



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

INSTALLATION & OPERATION MANUAL



HQD6, HQD6L, (Q)D6(1)(3), D6L(1)(3), (Q)D6H(1)(3), D6R(1)(3), D6RL(1)(3), D6RLG(1)(3),
D6N(1)(3)



IMPORTANT – KEEP IN STORE FOR FUTURE USE

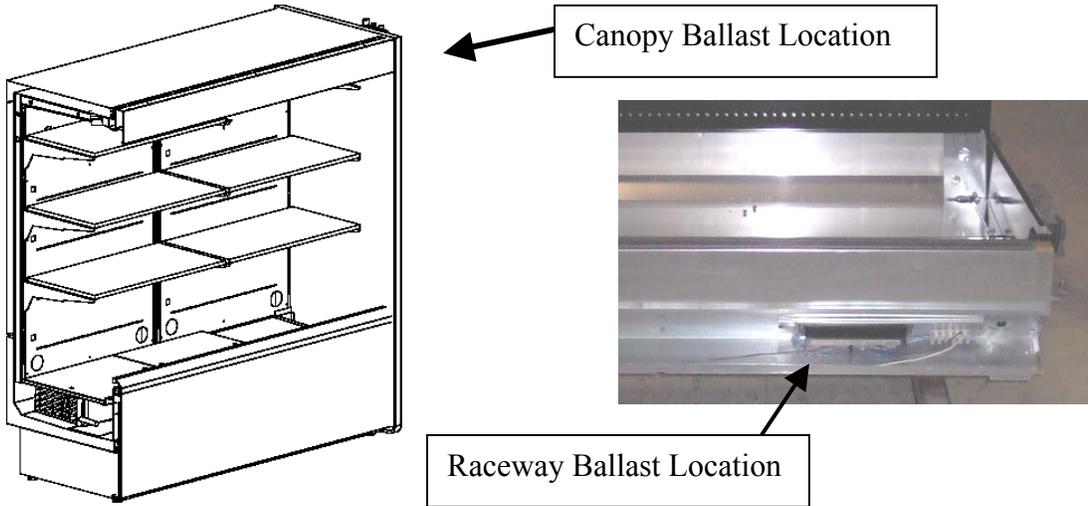


INSTALLATION & OPERATION MANUAL ADDENDUM BALLAST RELOCATION

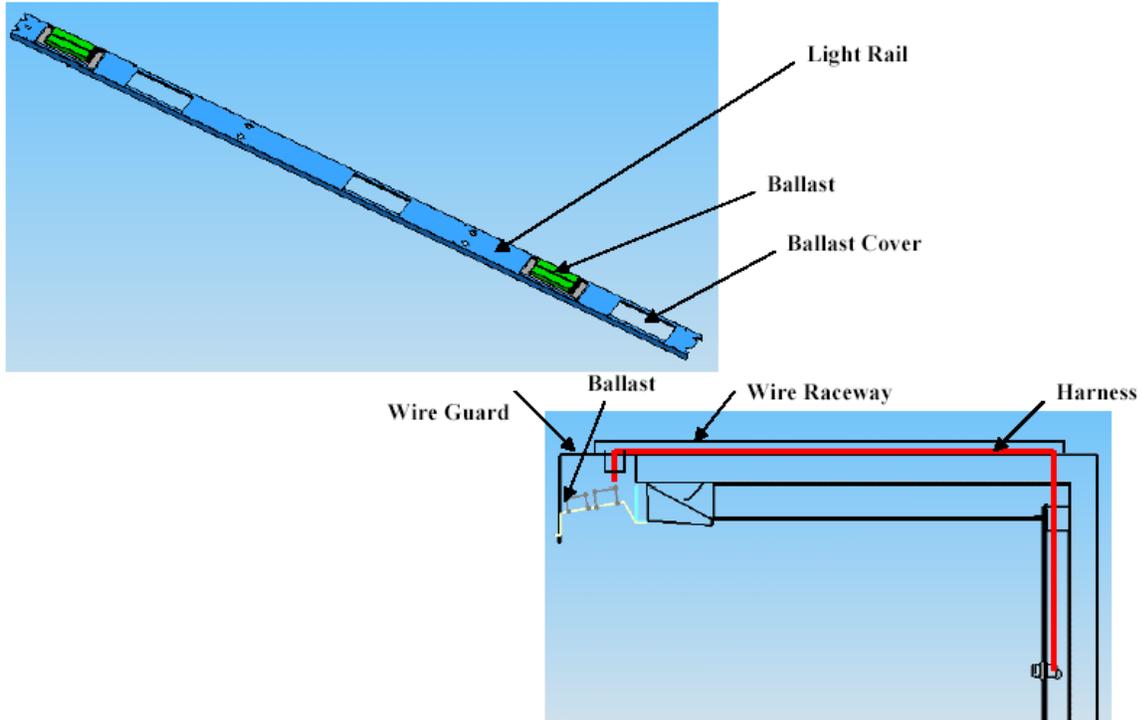
The ballast for this case has been relocated as of January 09, 2006. The advantage of the new location allows for more shelf space and lowers the BTU. The information we have placed in this addendum is for the shelf light ballast only. For any other information, refer to the manual or contact our office at 1-800-866-5596.

Ballast Location/Connections

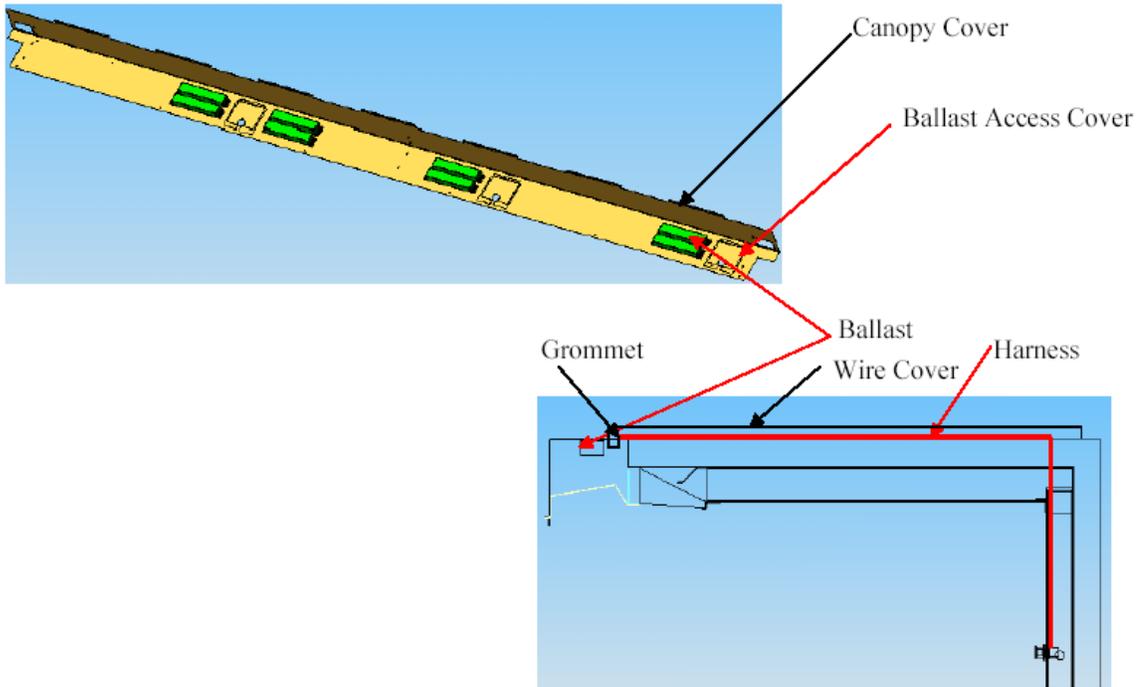
Ballasts are located in canopy or the raceway. See wiring diagram for layout.



