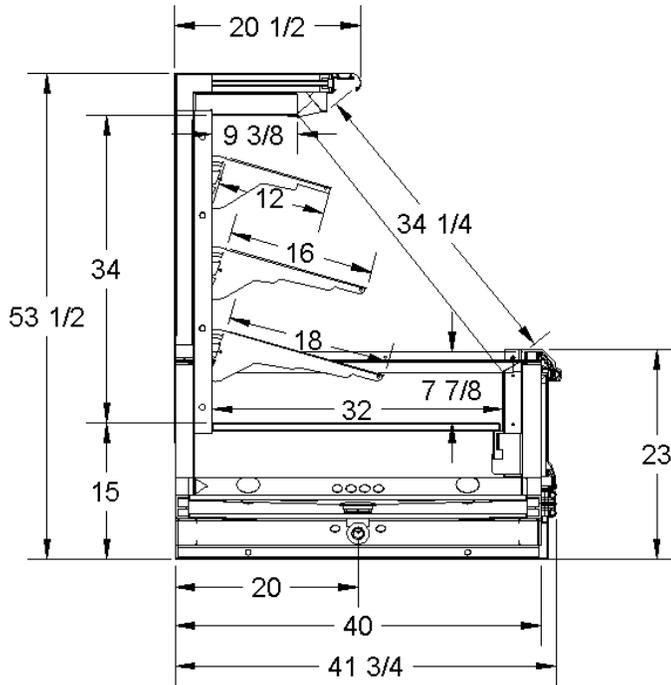
## QM3TE Twin Island with Unitized End Case – Cross-Section

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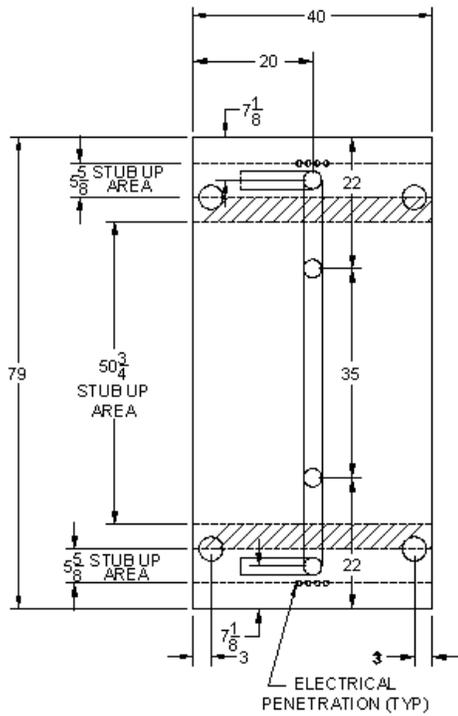
## QM3TE Island End Case – Cross-Section

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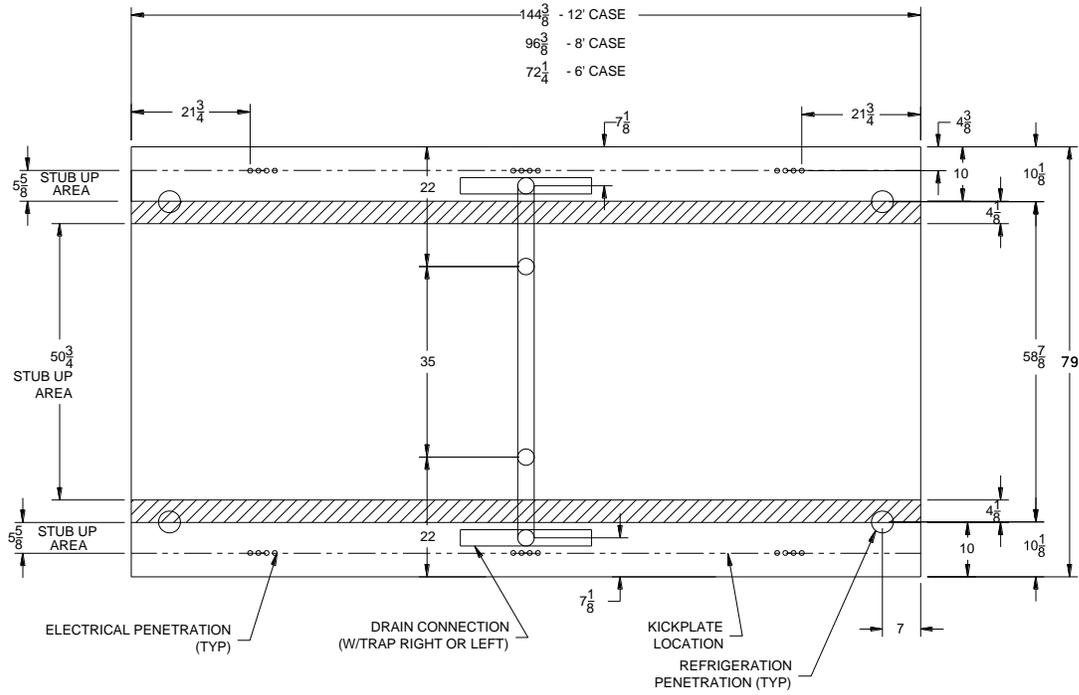


## QM2TE / QM3TE Island End Case – Plan View

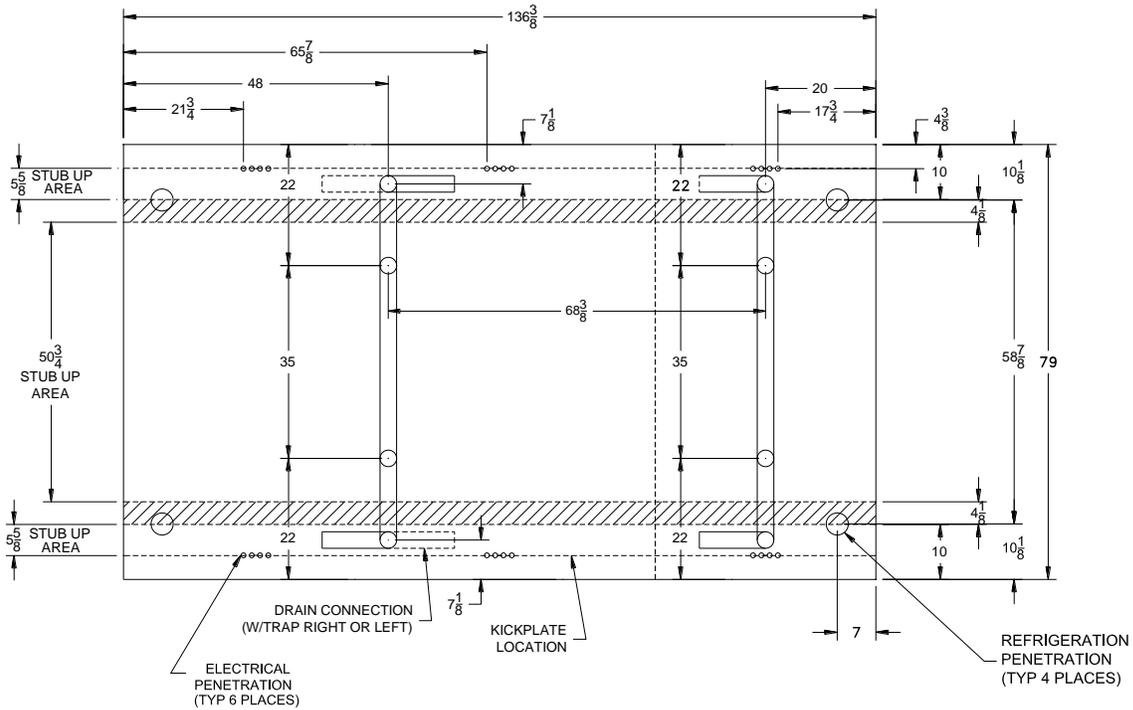
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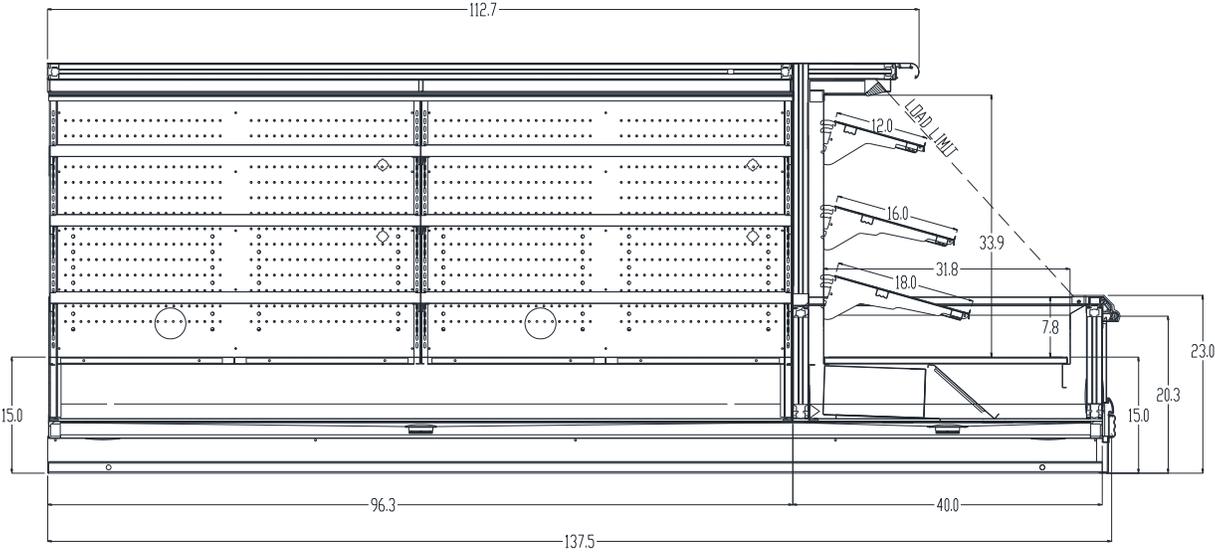
## QM2T / QM3T Twin Island – Plan View



## QM3TE Twin Island with Unitized End Case – Plan View



**QM3TE Twin Island with Unitized End Case – Side View**



## Case Data



All the BTU requirements shown in the case data are for use on parallel systems only. A minimum of 8% excess capacity should be added to all conventional single compressor condensing units.



The air current is very important to the performance of these cases. The load limit line (see load case selection) is the indicator of the inside edge of the air current and at no time should product, signs, debris, etc. interfere with air current.

### QM2T – Twin Island

#### Capacities

Length (ft)	Facing Area (ft <sup>2</sup> )	Cubic Volume (ft <sup>3</sup> )
6	14.6	26.2
8	19.5	34.9
12	29.3	52.4

#### Refrigeration Data per side

Length (ft)	BTUH Per Side Unlighted Shelves			Evaporator Temp (°F)	Discharge Air	
	STD Fan	PSC Fan	ECM Fan		Temp (°F)	Velocity (FPM) (1 hr. after defrost)
6	5610	5550	5490	+24	+29	250
8	7480	7400	7320			
12	11220	11100	10980			

NOTE: For sizing conventional/ individual condensing units, Add 8% to BTU Load.

#### Electrical Data per side

Length (ft)	Fan Data (Amps)				Canopy Light (per row)	Electric Defrost Heater (optional 230V)
	Fan Qty	STD Fan	PSC Fan	ECM Fan	Amps	Amps
6	2	0.70	0.44	0.60	0.40	5.61
8	2	0.70	0.44	0.60	0.50	7.93
12	3	1.05	0.66	0.90	0.75	11.54

All electrical data based on 115V and unlighted shelves.

#### Defrost Data

Defrost Type	Defrost per Day	Fail Safe (Minutes)	Termination (°F)
Electric	4	35	48
Hot Gas	4	20	48
Off Cycle	4	40	48

## QM2TE – Island End Case

---

### Capacities

Length (ft)	Facing Area (ft <sup>2</sup> )	Cubic Volume (ft <sup>3</sup> )
4	14.6	26.2

### Refrigeration Data per side

Length (ft)	BTUH Per Side Unlighted Shelves			Evaporator Temp (°F)	Discharge Air	
	STD Fan	PSC Fan	ECM Fan		Temp (°F)	Velocity (FPM) (1 hr. after defrost)
4	5610	5550	5490	+24	+29	250

NOTE: For sizing conventional/ individual condensing units, Add 8% to BTU Load.