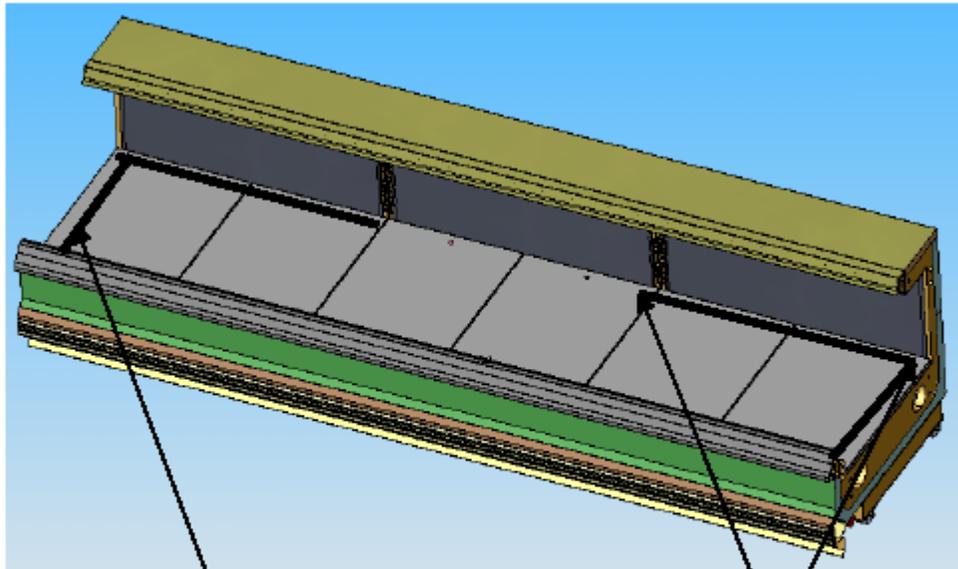
Remote Ballast Location (Welded-Canopy)



Remote Ballast Location (Drop-Down Canopy)



Remote Ballast Location (Canopyless Cases):



Left 4' Section

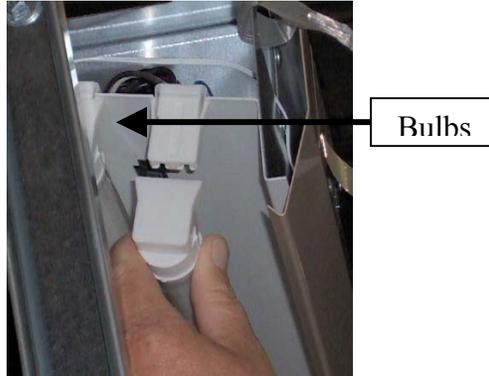
Wiring to Left side of Raceway

Middle & Right 4' Section

Wiring to Right side of Raceway



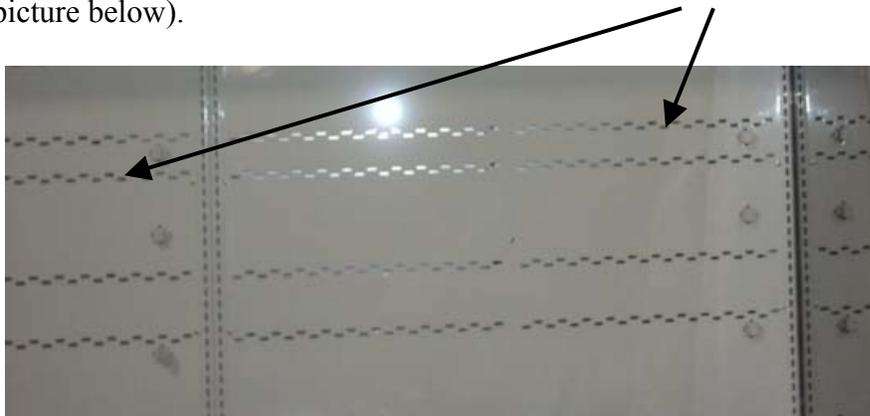
WARNING! It is imperative that the pins of the bulbs and the shelf power cords be completely seated in their respective lamp holder or receptacle (see pictures below). If they are not completely seated, an electrical arc could occur which will cause the lamp holders to melt and become an electrical hazard.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



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



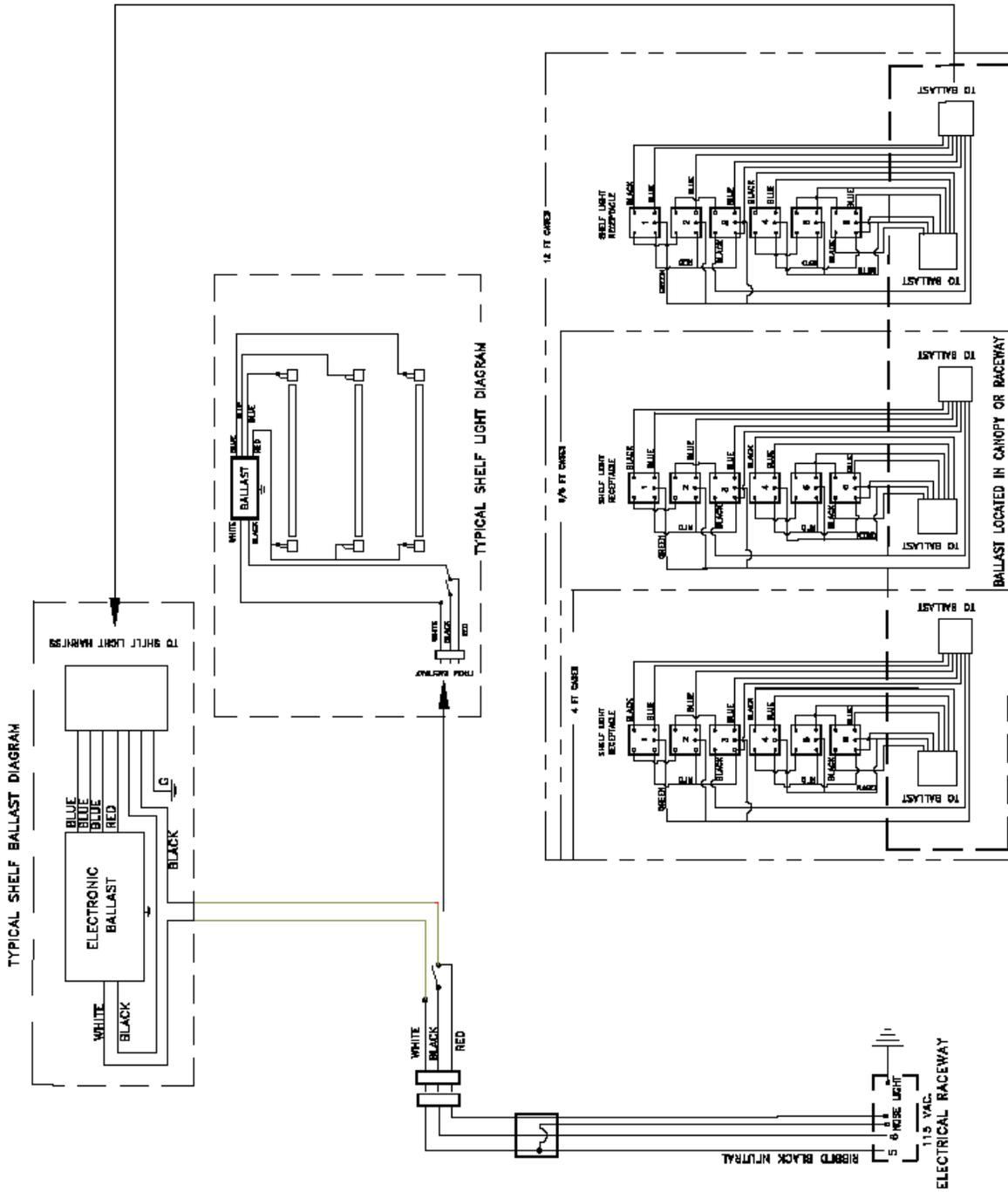
Note: The shelf light harness has power interruption circuit and ALL shelves must be plugged in correctly before any shelf lights will work. The **shelf plugs** are now located on the right side of each back panel. (See picture below).