### Electrical Data per side

Length (ft)	Fan Data (Amps)				Canopy Light (per row)	Electric Defrost Heater (optional 230V)
	Fan Qty	STD Fan	PSC Fan	ECM Fan	Amps	Amps
4	2	0.70	0.44	0.60	0.40	5.61

All electrical data based on 115V and unlighted shelves.

### Defrost Data

Defrost Type	Defrost per Day	Fail Safe (Minutes)	Termination (°F)
Electric	4	35	48
Hot Gas	4	20	48
Off Cycle	4	40	48

## QM3T – Twin Island

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### Capacities

Length (ft)	Facing Area (ft <sup>2</sup> )	Cubic Volume (ft <sup>3</sup> )
6	17.8	30.2
8	23.8	40.3
12	35.6	60.5

### Refrigeration Data per side

Length (ft)	BTUH Per Side Unlighted Shelves			Evaporator Temp (°F)	Discharge Air	
	STD Fan	PSC Fan	ECM Fan		Temp (°F)	Velocity (FPM) (1 hr. after defrost)
6	5628	5568	5508	+24	+29	250
8	7504	7424	7348			
12	11256	11136	11016			

NOTE: For sizing conventional/ individual condensing units, Add 8% to BTU Load.

### Electrical Data per side

Length (ft)	Fan Data (Amps)				Canopy Light (per row)	Electric Defrost Heater (optional 230V)
	Fan Qty	STD Fan	PSC Fan	ECM Fan	Amps	Amps
6	2	0.70	0.44	0.60	0.40	5.61
8	2	0.70	0.44	0.60	0.50	7.93
12	3	1.05	0.66	0.90	0.75	11.54

All electrical data based on 115V and unlighted shelves.

### Defrost Data

Defrost Type	Defrost per Day	Fail Safe (Minutes)	Termination (°F)
Electric	4	35	48
Hot Gas	4	20	48
Off Cycle	4	40	48

## QM3TE – Island End Case

---

### Capacities

Length (ft)	Facing Area (ft <sup>2</sup> )	Cubic Volume (ft <sup>3</sup> )
4	17.8	30.2

### Refrigeration Data per side

Length (ft)	BTUH Per Side Unlighted Shelves			Evaporator Temp (°F)	Discharge Air	
	STD Fan	PSC Fan	ECM Fan		Temp (°F)	Velocity (FPM) (1 hr. after defrost)
4	5628	5568	5508	+24	+29	250

NOTE: For sizing conventional/ individual condensing units, Add 8% to BTU Load.

### Electrical Data per side

Length (ft)	Fan Data (Amps)				Canopy Light (per row)	Electric Defrost Heater (optional 230V)
	Fan Qty	STD Fan	PSC Fan	ECM Fan	Amps	Amps
4	2	0.70	0.44	0.60	0.40	5.61

All electrical data based on 115V and unlighted shelves.

### Defrost Data

Defrost Type	Defrost per Day	Fail Safe (Minutes)	Termination (°F)
Electric	4	35	48
Hot Gas	4	20	48
Off Cycle	4	40	48

\*Lights Amps include only cases with single row canopy. Add @ .40 A/6' for each additional row of shelf or canopy light.

\*\*BTU requirements include only canopy lights. Add @ 19 Btu/Hr/Ft per row of lighted shelves.

## QM3TE –Twin Island with Unitized End Case

### Capacities

Length (ft)	Facing Area (ft <sup>2</sup> )	Cubic Volume (ft <sup>3</sup> )
4' End	17.8	30.2
8' Side	23.8	40.3

### Refrigeration Data per side

Length (ft)	BTUH Per Side Unlighted Shelves			Evaporator Temp (°F)	Discharge Air	
	STD Fan	PSC Fan	ECM Fan		Temp (°F)	Velocity (FPM) (1 hr. after defrost)
4	5628	5568	5508	+24	+29	250
8	7504	7424	7348			

NOTE: For sizing conventional/ individual condensing units, Add 8% to BTU Load.

### Electrical Data per side

Length (ft)	Fan Data (Amps)				Canopy Light (per row)	Electric Defrost Heater (optional 230V)
	Fan Qty	STD Fan	PSC Fan	ECM Fan	Amps	Amps
4	2	0.70	0.44	0.60	0.40	5.61
8	2	0.70	0.44	0.60	0.50	7.93

All electrical data based on 115V and unlighted shelves.

### Defrost Data

Defrost Type	Defrost per Day	Fail Safe (Minutes)	Termination (°F)
Electric	4	35	48
Hot Gas	4	20	48
Off Cycle	4	40	48

\*Lights Amps include only cases with single row canopy. Add @ .40 A/4', .50 A /8' for each additional row of shelf or canopy light.

\*\*BTU requirements include only canopy lights. Add @ 19 Btu/Hr/Ft per row of lighted shelves.

\*Lights Amps include only cases with single row canopy. Add @ .50 A /8', .75A/12' for each additional row of shelf or canopy light.

\*\*BTU requirements include only canopy lights. Add @ 19 Btu/Hr/Ft per row of lighted shelves.

## Maximum Shelving Size Recommended

Top Shelf	Bottom Shelf
Not to exceed <b>12” at 25 deg.</b>	Not to exceed <b>20”</b>

 **Note:** The air current is very important to the performance of this case. The load limit line (see load case section) is the indicator of the inside edge of the air current and at no time should shelving, product, signs, debris, etc., interfere with air current.

 **Note:** Temperature is measured in discharge air. Defrost frequency is at design conditions. Higher temperature or humidity may require more defrost and longer fail-safes. These cases are not designed to operate in environments where the ambient temperature is greater than 75°F and the relative humidity is greater than 55%. Off-cycle defrost is the recommended defrost for these cases. Electric defrost and hot gas defrost are available for installations requiring a positive defrost. Refer to [www.kysorwarren.com](http://www.kysorwarren.com) for other electrical data and information.

 **CAUTION:** Failure to maintain maximum design conditions may result in operational issues such as: increased BTU load, high product temperature, coil icing, product frosting, and external sweating.

 **CAUTION:** Failure to properly install electrical wiring and control wiring as per wiring diagram(s), defrost settings, and temperature set-points may result in operational issues such as: increased BTU load, high product temperature, coil icing, product frosting, and external sweating.

## Case Installation

These display cases may be installed individually or in a continuous line up consisting of several 4', 6', 8' and 12' sections using a joint kit. A plexi-glass divider kit must be used between cases operating on different refrigeration systems. The divider will be factory installed if specified on order.

### Preparation

Prepare the installation area as follows:

1. Clean area where case is to be installed.
2. Verify installation area is at least 15 feet from any outside entrances or heating and cooling outlets.
3. Verify at least 2 feet of distance between hot and cold cases.

 **Caution:** To prevent condensation on the end panels of cases, a minimum of 6.0 inches between walls or other cases is required for airflow. If 6.0 inches is not possible, then the space between the cases must be completely filled and sealed or an updraft fan kit must be installed to provide air circulation through the space.

4. Ensure floor loading will support the case and the case contents.
5. Ensure proper AC power is available. Refer to case AC input requirements located in the electrical connections section of this manual.
6. Ensure location will allow connection to drain lines and the drain line, when installed, will meet the recommendations as set forth in the refrigeration piping and dehydration section of this manual.
7. Ensure expansion valve in case is the proper valve for the type of refrigerant used at the installation site.

## Installation

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The following instructions are provided for unpacking, moving, loading, and lifting the case prior to installation.



**Note: READ ALL INSTRUCTIONS CAREFULLY BEFORE BEGINNING INSTALLATION**

## Unpacking

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1. Remove all shipping tape from lamps and ensure that all lamp ends are snapped in place.



**Warning:** Use caution when removing the strapping in the following procedure, as the shelves are very heavy and could fall causing personal injury or equipment damage.

2. Ensure the evaporator cover is installed correctly with the deck pans installed.
3. Move the case into position, install, adjust superheat, and perform the operational checkout procedures following the instructions within this manual.



**Caution:** Be careful not to damage the factory-installed end while moving the case. Use the case lift points on the case to move it to the proper location.

## Installing First Case

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3. Ensure all preparation for installation, as outlined in the above paragraphs, have been fully complied with and are complete.
4. If multiple cases are to be installed, find the highest area of the floor to place the first case.
5. Allow a minimum of 6 inches between the rear of the case and the store walls and/or other cases. This space reduces the possibility of condensation problems. It may be necessary to provide forced air ventilation in some installations.
6. All cases must be located on a firmly based floor and be leveled within plus or minus 1/16 inch.

7. Use shims provided to support and level the entire length of your case(s). All rails of the case must be properly shimmed and be in contact with the floor. Cases with shims on the ends must also have shims in the middle and be no more than 4 ft. apart. All legs of the case must be properly adjusted and be in contact with the floor.
8. If multiple cases are to be installed, refer to the floor plan and install the first case in the line up by snapping a chalk line where the front and rear of the cases are to be located.
9. Continue the chalk line if multiple cases are to be installed. The first case is typically the case that is at the highest area on the floor.
10. Connect water drain line. Reference waste outlet (drip pipe) description and location procedure later in this chapter.
11. Connect input AC power. Reference electrical installation procedure later in this manual.
12. Connect refrigerant lines. Reference procedure later in this manual.
13. Install all ends, caps, and trim per the applicable instructions contained in this manual.
14. Remove shipping tape on fluorescent lamps and remove all other shipping material.
15. Refer to the operational start up procedures later in this manual. If multiple cases are to be installed, refer to the following paragraph for installing subsequent cases.

## **Installing Subsequent Cases**

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If additional cases are to be installed, follow the same procedures as described in the installing first case procedure (above), in addition to the following:

1. Move cases as near their permanent location as possible before removing shipping braces, skids or rollers.



Note: All cases are factory numbered with line up and position numbers. Make sure that cases are installed in order (line up sticker found on the fan plenum or door and on the back panel of the case).

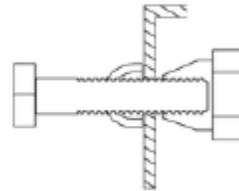
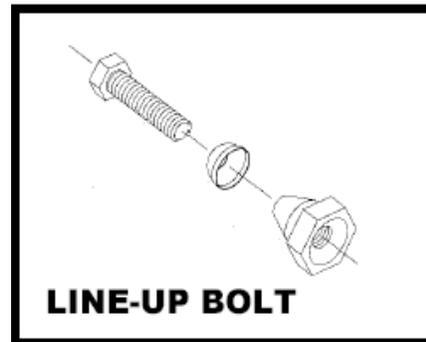
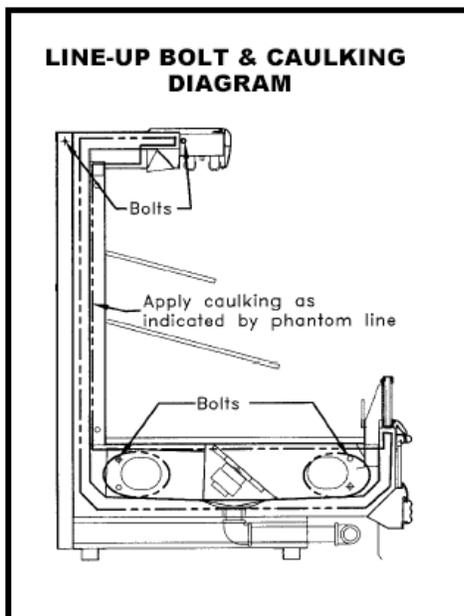
2. Remove skids and shipping braces.
3. Ensure all case expansion valves are correct.
4. Do not install electrical, drain lines, or refrigerant lines until all the cases have been set/placed into position and properly leveled.
5. Do not install case trim, ends, or caps until all cases have been set into position and properly positioned and leveled.