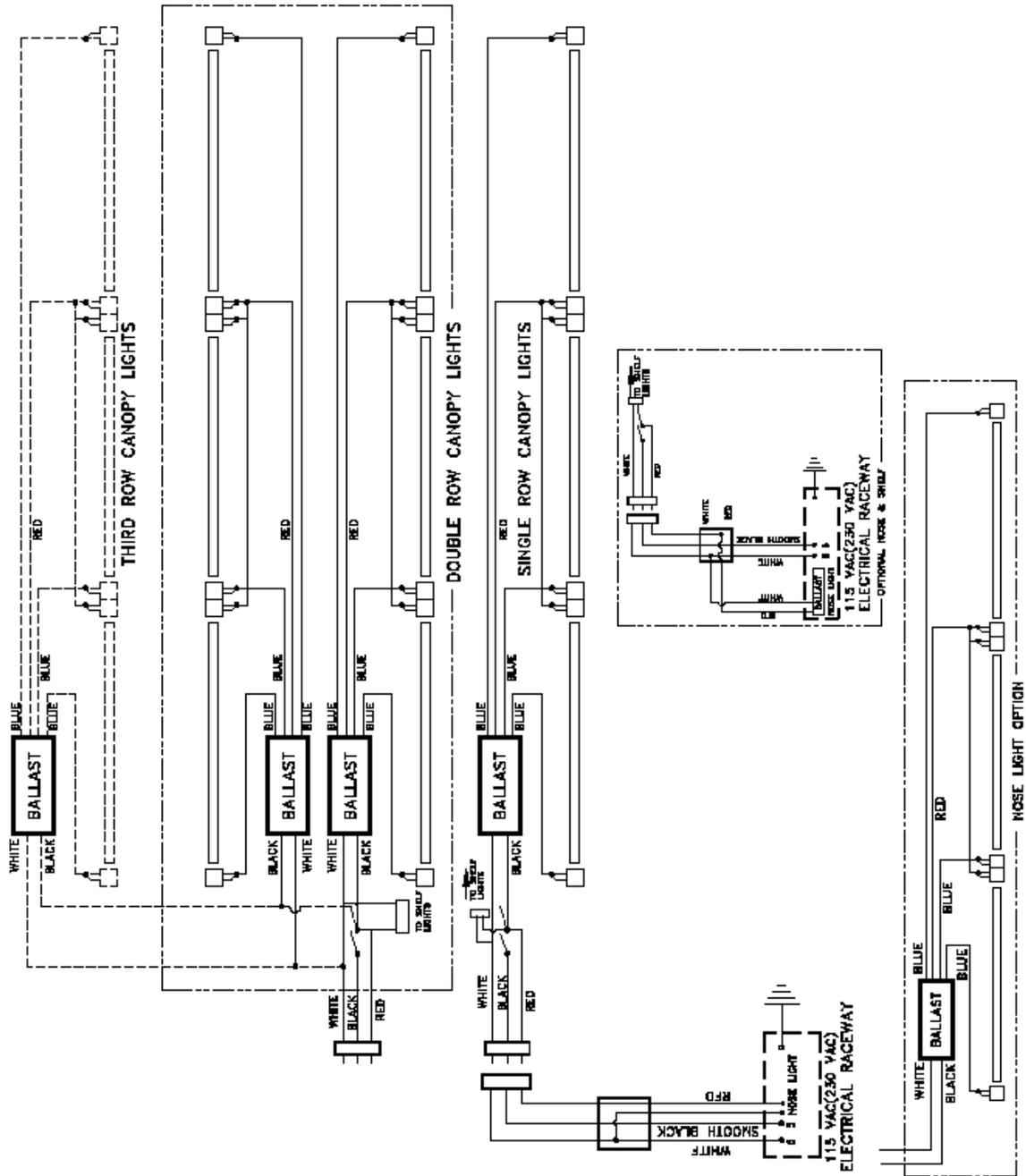
WARNING! Always disconnect the electrical power at the main disconnect when servicing or replacing any electrical component. This includes, but is not limited to, such items as fans, heaters, thermostats and light bulbs. Failure to disconnect the electrical power may result in personal injury or death.

Wiring Diagram

Both Canopy and Raceway



Wiring Diagram for Canopy Light



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 multi-shelf self service dairy cases are designed to merchandise packaged dairy/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.

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

Icon Key

	Caution
	Special Note
	Warning

Case Description

Model	Description
HQD6	High energy efficient front load dairy case.
HQD6L	High energy efficient front load dairy case.
D6L(1)(3)	Front load dairy case, Front height 19.5", Standard (4) adjustable shelves 20", 22"
*(Q)D6(1)(3)	Front load dairy case, Front height 23.75", Standard (4) adjustable shelves 20", 22", 24"
*(Q)D6H(1)(3)	Front load dairy case, Front height 28.25", Standard (4) adjustable shelves 20", 22", 24"
**D6R(1)(3)	Rear load dairy case, Front height 23.75", Standard (4) adjustable shelves 20", 22"
**D6RL(1)(3)	Rear load dairy case, Front height 19.5", Standard (4) adjustable shelves 20", 22"
**D6RLG(1)(3)	Rear load dairy case with glass front, Front height 19.5" plus glass height, Standard (4) adjustable shelves 20", 22"
**D6N(1)(3)	Front load dairy case, Front height 38.25", Standard (5) adjustable shelves 10", 12", 14", 16", 18"

* These models may be used for deli (processed meats) with proper BTU capacity and Kysor//Warren special hook-a-pack systems are used or 18" and 20" shelves are used above a hook-a-pack system supplied by others.

** All rear load dairy cases must be installed in a wall of a walk-in cooler where the ambient temperature is less than 40° F. These cases are not intended to operate as free standing models.

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 provided the correct expansion valve is equipped with the case when ordered (i.e., R404A required for the end user requires specifying the correct expansion valve for R404A refrigerant when the order is placed). 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.



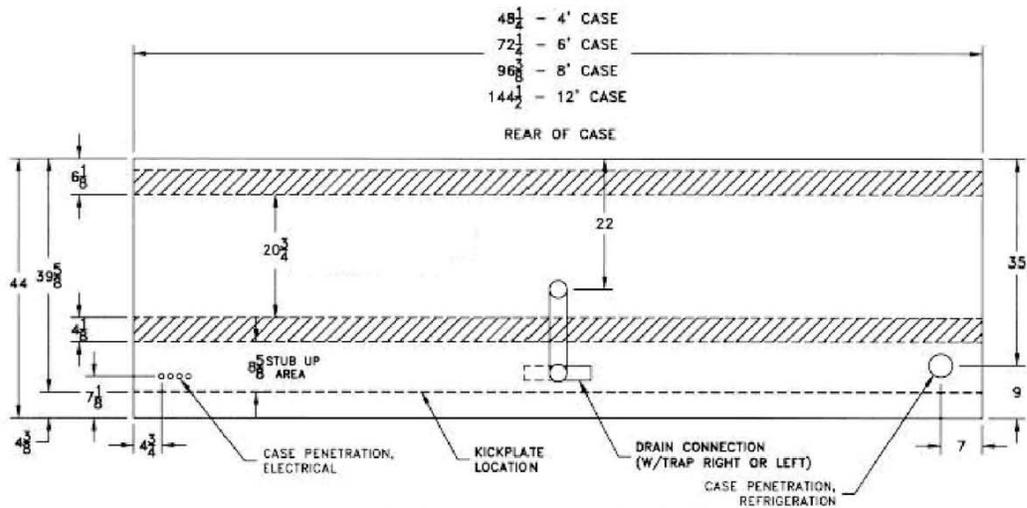
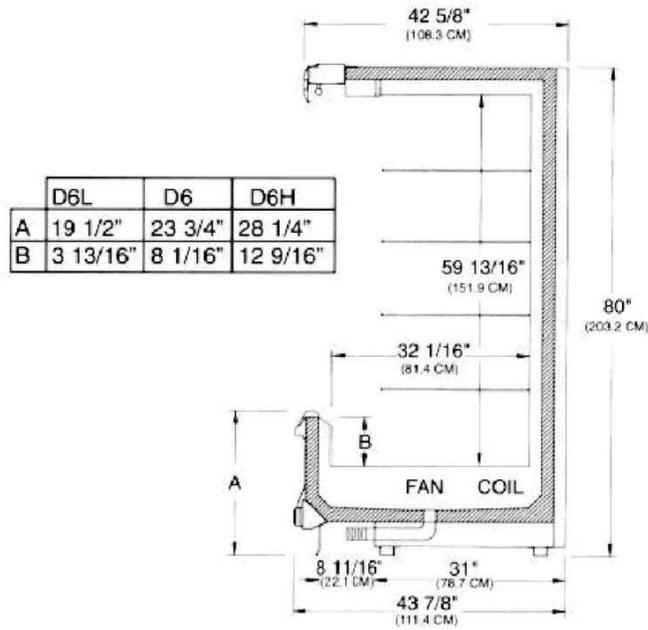
NOTE: *Refer to Case Data Control Settings for refrigeration requirements.*

Heat Exchangers

Heat exchangers are standard in some models, optional in other models, and are not needed if mechanical sub-cooling is incorporated in the system design. They are an aid to increasing operating efficiency and reducing frosting and flood-back to the compressor.

Plan Views and Cross Sections

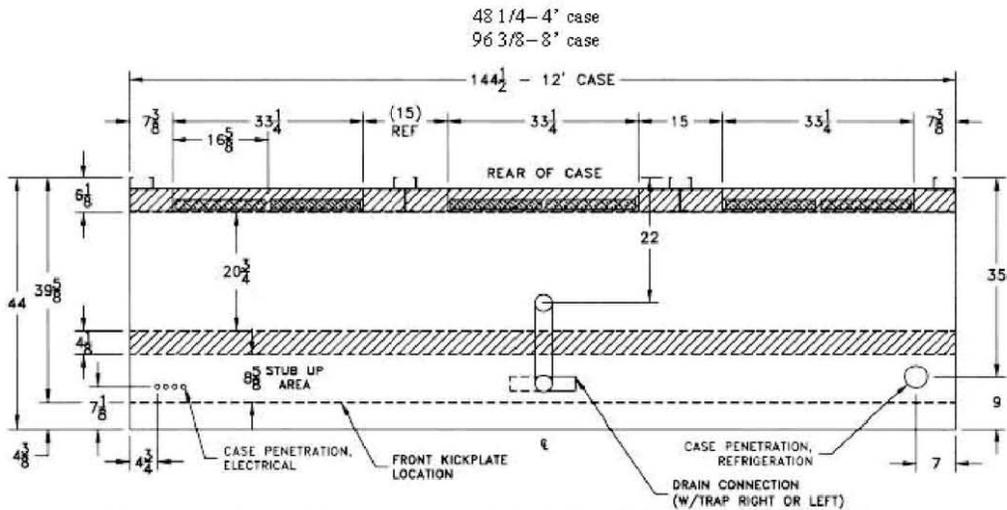
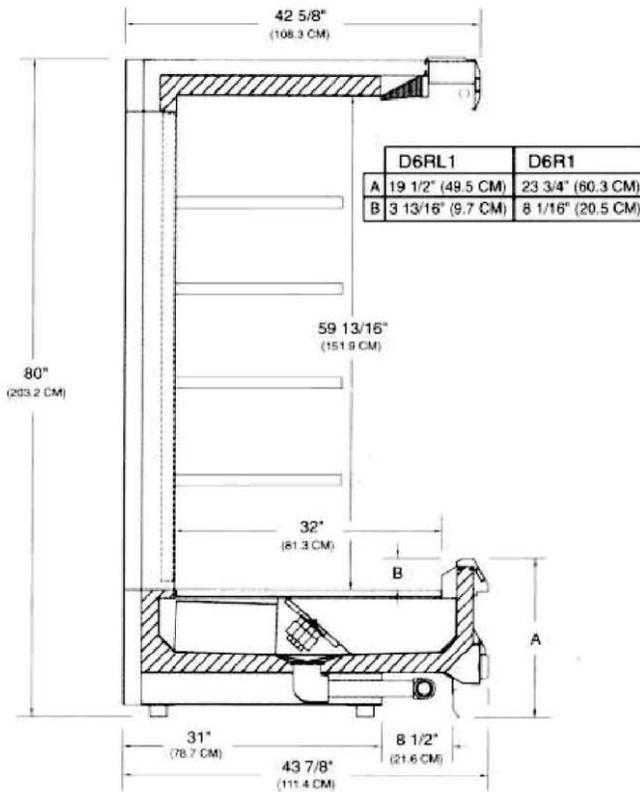
D6L, D6, D6H



Drawings shown are for case dimensions only. Refer to drawings in the "Technical Info" section for Engineering data.
 Type I refrigerator, intended for use in an area where the environmental conditions are controlled and maintained such that conditions do not exceed 75 deg F and 55% relative humidity.
 Fixtures shown may contain options and accessories at additional cost.
 Kysor/Warren, whose policy is one of continuous improvement, reserves the right to change at any time, specifications, design or prices without incurring obligation.
 Dual-Jet and Air Defrost are registered trademarks of Kysor/Warren.

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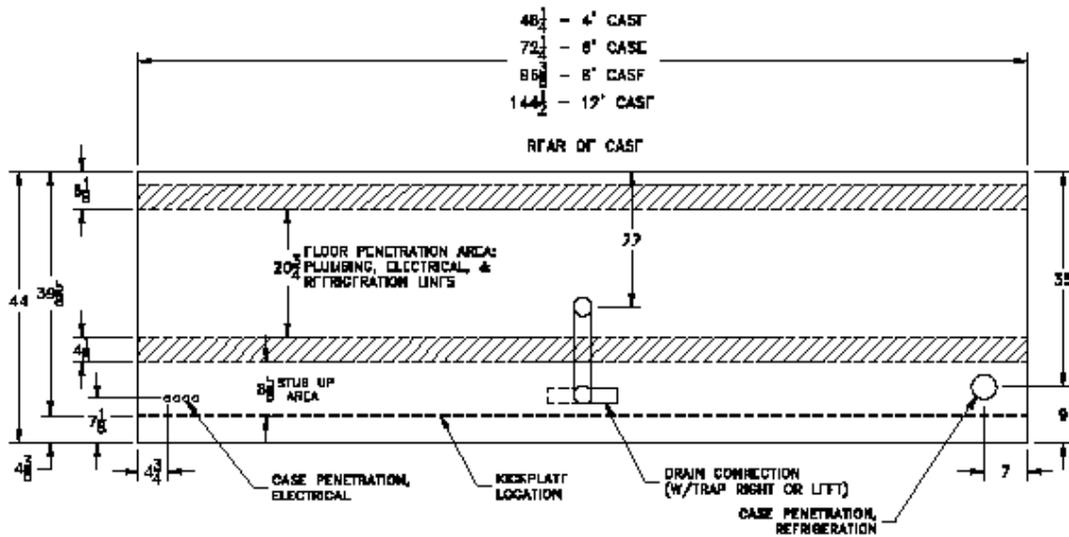
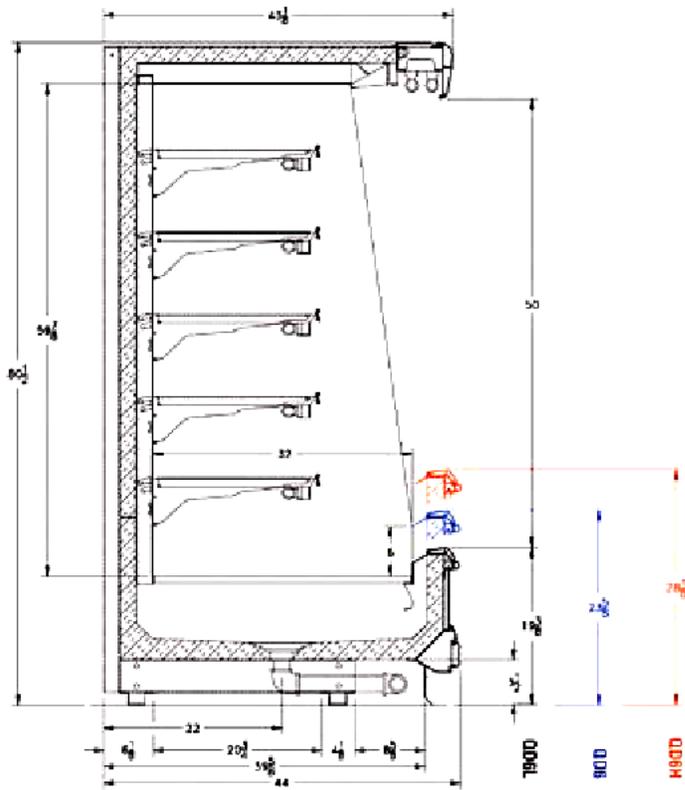
D6RL, D6R



Drawings shown are for case dimensions only. Refer to drawings in the "Technical Info" section for Engineering data.
 Type I refrigerator, intended for use in an area where the environmental conditions are controlled and maintained such that conditions do not exceed 75 deg F and 55% relative humidity.
 Fixtures shown may contain options and accessories at additional cost.
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QD6



Maximum Shelving Size Recommended

Not to exceed 24"

Case Data

HQD6

CASE DATA AMPS	4'	6'	8'	12'
PSC Fan / # Fans	0.37/1	0.52/ 2	0.74/2	1.11/3
ECM Fan / # Fans	0.30/1	0.60/2	0.60/2	0.90/3
T8 Lights (per shells)	0.25	0.22	0.25	0.25
LED Lights (per shelf)	0.11	0.09	0.11	0.11
T8 Lights (Canopy, 1 row)	0.25	0.40	0.50	0.75
LED Lights (Canopy, 1 row)	0.24	0.36	0.48	0.72
T8 Lights (Noselight)	0.25	0.40	0.50	0.75
LED Lights (Noselight)	0.11	0.18	0.22	0.33
All electrical data based on 115V and unlighted shelves.				