6. Before lining up cases using the front and rear edges as a baseline, inspect refrigeration lines, electrical connections and controls to insure cases are in proper line up and are in proper sequence.
7. Remove shipping tape on fluorescent lamps and remove all other shipping material. Follow all joining instructions listed below to connect cases in a line-up.

## Joining Instructions

Two or more cases of like models can be joined together to form a continuous line up. Before lining up cases, inspect refrigeration lines, electrical connections and controls to insure cases are in the proper line-up and are in the proper sequence. Reference and become familiar with the below figure, and then join the cases using the instructions that follow.

Line Up Bolt Holes on Side of Cases – See Caulking Diagram Below



1. A plexi-glass divider and EPR valve must be used when joining a Q-series case with a non-Q-series case.
2. Apply foam insulation tape and caulking around the side of the case as shown in the diagram above.
3. Remove access covers over line up holes and insert the small line up bolts (see previous diagram) in the end frame in the bolthole pattern. Place the special T-nut washer on the 3/8" machine bolt with the hollow section away from the bolt head. Tighten the 3/8" bolts with nut washer into the T-nuts alternately until cases are pulled up tight and the joint is completely sealed. (Reasonable care should be exercised in this procedure to prevent end frame distortion.) Assist pulling case up tight by bumping from opposite end of case or by using pry bar.

4. Inspect joint for proper air and watertight seal inside and outside the case.
5. Replace line up access cover plugs and plates.
6. Move cases as close together as possible and level by using the shims provided (same as original case). Use shelf standard struts for alignment to be sure cases are level.



Shelf standards on back wall should be even when leveled properly.

CASES MUST BE LEVELED FROM FRONT TO BACK AND END-TO-END AND SUPPORTED CONTINUOUSLY AS NEEDED WITH SHIMS.

## Installation of Trim, Caps, & Shelves

We offer several different trim packages. Below are basic instructions for our 3000 trim. For any other trim packages or questions not answered below, please contact the Technical Service Department at Kysor/Warren (800-866-5596).

Case front part selection and case trim selection are provided in the information that follows:

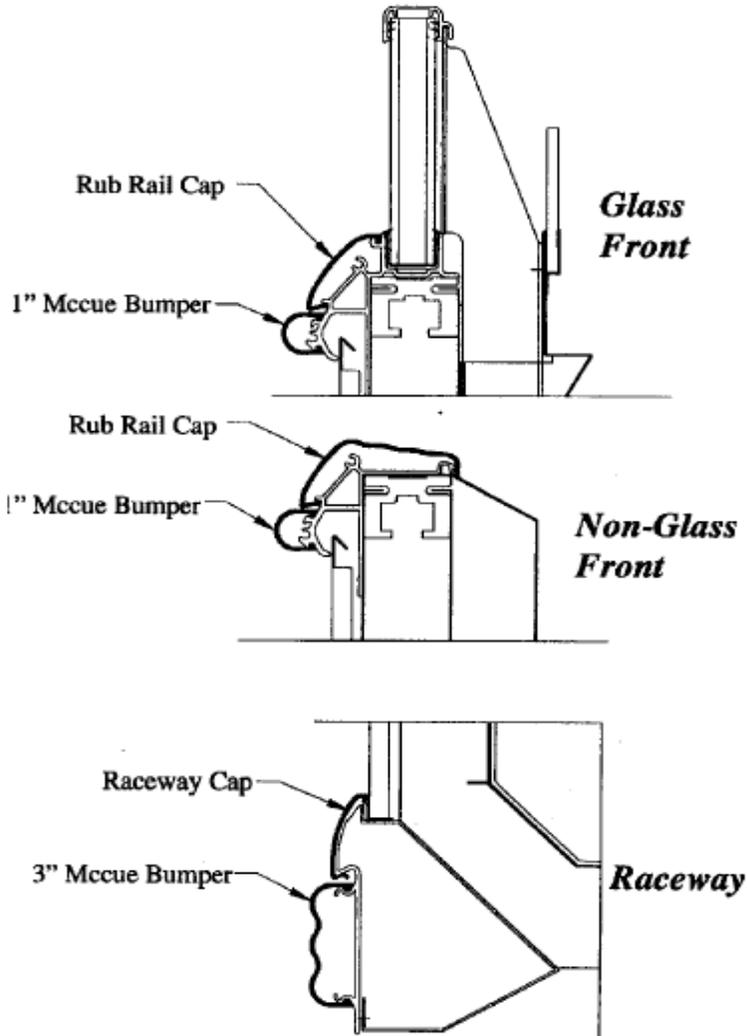
### **Case Front Part Selection**

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For Cases In A Lineup:

- Rub Rail Cap Starter                    1/lineup Std. or w/ptm
- Raceway Cap Starter                    1/lineup
- 1" Mccue Bumper Starter            1/lineup
- 3" Mccue Bumper Starter            1/lineup

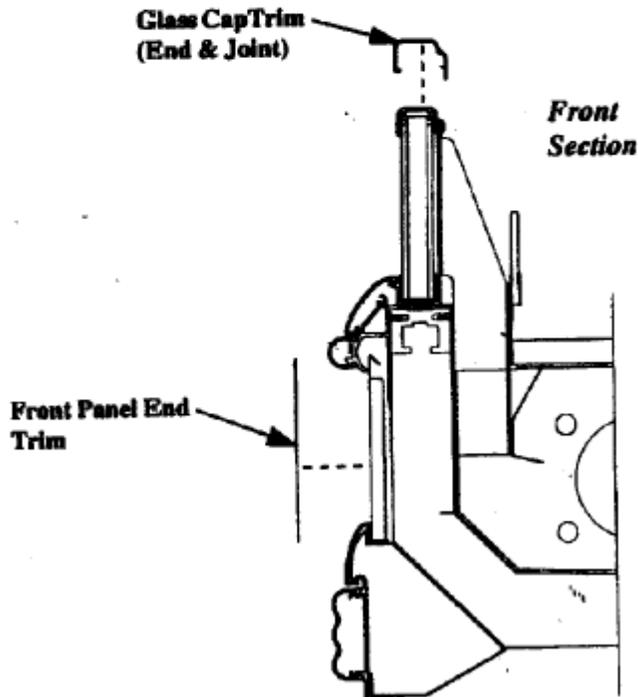
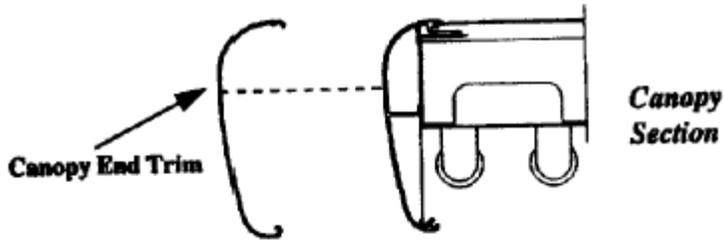
- Rub Rail Cap 1/case Std. or w/ptm
  - Raceway Cap 1/case
  - 1" Mccue Bumper 1/case
  - Parachoques McCue de 3" 1/vitrina



**For Single Case:**

- 
- Rub Rail Cap 1/case Std. or w/ptm
  - Raceway Cap 1/case
  - 1" Mccue Bumper 1/case
  - 3" Mccue Bumper 1/case
  - Canopy End Trim two per lineup

- Glass Cap End Trim                      two per lineup
- Glass Cap Joint Trim                      one per joint
- Front Panel End Trim                      two per lineup



## Case Trim Selection

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The only trim provided is on the right and left end cases. All exterior panels slide from right to center and left to center.

For Single Case W/ Two Ends:

Trim is factory installed.

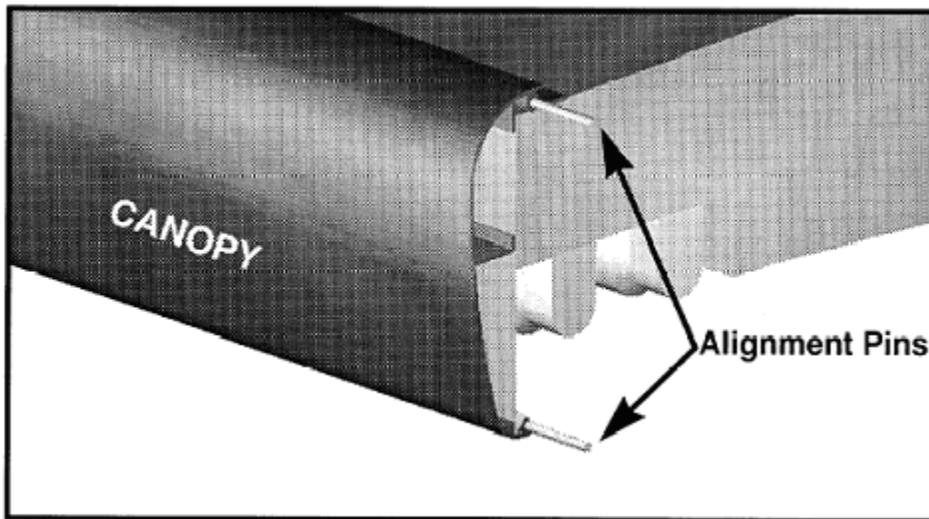
For Mutual End In A Lineup:

Proper additional piece of end trim should be used.

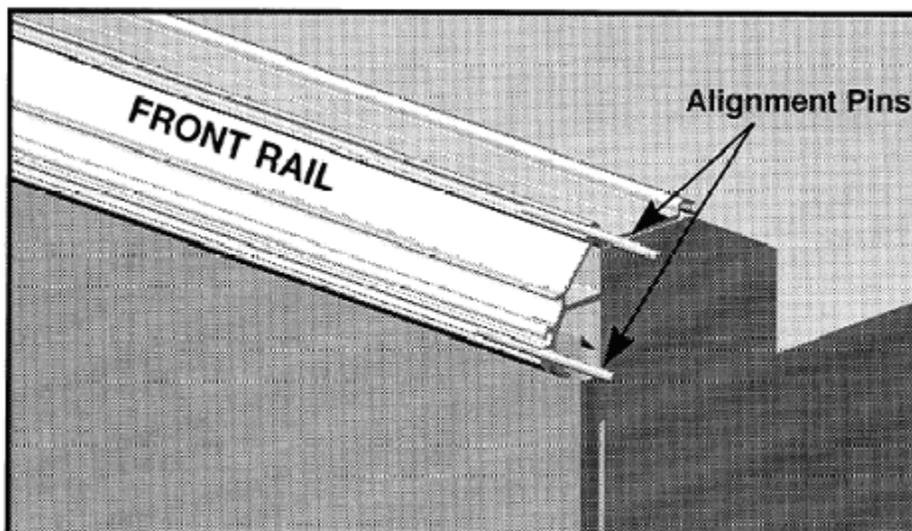
### Canopy and Front Rail Alignment

After the display cases are properly joined and sealed, align the canopies by sliding the alignment pins across the joint from one canopy into the adjoining canopy. It may be necessary to loosen and/or remove the screws at the top of the canopy to aid in the alignment of the two canopies and to eliminate any gap between the canopies. The screws should be tightened after canopies are aligned.

Align the case front rails with a single alignment pin sliding the pin across the joint into



the adjoining front rail. It may be necessary to loosen the screws holding the front rail to aid in the alignment process. The screws should be tightened after the front rails are aligned.