DEFROST CONTROLS			
Defrost	Per Day	Fail Safe	Termination
Off Cycle	3	40 min	48°F
Hot gas	3	20 min	48°F

BTUH per FT of Case	
PSC Fan	1260
ECM Fan	1230
Add BTUH per FT of Lighted Shelf	
T8	19
LED	11

CAPACITIES

	4'	6'	8'	12'
Facing Area	16.8 ft ²	25.1 ft ²	33.5 ft ²	50.2 ft ²
Cubic Capacity	47.8 ft ³	71.6 ft ³	95.5 ft ³	143.2 ft ³

Evap Temp	Discharge Air Velocity (1 hr. after Defrost)	Discharge Air Temp
30°F	250 FPM	34°F
Evaporator Temp = 27°F when lighted. Discharge Air Temp = 32°F when lighted.		

HQD6L

CASE DATA AMPS	4'	6'	8'	12'
PSC Fan / # Fans	0.37/1	0.52/ 2	0.74/2	1.11/3
ECM Fan / # Fans	0.30/1	0.60/2	0.60/2	0.90/3
T8 Lights (per shells)	0.25	0.22	0.25	0.25
LED Lights (per shelf)	0.11	0.09	0.11	0.11
T8 Lights (Canopy, 1 row)	0.25	0.40	0.50	0.75
LED Lights (Canopy, 1 row)	0.24	0.36	0.48	0.72
T8 Lights (Noselight)	0.25	0.40	0.50	0.75
LED Lights (Noselight)	0.11	0.18	0.22	0.33
All electrical data based on 115V and unlighted shelves.				

DEFROST CONTROLS			
Defrost	Per Day	Fail Safe	Termination
Off Cycle	3	40 min	48°F
Hot gas	3	20 min	48°F

BTUH per FT of Case	
PSC Fan	1350

ECM Fan	1320
Add BTUH per FT of Lighted Shelf	
T8	19
LED	11

Capacities				
	4'	6'	8'	12'
Facing Area	16.8 ft ²	25.1 ft ²	33.5 ft ²	50.2 ft ²
Cubic Capacity	47.8 ft ³	71.6 ft ³	95.5 ft ³	143.2 ft ³

Evap Temp	Discharge Air Velocity (1 hr. after Defrost)	Discharge Air Temp
30°F	250 FPM	34°F
Evaporator Temp = 27°F when lighted. Discharge Air Temp = 32°F when lighted.		

QD6

CASE DATA AMPS	4'	6'	8'	12'
STD Fan / # of Motors	0.52/1	0.70/1	1.04/2	1.56/3
PSC Fan / # of Motors	0.26/1	0.44/1	0.52/2	0.78/3
ECM Fan / # of Motors	0.25/1	0.40/1	0.50/2	0.75/3
T8 Lights (Canopy, 1 Row)	0.25	0.40	0.50	0.75
T8 Lights (per shelf)	0.25	0.22	0.25	0.25
Electric Defrost (Electric - 230V)	3.30	5.61	7.93	11.54
All electrical data based on 115V and unlighted shelves.				

DEFROST CONTROLS			
Defrost	Per Day	Fail Safe	Termination
Off Cycle	4	30	48°F

Hot gas	4	20	48°F
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BTUH per Ft - Unlighted Shelves	
STD Fan	1300
PSC Fan	1290
ECM Fan	1275
NOTE: For sizing conventional/individual condensing units, add 8% to BTUH load. *For lighted shelves, please add 19 BTUH.	

Evap Temp	Discharge Air Velocity	Discharge Air Temp
+23°F	275 FPM	+31.5°F

CAPACITIES				
	4'	6'	8'	12'
Facing Area (ft ²)	16.8	25.1	33.5	50.2
Cubic Capacity (ft ³)	42.2	63.2	84.3	126.4

(Q)D6 (Q)D6L (Q)D6H

	4 Foot	6 Foot	8 Foot	12 Foot
Cubic Capacity	40.1 cf	60.2 cf	80.2 cf	120.3 cf
#Defrosts/Failsafe (Off-Cycle)	4/40	4/40	4/40	4/40
#Defrosts/Failsafe (Electric) (not on Q)	4/30	4/30	4/30	4/30
#Defrosts/Failsafe (Hot Gas)	4/20	4/20	4/20	4/20
Temp. Termination Hot Gas (all except Q))	+55 °F	+55 °F	+55 °F	+55 °F
Temp. Termination Hot Gas (Q)	+48 °F	+48 °F	+48 °F	+48 °F
Superheat Setting	6-8 °F	6-8 °F	6-8 °F	6-8 °F
Dairy - Discharge Air Temp (all except Q)	28-32 °F	28-32 °F	28-32 °F	28-32 °F
Deli - Discharge Air Temp (all except Q)	24-28 °F	24-28 °F	24-28 °F	24-28 °F
Dairy or Deli - Discharge Air Temp (Q)	30-32 °F	30-32 °F	30-32 °F	30-32 °F

D6N

	8 foot	12 Foot

Cubic Capacity	75.10 cf	112.66 cf
#Defrosts/Failsafe (Off-Cycle)	4/40	4/40
#Defrosts/Failsafe (Electric)	4/30	4/30
#Defrosts/Failsafe (Hot Gas)	4/20	4/20
Temp. Termination Hot Gas (All modes)	+55 °F	+55 °F
Superheat Settings	6-8 °F	6-8 °F
Dairy - Discharge Air Temp	28-32 °F	28-32 °F
Deli - Discharge Air Temp	24-28 °F	24-28 °F

D6R, D6RL, D6RLG

	4 Foot	6 Foot	8 Foot	12 Foot
Cubic Capacity	40.1 cf	60.2 cf	80.2 cf	120.3 cf
#Defrosts/Failsafe (Off-Cycle)	4/40	4/40	4/40	4/40
#Defrosts/Failsafe (Electric)	4/30	4/30	4/30	4/30
#Defrosts/Failsafe (Hot Gas)	4/20	4/20	4/20	4/20
Temp. Termination Hot Gas	+55 °F	+55 °F	+55 °F	+55 °F
Superheat Setting	6-8 °F	6-8 °F	6-8 °F	6-8 °F
Discharge Air Temp	28-32 °F	28-32 °F	28-32 °F	28-32 °F



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. Hot gas defrost is available for installations requiring a positive defrost. Refer to www.kysorwarren.com for other electrical data and information.*

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

Conversion from Wattage to Amps for Single phase cases:

Power = (Voltage)(Current)

Watts = (Volts)(Amps)

Watts/Volts = Amps

UNIT 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 Plexiglas divider kit must be used between cases operating on different refrigeration systems. The divider will be factory installed if specified on order.

Shipping Damage

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. A claim must be filed with the carrier by the consignee for all damages.



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

Installation Location and Preparation

Proper installation of the case ensures maximum case life and ensures all future warranty claims, if required, will be honored. Review the following instructions and contact your Kysor//Warren Service Representative if there are any questions or concerns.

Location and Special Precautions



Caution: Influences, such as heating and air conditioning outlets and outside entrances, may adversely affect the operation of the case. Damage to case contents may occur if case temperature is not properly maintained. Follow all recommendations for case installation.



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



Caution: The installation area must be clean of all debris that may restrict airflow or otherwise inhibit proper installation. In addition, it is recommended that all refrigeration units are located at least 15 feet away from outside entrance doorways or heating and air conditioning outlets that may adversely affect case temperature.

UNIT INSTALLATION

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 distance between hot and cold cases.
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 installation section of this
6. Ensure location will allow connection to drain lines and the drain line, when installed, will meet the recommendations as set forth in the installation instructions for drain line contained in the drain installation section of this
7. Ensure expansion valve in case is the proper valve for the type of refrigerant used at the installation site.

Installation Instructions

The following instructions are provided for properly installing the Kysor//Warren case. If there are any questions during the installation process, please contact your Kysor//Warren Service Representative.

Unpacking, Moving, Loading, and Lifting

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

Unpacking

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

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



Caution: Use caution when removing the strapping in the following procedure as the shelves are very heavy and could fall and cause damage to the case or case components.

2. Remove the strapping that secure the case shelves to the case and remove the shelves.

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

Moving Case

Once the case has been removed from the protective crate and removed from the pallet, the case can be moved as follows:



WARNING! Cases are very heavy and require at least two people to move them into position. Failure to follow the moving instructions may cause personal injury.



Caution: Be careful not to damage the factory installed end while moving the case.

1. Use the case lift points on the case to move it to the proper location.

Installing First Case

Install the first case as follows:

1. Ensure all preparation for installation, as outlined in the above paragraphs, have been fully complied with and are complete.
2. If multiple cases are to be installed, find the highest area of the floor to place the first case.
3. Allow a minimum of 3 in. 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.
4. All cases must be located on a firmly based floor and leveled within plus or minus 1/16 in. Use shims provided to support and level the entire length of your case(s). All legs of the case must be properly adjusted and in contact with the floor. Refer to the leveling cases procedure located in the Adjustments chapter of this manual for the proper shimming procedure.
5. 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. 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.
6. Connect water drain line. Reference waste outlet (drip pipe) description and location procedure later in this chapter.
7. Connect input AC power. Reference electrical installation procedure later in this chapter.

UNIT INSTALLATION

8. Connect refrigerant lines. Reference procedure later in this chapter.
9. Install all ends, caps, and trim per the applicable instructions contained in the Assembly chapter of this manual.
10. Remove shipping tape on fluorescent lamps and remove all other shipping material.
11. 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

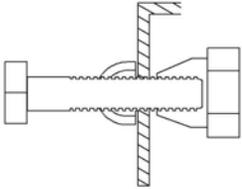
If additional cases are to be installed, follow the same procedures as described in the installing first case procedure (above), except the following:

1. Ensure all case expansion valves are correct.
2. Do not install electrical, drain lines, or refrigerant lines until all the cases have been set/placed into position.
3. Do not install case trim, ends, or caps until all cases have been set into position and properly joined.
4. 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.
5. 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 front of each case).
6. Remove skids and shipping braces. Install approximately a 5/16" bead of sealer at one end of case as noted by a phantom line on cross-section.
7. Move cases as close together as possible and level by using the shims provided. Refer to the leveling cases procedure located in the Adjustments chapter of this manual for the proper shimming procedure. **CASES MUST BE LEVELED FROM FRONT TO BACK END-TO-END AND SUPPORTED CONTINUOUSLY AS NEEDED WITH SHIMS.**
8. Install plexiglass divider, as required.
9. Remove shipping tape on fluorescent lamps and remove all other shipping material.
10. Refer to the operational start up procedures later in this manual.

Joining

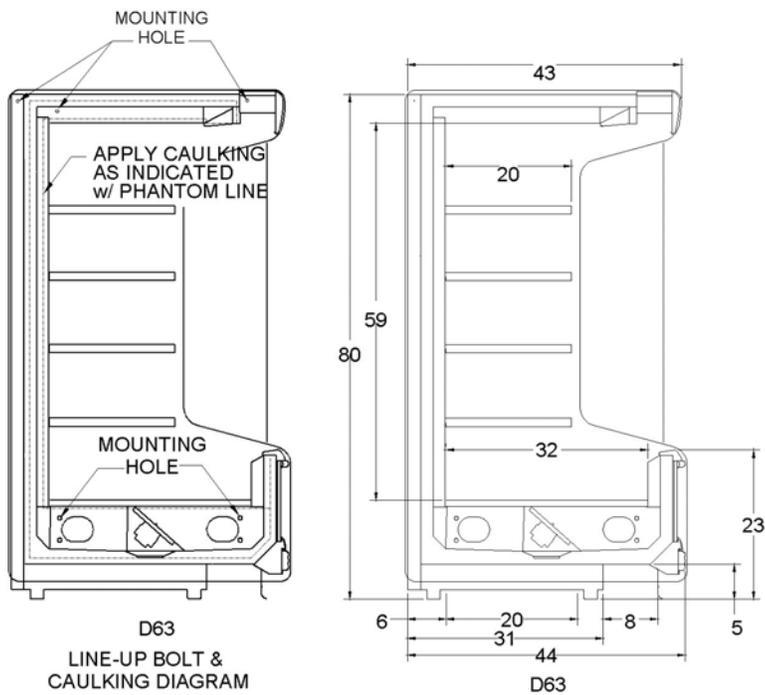
Two or more cases of like models can be joined together to form a continuous line up. Reference and become familiar with Figures 3-1 through 3-3 prior to joining the cases, and then join the cases using the instructions that follow.

Line Up Bolt



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Line-Up Bolt Holes and Caulking Diagram on Side of Cases



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UNIT INSTALLATION

Access Cover



Canopy and Front Rail Alignment

Ensure the canopy and front rails are aligned on all cases in the line up. Adjust case height as appropriate to properly align cases. Cases should be aligned within 1/16 in.

Joining Instructions

1. Remove access covers over line up holes (Figure 3–3) and insert the small line up bolts (Figure 3–1) in the end frame in the bolt hole pattern identified in Figure 3–2. 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.
2. Inspect joint for proper air and watertight seal inside and outside the case.
3. Replace line up access cover plugs and plates.



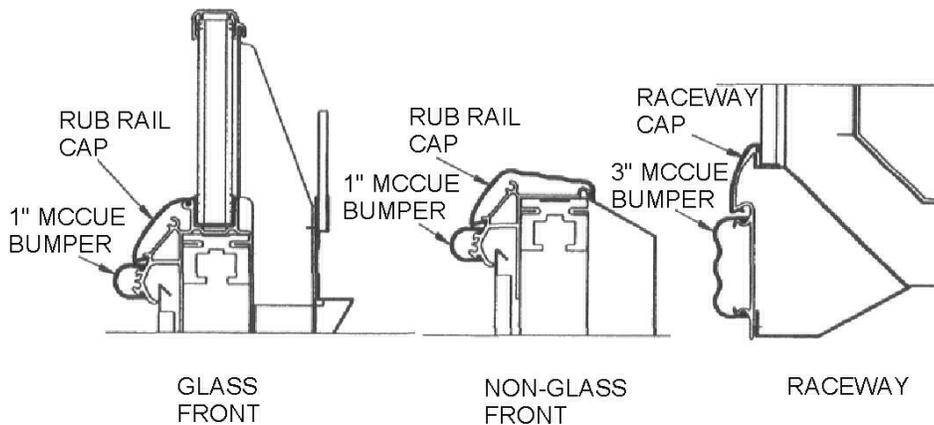
Note: Most case trim can and should be installed immediately after cases are lined up. Where possible, install all trim immediately so it will not be lost. The trim that cannot be installed immediately should be stored in a safe place until refrigeration and electrical work is done.

Installation of Trim, Caps, and Shelves

Install all trim, caps and shelves using the instructions provided in the Assembly chapter of this manual. Case front part selection and case trim selection is provided in the information that follows.

Case Front Part Selection

Case Front Part Selection



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CASE FRONT PART SELECTION

FOR CASES IN A LINEUP:

- o Rub Rail Cap Starter — one per lineup standard or w/ptm
- o Raceway Cap Starter — one per lineup
- o 1" Mccue Bumper Starter – one per lineup
- o 3" Mccue Bumper Starter – one per lineup
- o Rub Rail Cap – one per lineup standard or w/ptm
- o Raceway Cap – one per case
- o 1" Mccue Bumper – one per case
- o 3" Mccue Bumper – one per case