### 3" Bumper

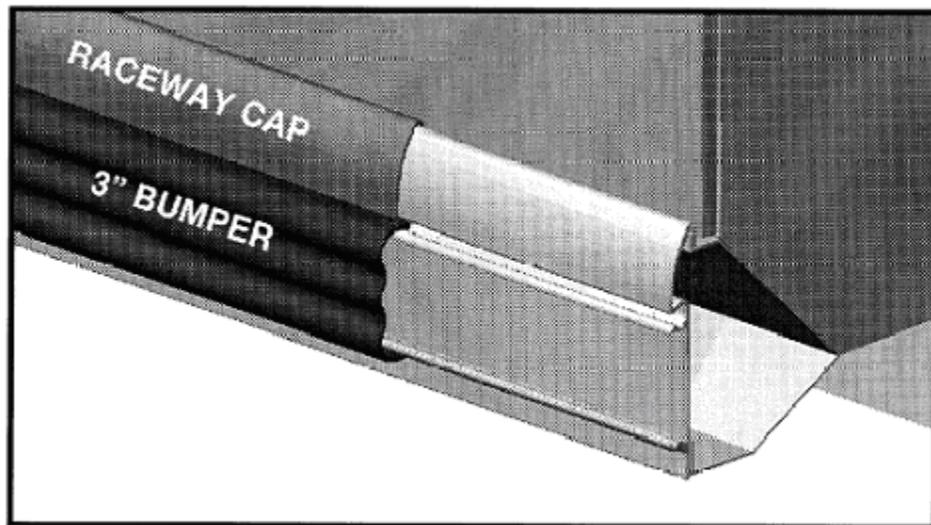
Install the 3" bumper parts to the raceway using the same procedure as described for the 1" bumper parts.

### Raceway Cap

Install the raceway cap parts to the raceway using the same procedure as described for the rub rail cap.

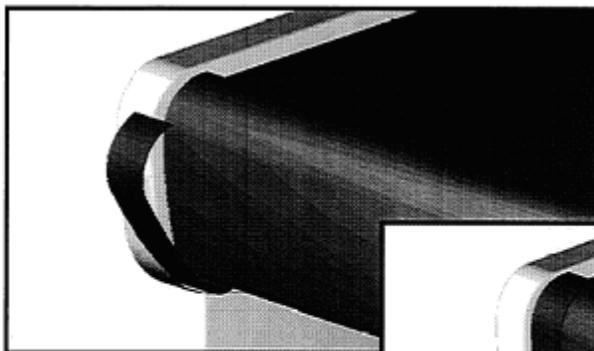


Note: The raceway cover parts do not overlap as the rub rail cap parts do.

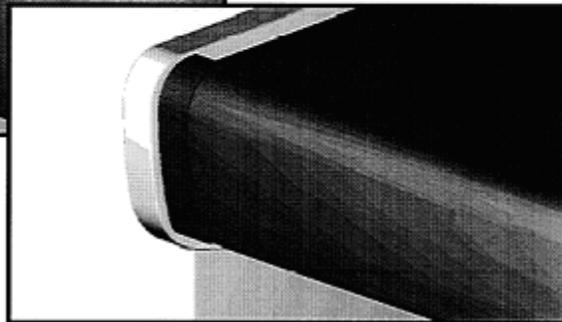


## Canopy End Trim Installation – All Models

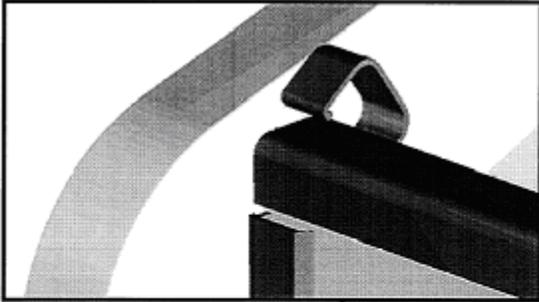
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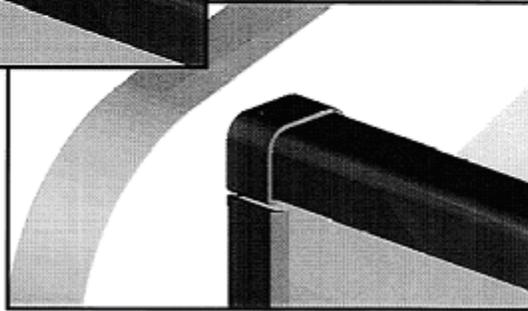
Hook the end trim under the lower edge of the canopy then rotate the part over the top of the canopy and snap into place.



## Glass Cap Rail End Trim Installation – Glass Models

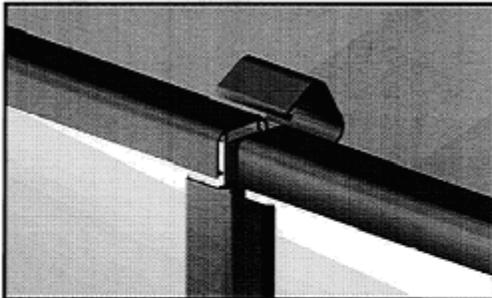


Hook the back inside edge of the end trim to the back side of the glass cap rail then rotate the part forward and snap into place.

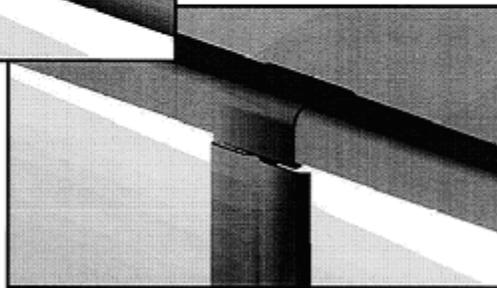


## Glass Cap Rail Joint Trim Installation – Glass Models

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Hook the back inside edge of the joint trim to the back side of the glass cap rail then rotate the part forward and snap into place.



## Bumper, Rub Rail Cap, and Raceway Cover Installation

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### 1" Bumper

Install the two-foot length of 1" bumper to the left hand end of the first case in the lineup. To install the bumper, hook the lower edge of the bumper to the aluminum retainer and rotate the bumper up and snap the top edge onto the retainer. Install this part as close to the case flat end panel as possible.

Install the additional case length 1" bumper parts crossing over the joint of the cases in the lineup and trimming the last piece to fit the last case in the lineup.

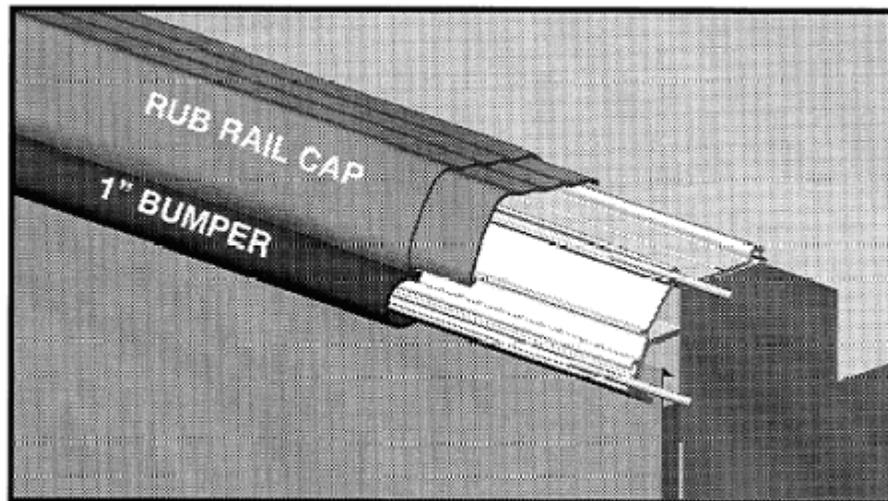
### Rub Rail Cap

Install the four foot rub rail cap part to the left hand of the first case in the lineup. To install the rub rail cap, hook the lower edge of the cap to the aluminum front rail just above the 1" bumper then rotate the cap toward the case and snap it down to the back hook on the aluminum front rail on non-glass models and the top hook on the aluminum rail on glass models. Install this part as close to the case flat end panel as possible.

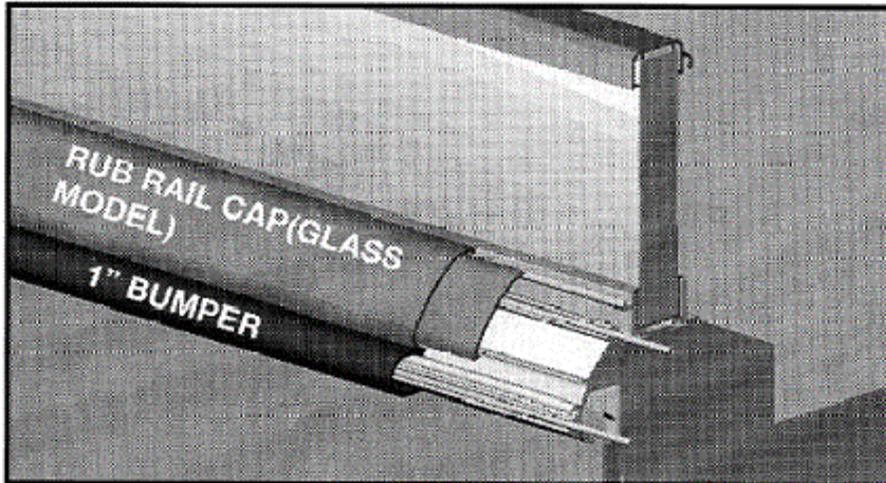
Install the additional case length rub rail cap parts as close to one another as possible, crossing over the joint of the cases in the lineup and overlapping each part where provided. Trim the last part to fit the last case in the lineup.



Note: If a mutual end is used in a lineup, the proper additional pieces of trim should be used.



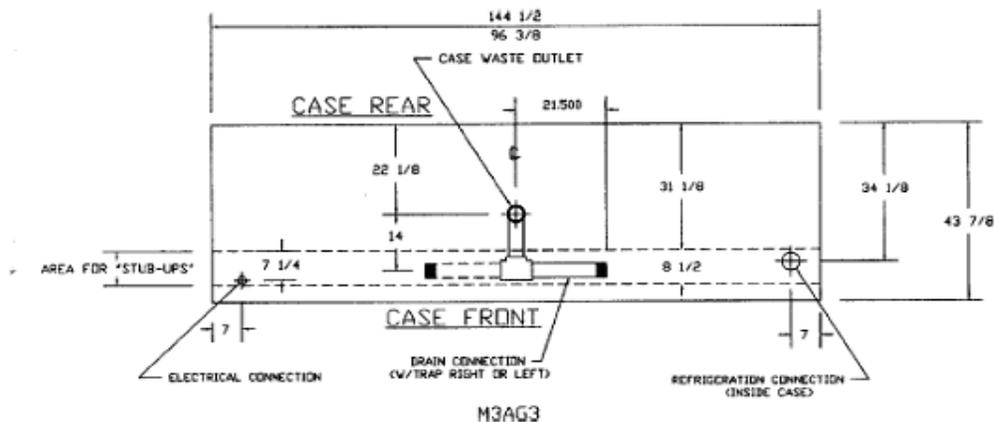
**Non-Glass Model**



**Glass Model**

## **Waste Outlet (Drip Pipe) Description and Location**

These cases are equipped with 1 ½" M-NPT waste outlet connection that terminates in the center of the refrigerator below the insulated bottom. The water seal trap is shipped loose for field installation.



Note: Improperly installed drip pipes can seriously effect the operation of this case and result in increased maintenance cost. Listed below are some general rules for drip pipe installation:

- Never use a double water seal.
- Never use a pipe smaller than the size pipe or water seal supplied with the case.
- Always provide as much fall as possible in drip pipe. (1" fall for each 4' of drip pipe.)

- Avoid long runs in drip pipe, which make it impossible to provide maximum fall in pipe.
- Provide a drip space between drip pipe and floor drain or sewer connection.
- Do not allow drip pipe to come in contact with un-insulated suction lines, which will cause the condensation from your case to freeze.

## Drain Strainer

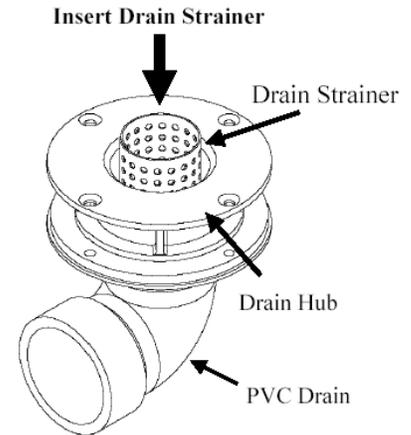


**Note:** Not all of our cases have drain strainers. This information applies only to the cases equipped with the strainers.

- Purpose:** Keep debris or any foreign objects from entering the PVC drain, which could cause blockage.
- Installation:** Insert into drain until drain strainer stops – it will not be flush. Strainer will exceed hub by 1". DO NOT flatten drain strainer

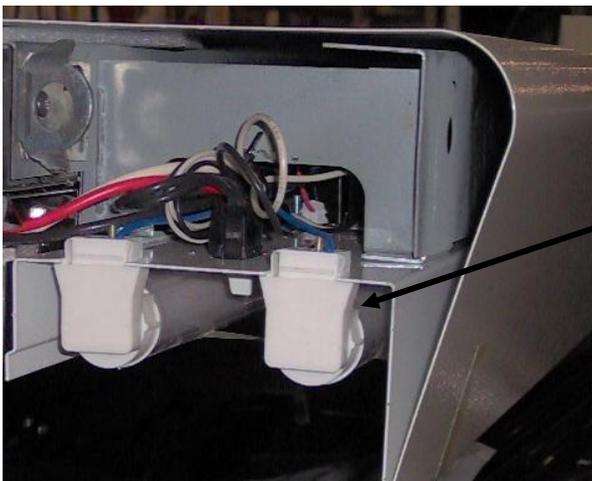


**Note:** 1 1/2" Drain Pipe



## Electrical Connections – General

Cases are standard with two rows of high output lamps for canopy and one for shelves. Ballasts are located behind the canopy or raceway. If lighted shelves are supplied, ballasts for shelves will be located behind the canopy or the electrical raceway. See wiring diagram for layout.



- Remove the light bulb.
- Remove access cover located under bulb.
- Ballast is located under the access cover.



**Note:** All shelves receptacles must be plugged in before any of the lights will turn on.

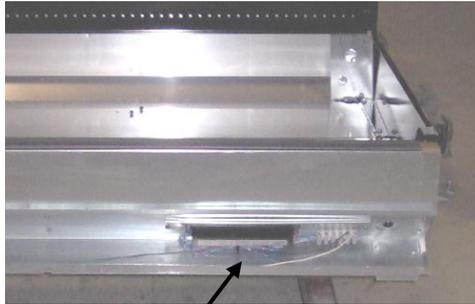
## Ballast Location/Connections

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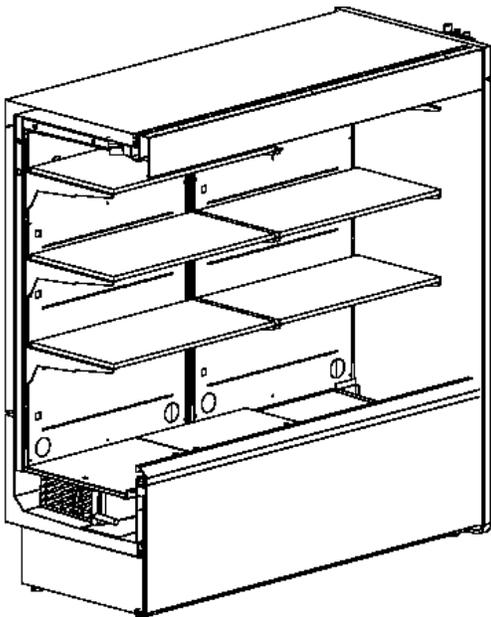
Ballasts are located in canopy or the raceway. See wiring diagram for layout.



**WARNING! Always disconnect the electrical power at the main disconnect when servicing or replacing any electrical component. This includes, but is not limited to, such items as fans, heaters, thermostats and light bulbs. Failure to disconnect the electrical power may result in personal injury or death.**

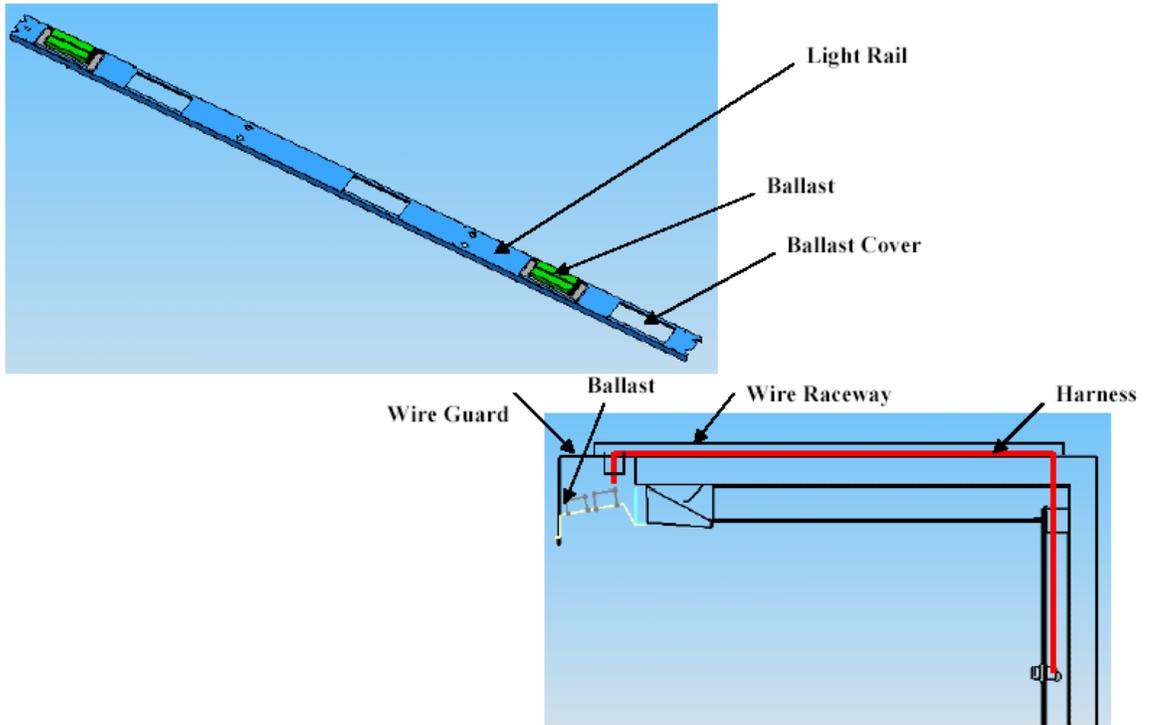


Raceway Ballast Location

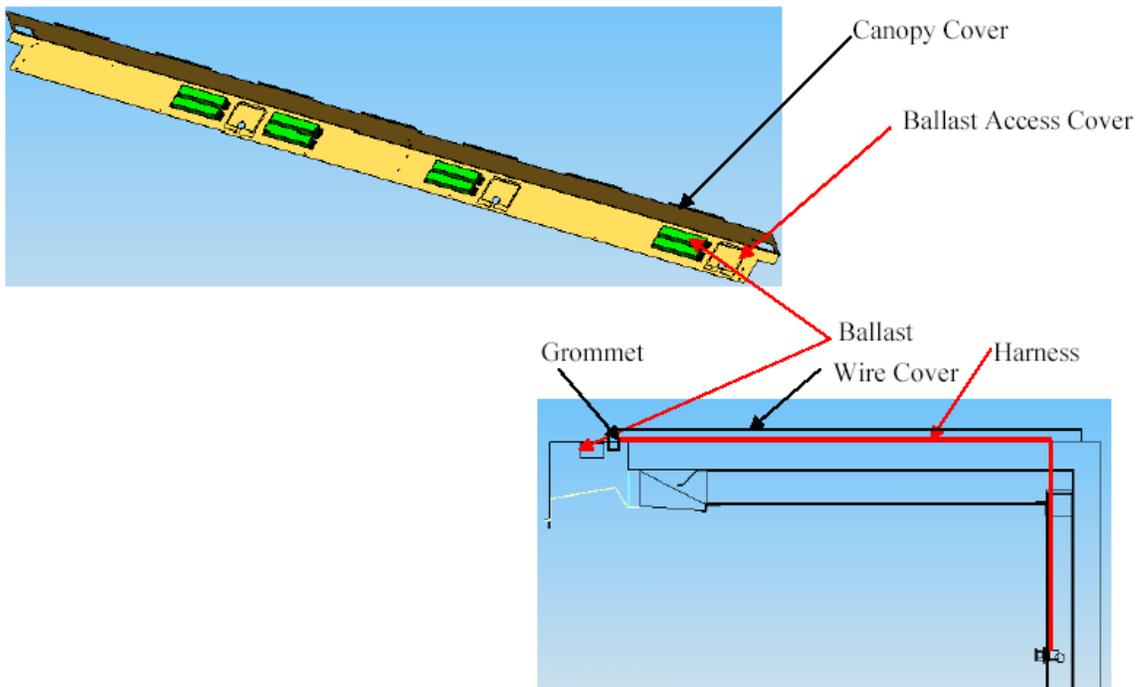


Canopy Ballast Location

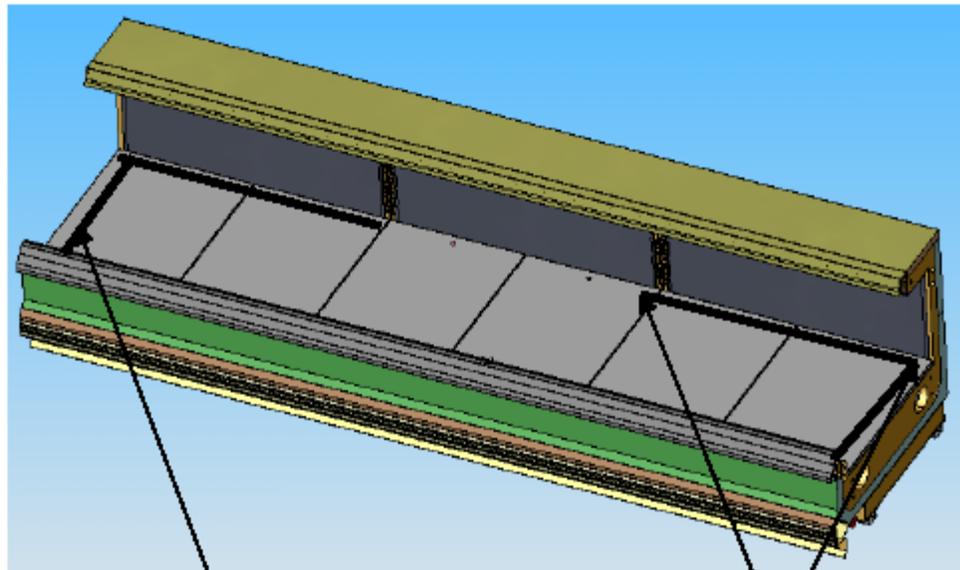
**Remote Ballast Location (Welded-Canopy)**



**Remote Ballast Location (Drop-Down Canopy)**



## Remote Ballast Location (Canopyless Cases):



### Left 4' Section

Wiring to Left side of Raceway

### Middle & Right 4' Section

Wiring to Right side of Raceway



**WARNING!** It is imperative that the pins of the bulbs and the shelf power cords be completely seated in their respective lamp holder or receptacle (see pictures below). If they are not completely seated, an electrical arc could occur which will cause the lamp holders to melt and become an electrical hazard. Care must be taken during cleaning, product stocking and re-lamping processes to insure that the bulbs and shelf cords are not dislodged.



Bulbs



Shelf Plug



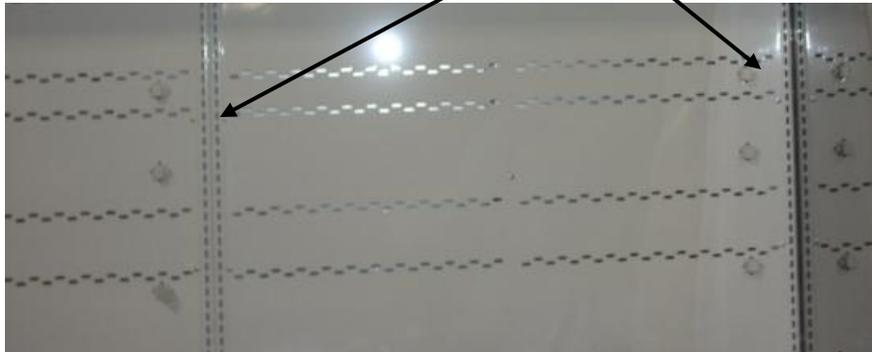
**Note:** The fluorescent bulb is capable of lighting even if the bulb and shelf power cord are not completely seated.