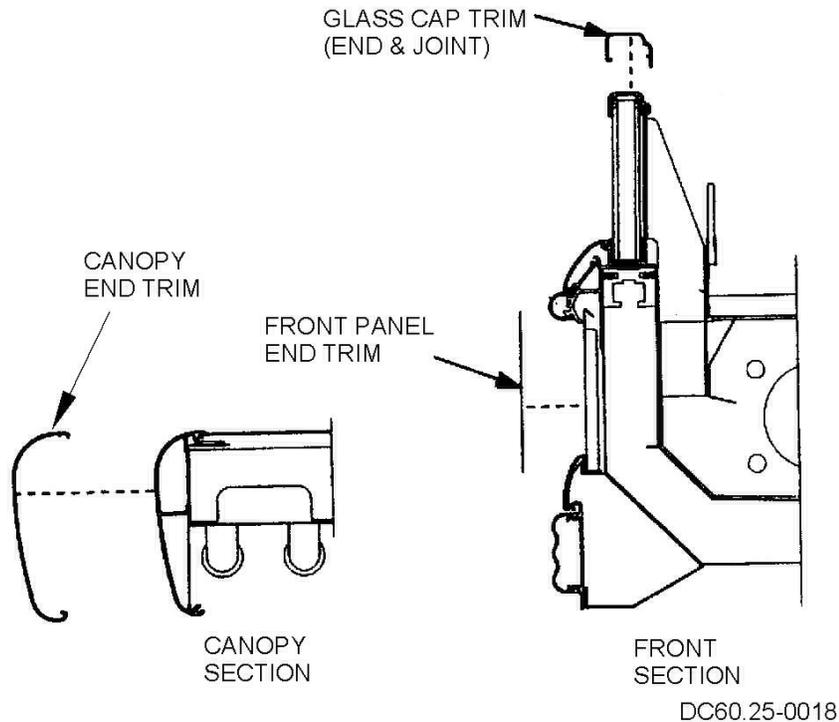
FOR SINGLE CASE:

- o Rub Rail Cap – one per case or w/ ptm
- o Raceway Cap – one per case
- o 1" Mccue Bumper – one per case
- o 3" Mccue Bumper — one per case

UNIT INSTALLATION

Case Trim Selection (3000 Series Only)

Case Trim Selection (3000 Series Only)



FOR CASES IN A LINEUP:

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

FOR SINGLE CASE W/ TWO ENDS:

- o No end trim is required.



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

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.

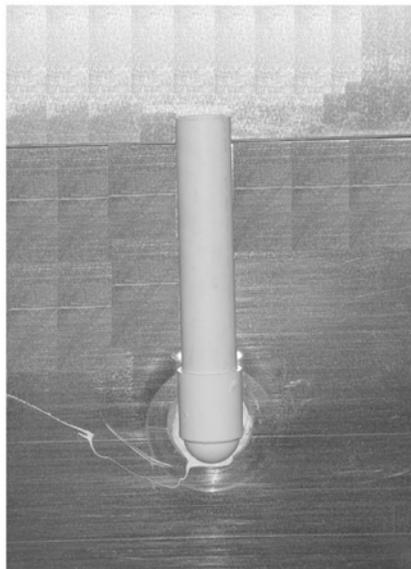
Installing/Connecting Waste Outlet Drip Pipe

Waste Outlet Drip Pipe Trap (Ship Loose, Typical)



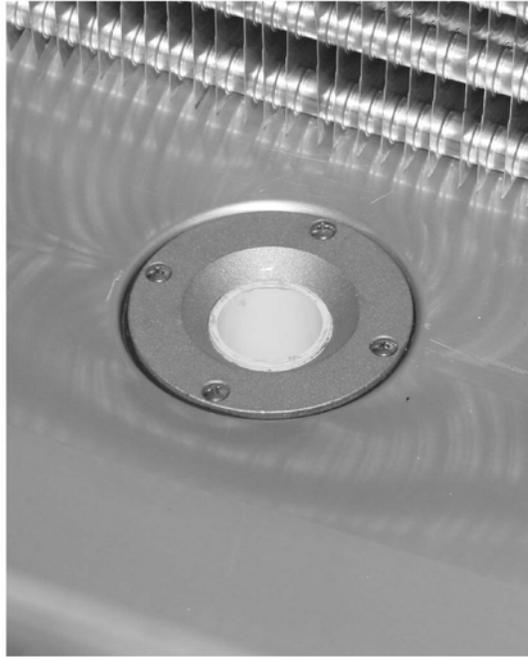
Improperly installed drip pipes (which is also the waste outlet) can seriously affect the operation of this case and result in increased maintenance costs. Listed below are some general rules for drip pipe installation.

Drip Pipe Installation (Outside-Bottom of Case)



UNIT INSTALLATION

Drip Pipe Installation (Inside-Bottom of Case)



WATER SEAL MUST BE INSTALLED

1. Never use a double water seal.
2. Always provide as much fall as possible in drip pipe. (1" fall for each 4' of drip pipe.)
3. Avoid long runs in drip pipe, which makes it impossible to provide maximum fall in pipe.
4. Provide a drip space between drip pipe and floor drain or sewer connection.
5. Do not allow drip pipe to come in contact with uninsulated suction lines. If touching, the condensation in your case will freeze.

Temperature Control

Temperature of a single condensing unit or units that are in parallel operation are controlled differently and are explained in the following paragraphs. For single condensing or parallel units, the Recommended Control Settings chart contained in the Chapter 6, Operation shows approximate settings for merchandisers. Since many variables are present in each installation, such as store temperature, length of tubing runs, temperature desired in the case, etc., the case data is only a guide for the installer.

Single Condensing Unit

On single condensing unit systems a thermostat should be used to control temperatures. The thermostat bulb should be mounted in the discharge air.

Thermostat

On single condensing units the thermostat (if utilized) is located at the left end of the case in the canopy light rail. Adjustment access is between the light tubes. If the case is equipped with a defrost terminator, it will be located in the same area. Should the thermostat have to be replaced, remove the canopy lights for access. Refer to the following figure.

Thermostat Location



Thermostat Bulb

The thermostat bulb is mounted in the discharge air. To access the thermostat bulb refer to the removal/disassembly chapter of this manual.

UNIT INSTALLATION

Parallel Condensing Units

On parallel condensing units, temperature control is typically provided by an EPR valve.

Evaporator Pressure Regulator (EPR) Valve

The EPR valve can be used to control case temperature. This is accomplished by adjusting the valve to the desired flow to maintain the case temperature. Refer to manual 31E08001, Installation and Operation Manual for Parallel Compressor Units, for a complete explanation of the expansion valve.

Thermostat and Liquid Line Solenoid

The thermostat and liquid line solenoid can be used to control case temperature. This is accomplished by adjusting the liquid flow rate based on the case temperature. Refer to manual 31E08001, Installation and Operation Manual for Parallel Compressor Units, for a complete explanation of the thermostat and liquid line solenoid.

Solid State Low Pressure Switches on Compressor

When installed on the compressor, these switches are used to control case temperature. Refer to manual 31E08001, Installation and Operation Manual for Parallel Compressor Units, for a complete explanation of the solid state low pressure switches on the compressor.

Electrical

The following paragraphs explain the case electrical requirements and connections required for proper case operation.

NEC and Local Code Compliance



Caution: Ensure all National Electric Codes (NEC) and local electric codes are understood and followed. Failure to follow all existing codes may result in equipment damage and may void the equipment warranty.

All field installed wiring must comply with the National Electric Codes (NEC) and local codes. Before installing any wiring, verify that all NEC and local codes are understood and properly followed.

Electrical Raceway

An electrical raceway is provided with each case for wiring your fan, anti-sweat heaters, and light circuits for case to case without using conduit. This applies, of course, when the front bumper is properly secured into position. This is an approved method by the Underwriters Laboratories however, must be in accordance with local and national electrical codes.

Location

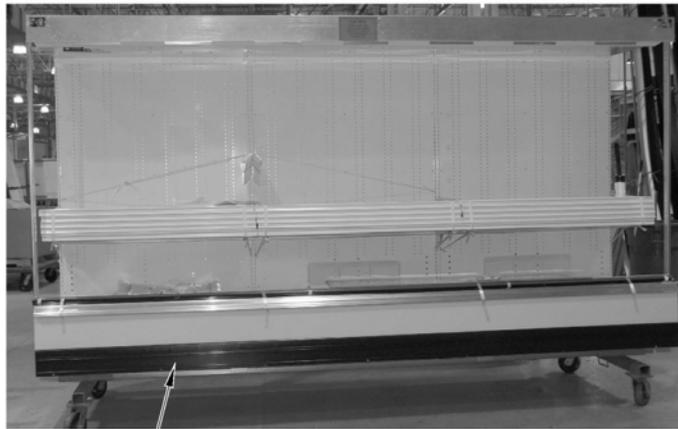
The electrical raceway is located in the front of the unit beneath the kickplate.

Electrical Connections - General

Case Lighting

Cases are standard with one row of high output lamps. Ballasts are located behind the canopy. If lighted shelves are supplied, ballasts for each shelf will be located under each shelf in the electrical raceway. See wiring diagram for layout.