**WARNING! Ensure the Kickplate does not come in contact with the case electrical wiring. Live electrical wiring that comes in contact with the case is a shock hazard that may cause severe injury or death by electrocution.**



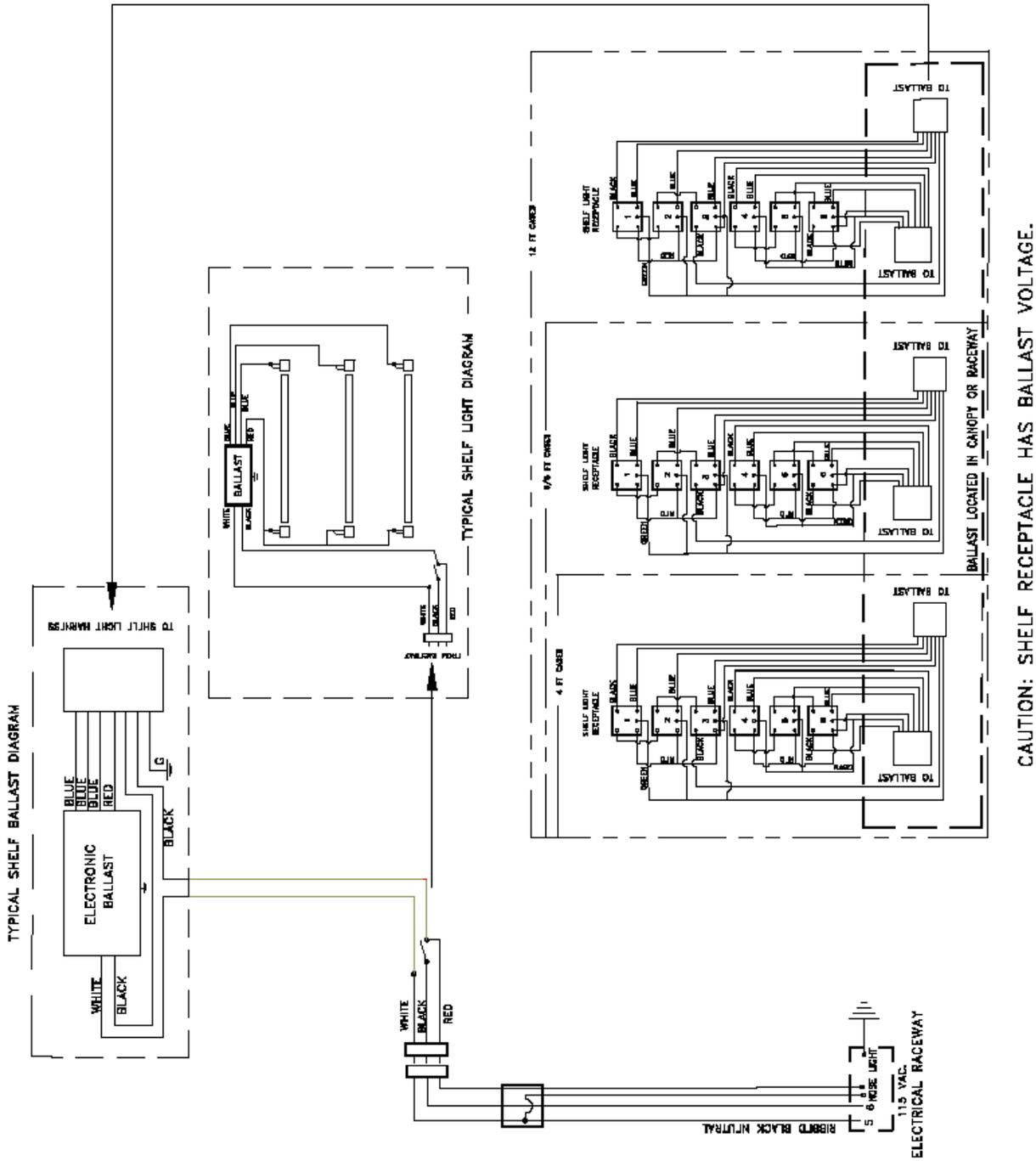
**Note:** The shelf light harness has power interruption circuit and ALL shelves must be plugged in correctly before any shelf lights will work. The **shelf plugs** are now located on the right side of each back panel. (See picture below).



**WARNING! Always disconnect the electrical power at the main disconnect when servicing or replacing any electrical component. This includes, but is not limited to, such items as fans, heaters, thermostats and light bulbs. Failure to disconnect the electrical power may result in personal injury or death.**

# Wiring Diagram

Both Canopy and Raceway



# Electrical Termination

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All electrical connections are made in the electrical raceway.

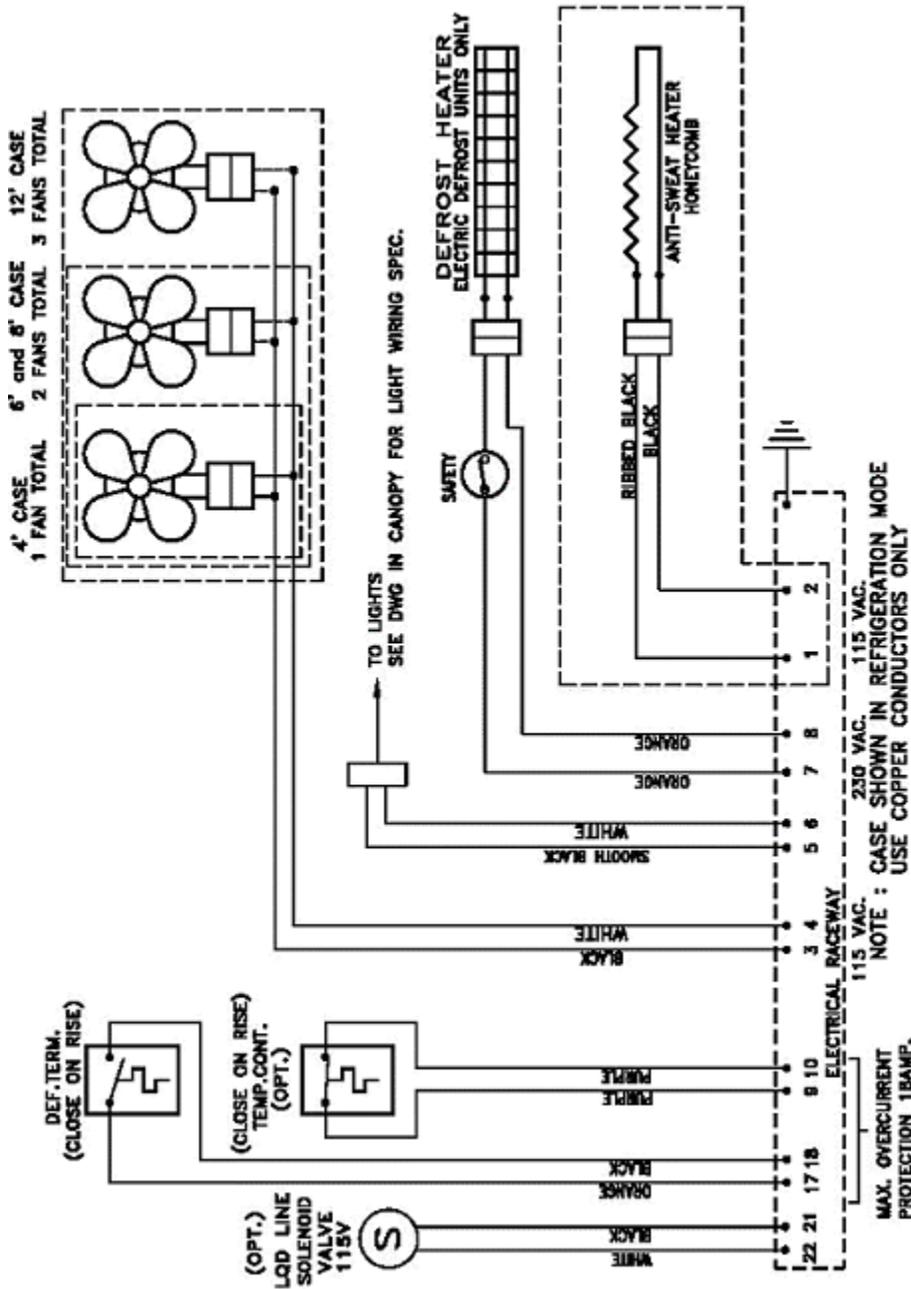


The wires are clearly identified for termination purposes as follows:

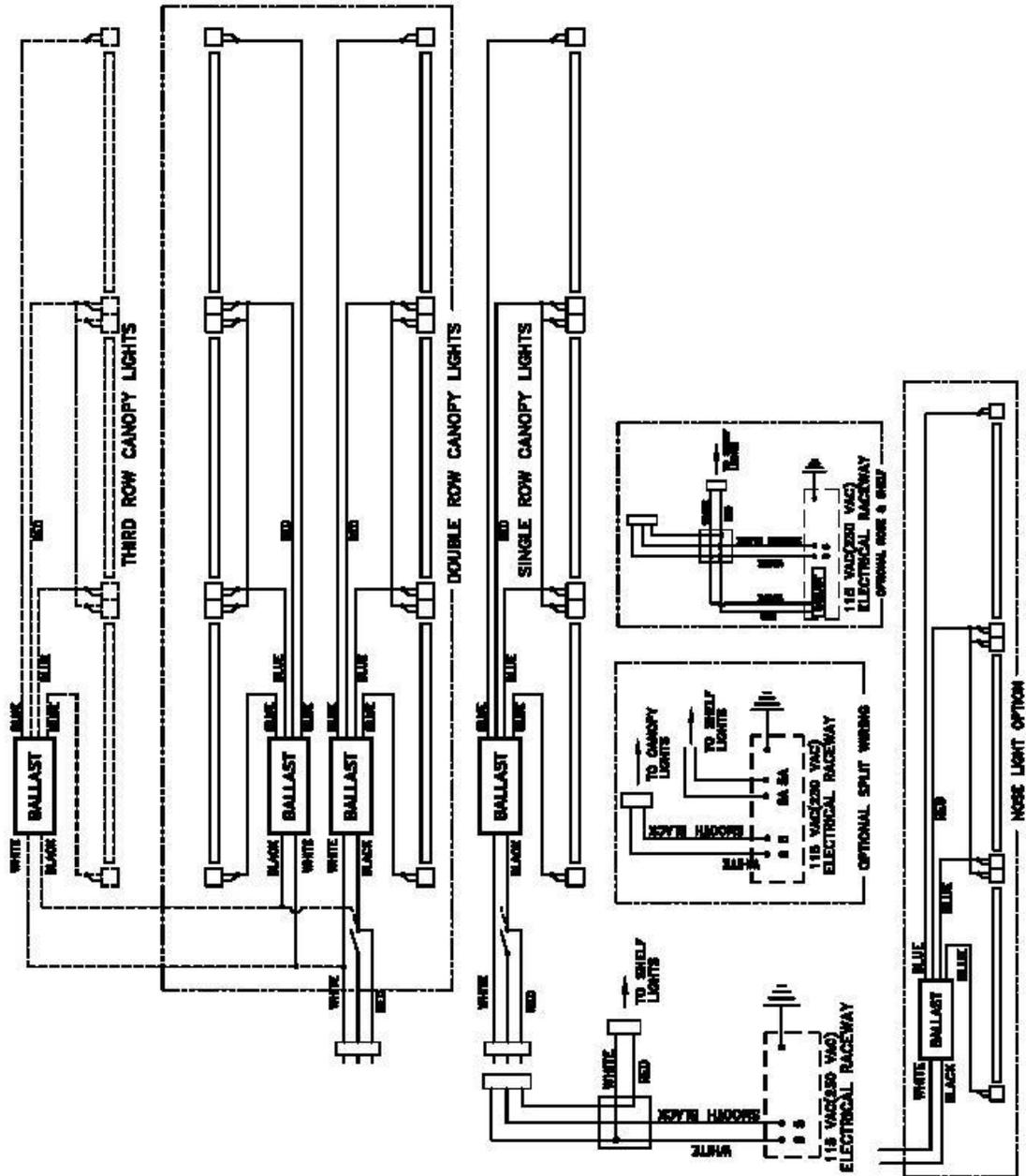
<b>Component</b>	<b>Wire Number</b>
Anti-Sweat Heater	1 and 2
Refrigerator Fan Motors and Drain Heater	3 and 4
Lighting Circuit	5 and 6
Defrost Heaters	7 and 8
Temperature Control	9 and 10
Dual Temperature	15 and 16
Defrost Termination Control	17 and 18

# Wiring Diagram

## OFF CYCLE DEFROST AND ELECTRIC DEFROST



CANOPY ONE (1) AND TWO (2) LIGHT ROWS AND NOSE LIGHT

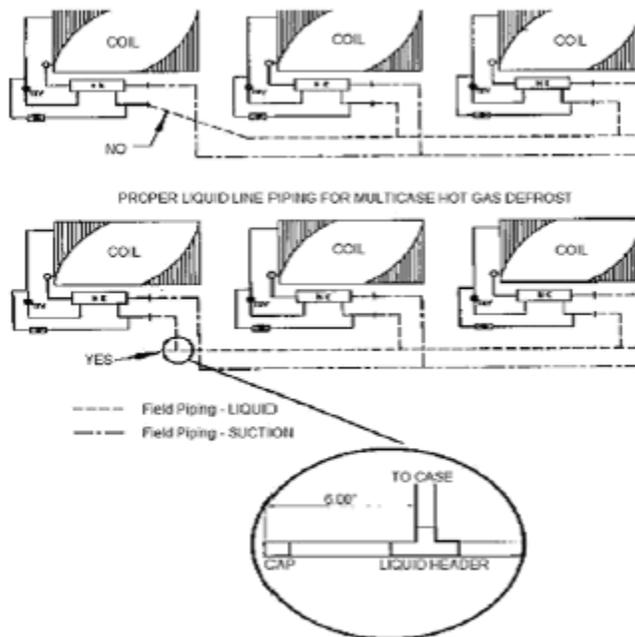


# Refrigeration Piping and Dehydration

## Opening a Ferrule Hole

The refrigeration lines are located under the deck pans. A refrigeration outlet is provided in the front right hand end of the cases. All refrigeration lines need to be as close to the drain pan as possible so as not to obstruct the air pattern or block the deck pans.

## Recommended Piping Instructions



1. Proper size refrigeration lines are essential to good refrigeration performance. Suction lines are more critical than liquid or discharge lines. Oversized suction lines may prevent good oil return to the compressor. Undersized lines can rob refrigeration capacity and increase operating cost. Consult the technical manual or legend sheet for proper line sizes.
2. Refrigeration lines in cases in line-ups can be reduced. However, the lines should be no smaller than the main trunk lines in at least 1/3 of the cases and no smaller than one size above the case lines to the last case. Reductions should not exceed one line size per case. It is preferred to bring the main trunk lines in at the center of line-up. Liquid lines on systems on hot gas defrost must be increased one line size above the main trunk line for the entire line-up. Individual feed lines should be at the bottom of the liquid header. (See proper liquid line piping diagram.)
3. Do not run refrigeration lines from one system through cases on another system.

4. Use dry nitrogen in lines during brazing to prevent scaling and oxidation.
5. Insulate suction lines from the cases to the compressor with 3/4" wall thickness foam on low temperature cases to provide maximum of 65-degree super heated gas back to the compressor and prevent condensation in exposed areas. Insulate suction lines on medium temperature cases with 1/2" thick insulation in exposed areas to prevent condensate drop-off.
6. Suction and liquid lines should never be taped or soldered together. Adequate heat exchanger is provided in the case. Kysor/Warren recommends use of heat exchanger in all medium and low temperature case that are not mechanically sub-cooled for proper operation.
7. Refrigeration lines should never be placed in the ground unless they are protected against moisture and electrolysis attack.
8. Always slope suction lines down toward the compressor, 2" each 10'. Do not leave dips in the line that would trap oil.
9. Provide P traps at the bottom of suction line risers, 4' or longer. Use a double P trap for each 20' of risers. P traps should be the same size as the horizontal line. Consult the technical manual or legend sheet for proper size risers.
10. Use long radius ells and avoid 45 degree ells.
11. Provide expansion loops in suction lines on systems on hot gas defrost. An expansion loop is required for each 100' of straight run.
12. Strap and support tubing to prevent excessive line vibration and noise.
13. Brazing of copper to copper should be with a minimum of 10% silver. Copper to brass or copper to steel should be with 45% silver.
14. Do not use bullhead tees in suction lines. An example is where suction gas enters both ends of the tee and exits the center. This can cause a substantial increase in pressure drop in the suction lines.
15. When connecting more than one suction line to a main trunk line, connect each branch with an inverted trap.

#### Suction line:

- a) Pitch in direction of flow.
- b) Suction lines should enter at the top of the branch line.

May be reduced by one size at one third of case run load and after the second third. DO NOT reduce below the case suction line size.

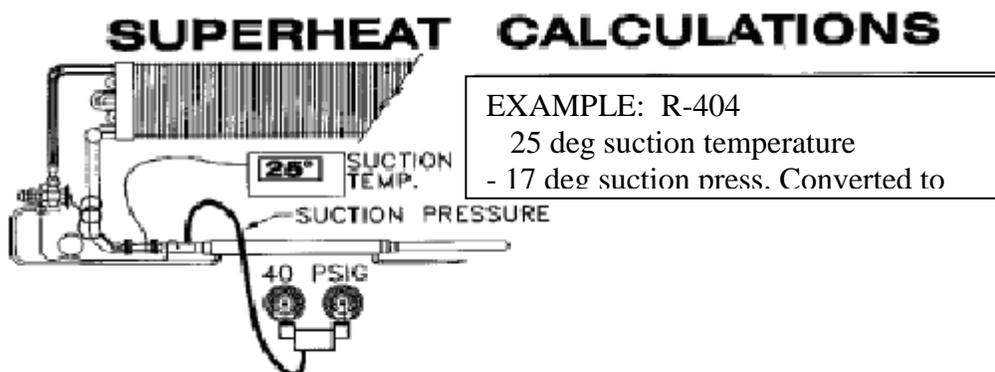
## Expansion Valve and Superheat



**Caution:** During service of this equipment, precautions should be taken to prevent loss of refrigerant to the atmosphere. Always install the expansion valve stem cap after making valve adjustments.

The expansion valve furnished with your case has been sized for maximum coil efficiency. To adjust superheat, perform the following:

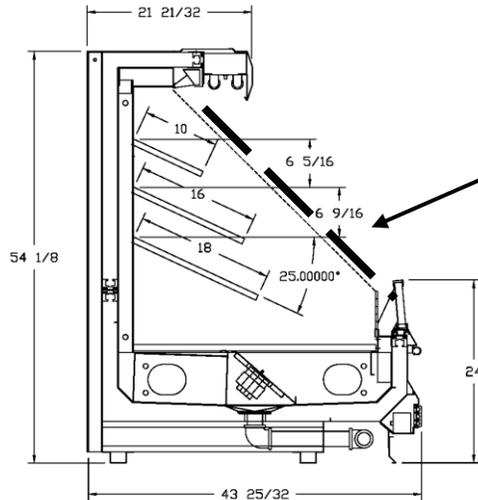
1. Place a thermocouple near the expansion valve bulb. Read the suction line pressure as near coil as possible. (If at the condensing case, estimate suction line loss at 2 PSIG).
2. Convert coil suction pressure to temperature. The difference between coil temperature and the thermocouple temperature is superheat. (Use average superheat when expansion valve is hunting).
3. Do not set superheat until cases have pulled down to operating temperature and never open or close the valve over  $\frac{1}{4}$  turn between adjustments and allow 10 minutes or more between adjustments.
4. Superheat should be set to 6-8°F.
5. After the initial setting, the superheat should be rechecked when product is stocked and at designed temperature.



# Operation

## Loading

Merchandise should not be placed in the fixture until all controls have been adjusted and the case is at the proper temperature. **AT NO TIME SHOULD THE CASE BE STOCKED BEYOND THE LOAD LINE OR OVER THE FRONT EDGE OF ADJUSTABLE SHELVES.**



All cases have load limit line markings. Product must be kept within the load limit line for cases to function properly.

Do not place product in cases until it is at proper operating temperature. Air discharge and return flues must remain open and free of debris or obstruction at all times to provide proper refrigeration and air current performance. Do not allow any product, signs, debris, etc. to block these grilles. Do not use any non-approved shelving, display racks or any accessory that could hamper air current performance.



**Warning! Do not walk on top of the cases!** This could result in damage to the case and serious personal injury could occur. These cases are not designed to support excessive external weight. Do not use top of cases for storage.

## Normal Operation

1. Off-Cycle Defrost is standard on these models. The fans run continuously and defrost termination is by termination Klixon.
2. Electric Defrost Models are optional. Electric heaters are utilized to melt the frost and ice on the coil. The heaters are located in the air stream in front of the coil. The defrost cycle is time initiated and should be temperature terminated. Case fans operate continuously in defrost and refrigeration. As a safety precaution, a safety cutoff Klixon is wired in series with the defrost heater to turn the heater off at temperatures above 70°F.

3. Hot Gas Defrost Models (optional for parallel compressor operation only) hot gas is routed through the suction line and evaporator coil. It exits the coil through a by-pass around the expansion valve and heat exchanger to return to the liquid line where the condensed liquid is used to feed the other cases on the same parallel case. The case fans continue to operate during defrost to warm up the drain pan and air ducts. The defrost cycle is time initiated and should be temperature terminated. (See case data information)
4. Single Condensing Case Systems – A thermostat should be used to control case temperatures. The thermostat bulb should be mounted in the discharge air (see case data if your case is a single condensing case system).

## Cleaning

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As a general rule, always use mild soap and water to wipe the case down. Special precautions must be taken when cleaning some components of the case.

*Exterior surfaces* should be cleaned with warm water and mild soap to protect and maintain the finish. **Do not use cleaners containing abrasive materials or ammonia, which will scratch or dull the finish.** The waste outlet should be flushed with water following each cleaning.

*Interior surfaces* may be cleaned with most mild soap formulas, ammonia based cleaners and sanitizing solutions with no harm to the surface.



**WARNING! Always shut power off during the cleaning process. Cleaning the case with electrical power applied is a shock hazard that may cause serious injury or death.**



**WARNING! DO NOT USE HOT water on COLD glass surfaces. This could cause the glass to shatter and could result in personal injury. Glass fronts and ends should be warm before applying hot water.**



**Caution:** The following could damage the case:

Do not use solvent, oil or acidic-based cleaners on any interior surfaces as the surface may become damaged.

Do not use abrasive cleaners and scouring pads, as these will mar the finish.

Never introduce water into the case faster than the waste outlet can release it.

**DO NOT USE STEAM OR HIGH PRESSURE SYSTEMS TO CLEAN THE CASE AS SEALS MAY BE BROKEN WHICH WILL CAUSE THE CASE TO LEAK.**

## Shelves

Do not use a hose or submerge shelves in water. When cleaning lighted shelves, wipe down with a wet sponge or cloth so that water does not enter the light rails.

## Mirrors

Mirrors are sheets of clear glass that have a very thin reflective coating applied to one side. These coatings are susceptible to deterioration if certain

cleaning solutions and even water are allowed to come in contact with them. Every precaution should be made to keep liquids away from the coated side of the mirrors. If liquids are allowed to flow along the face side of the mirror to its edge, the liquid can seep between the coating and the glass, causing serious damage.

To help prolong the life of the mirrors:

- Use only mild cleaning solutions (Windex, Solox, or a weak solution of vinegar and water.)
- Do NOT spray liquids on mirrors. Dampen the cleaning cloth, and then use the cloth to wipe the mirror.
- Wipe water from the mirrors immediately to prevent difficult to remove water spots and also to prevent the water from reaching the mirrors edge.
- Never use dirty cloths, scrapers or any other abrasive materials for cleaning.

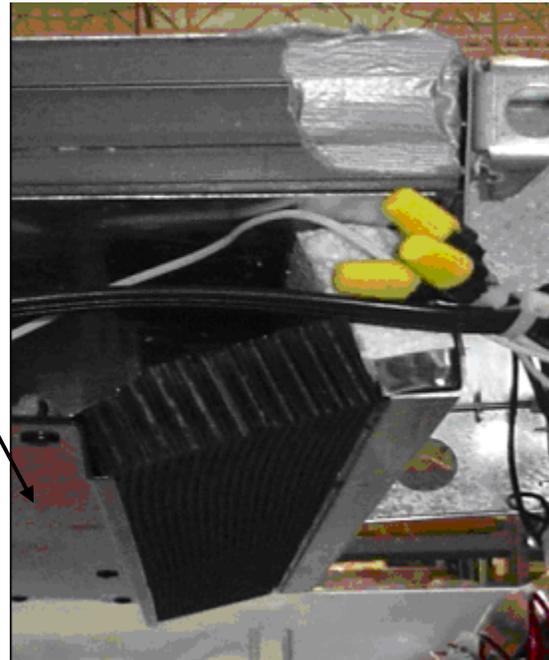
### Honeycomb Assembly

The honeycomb should be cleaned every 6-8 months, depending on store conditions. The honeycomb may be cleaned with a vacuum cleaner or removed to be washed with soap and water. The honeycomb must be completely dry before returning it to the case.

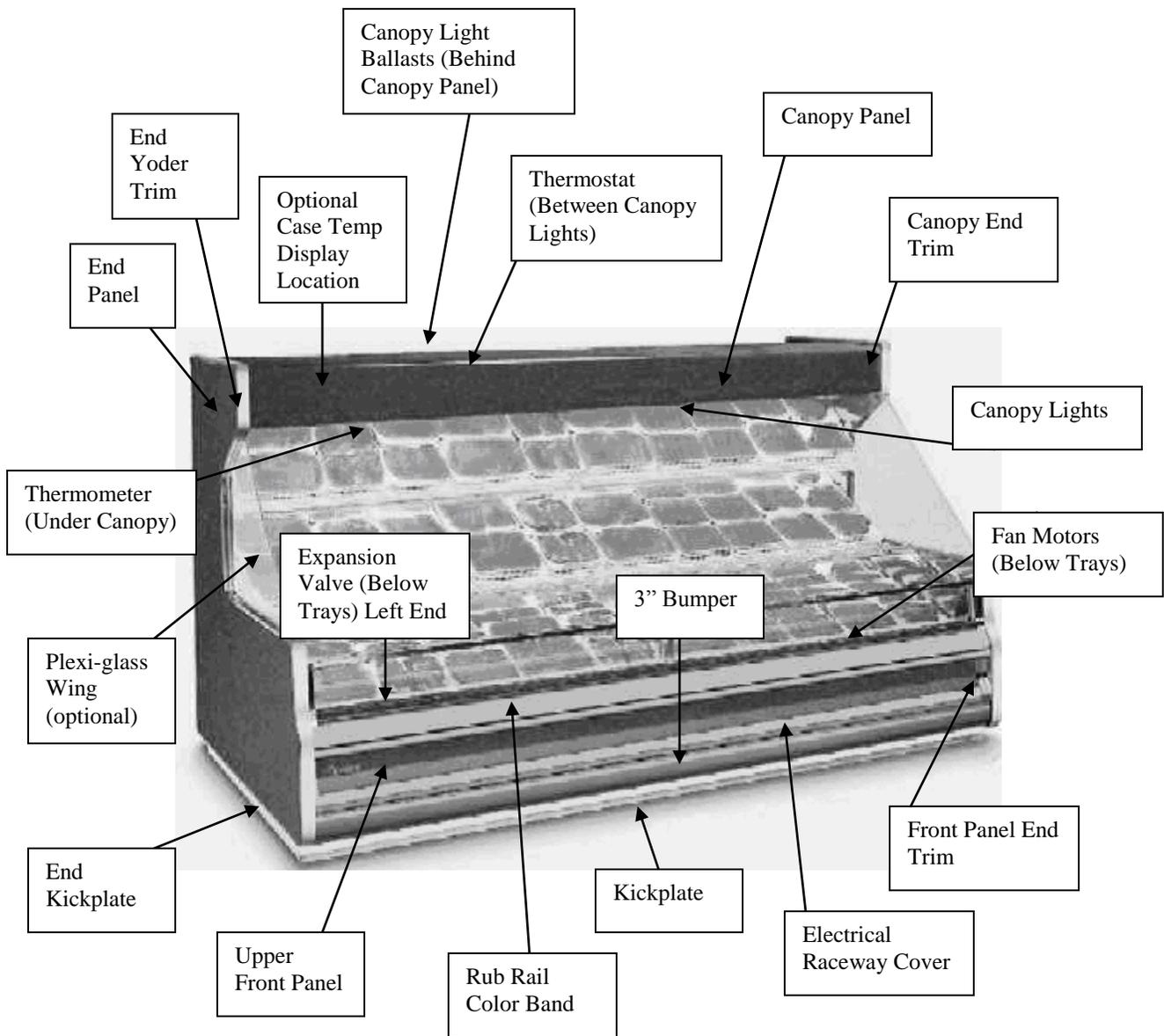
To remove honeycomb from case, take out screws located here.



Note the position and angle of the honeycomb when removing from the case. Honeycomb must be replaced at the same angle.



## Parts List And Drawings



Note: Standard parts are provided in the parts lists. Cases may be equipped with specialty parts that were incorporated into the case(s) at the time they were manufactured. It is important to have the case serial number when contacting Kysor/Warren for replacement parts.

## Parts List

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Description	Part No.	Quantity			
		4'	6'	8'	12'
Fan Motor STD 6W 115V	09A10040	1	2	2	3
Fan Motor PSC 6W 115V	09A10097	1	2	2	3
Fan Blade (8"- 18 Deg)	09B10072	1			
Fan Blade (8"- 15 Deg)	09B10056		2		
Fan Blade (8"- 18 Deg)	09B10072			2	
Fan Blade (8"- 18 Deg)	09B10072				3
Honeycomb-White	62G15074	1		2	3
Honeycomb-White	62G15076		1		
Honeycomb-Black	62G15075	1		2	3
Honeycomb-Black	62G15077		1		
Fan Bracket STD	54V11870	1	2	2	3
Fan Bracket PSC	54V11869	1	2	2	3
Deck Pan	54N18-314	2	3	4	6
External Drain Trap	60N11-048	1	1	1	1
Defrost Control (Hot Gas/Electric/Off Cycle)	08A11-027	1	1	1	1
Electric Defrost Safety	08A11-050	1	1	1	1
Plexiglass Wing	13A10694	2			



Note: Standard parts are provided in the parts lists. Cases may be equipped with specialty parts that were incorporated into the case(s) at the time they were manufactured. It is important to have the case serial number when contacting Kysor/Warren for replacement parts.

## **Warranty**

IN THE CONSTANT EFFORT TO IMPROVE OUR PRODUCTS, WE RESERVE THE RIGHT TO CHANGE AT ANY TIME SPECIFICATIONS, DESIGN, OR PRICES WITHOUT INCURRING OBLIGATION.

### **One-Year Warranty**

KYSOR/WARREN warrants to the original purchaser this new equipment and all parts thereof, to be free from defects in material and workmanship under normal use and service. If any part or parts of the equipment should prove defective during the period of one year from installation date (not to exceed one year and thirty days from the date of original shipment from the factory), KYSOR/WARREN hereby guarantees to replace or repair, without charge (F.O.B. Columbus, Georgia), such part or parts as proven defective, and which KYSOR/WARREN'S examination disclosed to its satisfaction to be thus defective, with a new or functionally operative part. The liability of KYSOR/WARREN under this warranty shall be limited to claims made by the original purchaser to KYSOR/WARREN or its local distributor within the warranty period.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED OR STATUTORY, INCLUDING, BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR FITNESS, AND ALL OTHER OBLIGATIONS OR LIABILITIES OF KYSOR/WARREN.

#### **I. GLAZING:**

Glass is not guaranteed against breakage. If this refrigerator is equipped with a glazing assembly carrying the manufacturer's brand name (Thermopane, Twindow, etc.), the manufacturer's glazing warranty in effect at the time of this shipment is extended to that assembly. It is void outside the continental United States.

#### **II. BULBS:**

Light bulbs and fluorescent lamp tubes are not covered by any warranty for length of life or for any type of breakage.

#### **III. THIS WARRANTY SHALL NOT APPLY:**

1. To the condensing case used with refrigerated equipment unless it was sold and shipped by KYSOR/WARREN.
2. When this equipment or any part thereof is damaged by fire, flood, act of God, or when the original model and serial number plate has been altered, defaced, or removed.
3. When this equipment or any part thereof is subject to accident, alteration, abuse, misuse, tampering, operation on low or improper voltages, or is put to a use other than recommended by KYSOR/WARREN.
4. When this equipment or any part thereof is damaged, or when operation is impaired, due to failure to follow installation manual (improper installation is the responsibility of the installer).

5. Outside the continental United States, Canada and Mexico.
6. To labor cost for replacement of parts, or for freight or shipping expenses.
7. To freight or shipping charges or to customs duties to any country.
8. If the Warranty holder fails to comply with all the provisions, terms and conditions of this Warranty.

Parts replaced under this Warranty are warranted only through the remainder of the original Warranty. KYSOR/WARREN may, at its option and in its discretion, elect to honor this Warranty and to disregard the original purchaser's non-compliance with any of the provisions, terms and conditions of the Warranty.

**THIS WARRANTY DOES NOT COVER CONSEQUENTIAL DAMAGES.**  
KYSOR/WARREN shall not be liable under any circumstances for any consequential damages, including loss of profits, additional labor costs, loss of refrigerant or food products, or injury to person or property caused by defective material or parts or for any delay in the performance of this Warranty due to causes beyond its control. The foregoing shall constitute the sole and exclusive remedy of any purchase and the sole and exclusive liability of KYSOR/WARREN in connection with this product.

### **Parts Warranty Policy**

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The following procedures are in accordance with Kysor/Warren's standard one-year warranty, which covers any part to be free of defects under normal use and service for one year from the date of installation. **Not to exceed one year and thirty days from the date of original shipment from the factory.**

### **New Equipment Parts Shortages and Defects**

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Any parts shortages or damage must be reported to Kysor/Warren no more than 10 working days from the date of delivery. After this time has expired Kysor/Warren will assume the parts were lost during installation and all parts required will be charged cost plus shipping to replace.

### **Parts Ordering Procedure**

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All parts must be ordered through the Kysor/Warren parts department with the following information:

- Store Name and Number
- Location
- Case or Case Model and Serial Number
- Firm or Contractor Placing Order
- Shipping Address
- Parts Description
- Reason for Defect

If the order is for a replacement part still in warranty a Purchase Order Number will be required from the contractor placing the order. We will then issue a Return Material Authorization Tag (RMA) that will be sent to the firm or contractor who has ordered the part.

## **Return Authorization Procedure**

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Warranty parts must be returned postage prepaid to Kysor/Warren within 30 days from replacement part ship date and must be accompanied by a RMA in order to ensure the proper credit. The RMA should also be written on the outside of the box. Any parts not returned within 30 days will be invoiced to the firm or contractor who has placed the order.

IN THE CONSTANT EFFORT TO IMPROVE OUR PRODUCTS, WE RESERVE THE RIGHT TO CHANGE AT ANYTIME SPECIFICATIONS, DESIGN, OR PRICES WITHOUT INCURRING OBLIGATION.

KYSOR/WARREN  
5201 Transport Boulevard  
Columbus, Georgia 31907  
706-568-1514





5201 Transport Boulevard  
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706-568-1514

Telephone: 1-800-866-5596  
Email: [solutions@kysorwarren.com](mailto:solutions@kysorwarren.com)  
Website: <http://www.kysorwarren.com/>

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