Electrical Raceway Location



ELECTRICAL RACEWAY LOCATED BEHIND COVER

DC60 50-0022

Electronic Lighting Advisory



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. If they are not completely seated, an electrical arc could occur which will cause the lamp holders or the shelf light receptacles to melt and become an electrical hazard. Care must be taken during cleaning and stocking processes to insure that the bulbs and shelf cords are not dislodged.

It is very important that when electronic lighting is used in the canopy or on the shelves of the display cases, special attention must be given to the proper installation of bulbs and shelf plug-ins.



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

UNIT INSTALLATION

Input Requirements and Model Table

Electrical input requirements vary with model selected. The electrical model table (shown in the following figures) provides the electrical input requirements for all cases.

D6 Electrical Model Table, QD6(1)(3)-04 Through D6H(1)(3)-6

Model	Description	Def	Parallel Btuh Unlighted Shelves	Parallel Btuh Lighted Shelves	Evap Temp	Std Fan Amps	PSC Fan Amps	Nose Light Amps T8 @ 115V	Canopy Light Amps T8 @ 115V Per Row	Def Amps	Def Volts
QD6(1)(3)-04	MD Dairy, Deli	O	5200	5500	23	0.52	0.26		0.25		
QD6(1)(3)-06	MD Dairy, Deli	O	7800	8250	23	0.70	0.44		0.20		
QD6(1)(3)-08	MD Dairy, Deli	O	10400	11000	23	1.04	0.52		0.50		
QD6(1)(3)-12	MD Dairy, Deli	O	15600	16500	23	1.56	0.78		0.75		
HQD6(1)(3)-08	MD Dairy, Deli	O	10400	11000	28	1.56	0.78		0.50		
HQD6(1)(3)-12	MD Dairy, Deli	O	15600	16500	28	2.08	1.04		0.75		
D6(1)(3)-4	MD Deli	E		5800	20	0.53	0.26	0.30	0.30	5.61	230
D6(1)(3)-4	MD Deli	H & O		5800	20	0.53	0.26	0.30	0.30		
D6(1)(3)-4	MD Dairy	E		5800	23	0.53	0.26	0.30	0.30	5.61	230
D6(1)(3)-4	MD Dairy, Produce	H & O		5800	23	0.53	0.26	0.30	0.30		
D6(1)(3)-6	MD Deli	E		8700	20	0.53	0.26	0.46	0.46	5.61	230
D6(1)(3)-6	MD Deli	H & O		8700	20	0.53	0.26	0.46	0.46		
D6(1)(3)-6	MD Dairy	E		8700	23	1.06	0.52	0.46	0.46	5.61	230
D6(1)(3)-6	MD Dairy, Produce	H & O		8700	23	1.06	0.52	0.46	0.46		
D6(1)(3)-8	MD Deli	E		11600	20	1.06	0.52	0.46	0.46	7.93	230
D6(1)(3)-8	MD Deli	H & O		11600	20	1.06	0.52	0.46	0.46		
D6(1)(3)-8	MD Dairy	E		11600	23	1.06	0.52	0.46	0.46	7.93	230
D6(1)(3)-8	MD Dairy, Produce	H & O		11600	23	1.06	0.52	0.46	0.46		
D6(1)(3)-12	MD Deli	E		17400	20	1.59	0.78	0.74	0.74	11.54	230
D6(1)(3)-12	MD Deli	H & O		17400	20	1.59	0.78	0.74	0.74		
D6(1)(3)-12	MD Dairy	E		17400	23	1.59	0.78	0.74	0.74	11.54	230
D6(1)(3)-12	MD Dairy, Produce	H & O		17400	23	1.59	0.78	0.74	0.74		
QD6H(1)(3)-04	MD Dairy, Deli	O	4800	5100	23	0.52	0.26		0.25		
QD6H(1)(3)-06	MD Dairy, Deli	O	7200	7650	23	0.70	0.44		0.20		
QD6H(1)(3)-08	MD Dairy, Deli	O	9600	10200	23	1.04	0.52		0.50		
QD6H(1)(3)-12	MD Dairy, Deli	O	14400	15300	23	1.56	0.78		0.75		
HQD6H(1)(3)-08	MD Dairy, Deli	O	9600	10200	28	1.56	0.78		0.50		
HQD6H(1)(3)-12	MD Dairy, Deli	O	14400	15300	28	2.08	1.04		0.75		
D6H(1)(3)-4	MD Dairy	E		5380	23	0.53	0.26	0.30	0.30	3.30	230
D6H(1)(3)-4	MD Dairy	H & O		5380	23	0.53	0.26	0.30	0.30		
D6H(1)(3)-4	MD Deli	E		5800	20	0.53	0.26	0.30	0.30	3.30	230
D6H(1)(3)-4	MD Deli	H & O		5800	20	0.53	0.26	0.30	0.30		
D6H(1)(3)-6	MD Dairy	E		8070	23	1.06	0.52	0.46	0.46	5.61	230

UNIT INSTALLATION

D6 Electrical Model Table, D6H(1)(3)-6 Through D6R(1)(3)-4

Model	Description	Def	Parallel Btuh Unlighted Shelves	Parallel Btuh Lighted Shelves	Evap Temp	Std Fan Amps	PSC Fan Amps	Nose Light Amps T8 115V	Canopy Light Amps T8 @ 115V Per Row	Def Amps	Def Volts
D6H(1)(3)-6	MD Dairy	H & O		8070	23	1.06	0.52	0.46	0.46		
D6H(1)(3)-6	MD Deli	E		8700	20	0.53	0.26	0.46	0.46	5.61	230
D6H(1)(3)-6	MD Deli	H & O		8700	20	0.53	0.26	0.46	0.46		
D6H(1)(3)-8	MD Deli	E		10760	20	1.06	0.52	0.46	0.46	7.93	230
D6H(1)(3)-8	MD Deli	H & O		10760	20	1.06	0.52	0.46	0.46		
D6H(1)(3)-8	MD Dairy	E		10760	23	1.06	0.52	0.46	0.46	7.93	230
D6H(1)(3)-8	MD Dairy	H & O		10760	23	1.06	0.52	0.46	0.46		
D6H(1)(3)-12	MD Deli	E		16140	20	1.59	0.78	0.74	0.74	11.54	230
D6H(1)(3)-12	MD Deli	H & O		16140	20	1.59	0.78	0.74	0.74		
D6H(1)(3)-12	MD Dairy	E		16140	23	1.59	0.78	0.74	0.74	11.54	230
D6H(1)(3)-12	MD Dairy	H & O		16140	23	1.59	0.78	0.74	0.74		
D6L(1)(3)-12	MD Dairy/Deli	E		18000	23	1.59	0.78	0.74	0.74	11.54	230
D6L(1)(3)-4	MD Deli	E		6000	20	0.53	0.26	0.30	0.30	3.30	230
D6L(1)(3)-4	MD Dairy	E		6000	23	0.53	0.26	0.30	0.30	3.30	230
D6L(1)(3)-6	MD Deli	E		9000	20	1.06	0.52	0.46	0.46	5.61	230
D6L(1)(3)-6	MD Dairy	E		9000	23	1.06	0.52	0.46	0.46	5.61	230
D6L(1)(3)-8	MD Deli	E		12000	20	1.06	0.52	0.46	0.46	7.93	230
D6L(1)(3)-8	MD Deli	H ₂ O		12000	20	1.06	0.52	0.46	0.46		
D6L(1)(3)-8	MD Dairy	E		12000	23	1.06	0.52	0.46	0.46	7.93	230
D6L(1)(3)-8	MD Dairy	H ₂ O		12000	23	1.06	0.52	0.46	0.46		
D6L(1)(3)-4	MD Deli	H ₂ O		6000	20	0.53	0.26	0.30	0.30		
D6L(1)(3)-6	MD Deli	H ₂ O		9000	20	1.06	0.52	0.46	0.46		
D6L(1)(3)-6	MD Deli	E		18000	20	1.59	0.78	0.74	0.74	11.54	230
D6L(1)(3)-12	MD Deli	E		18000	20	1.59	0.78	0.74	0.74		
D6L(1)(3)-12	MD Dairy	H ₂ O		18000	20	1.59	0.78	0.74	0.74		
D6L(1)(3)-4	MD Dairy	H ₂ O		6000	23	0.53	0.26	0.30	0.30		
D6L(1)(3)-6	MD Dairy	H ₂ O		9000	23	1.06	0.52	0.46	0.46		
D6L(1)(3)-12	MD Dairy	E		18000	23	1.59	0.78	0.74	0.74	11.54	230
D6L(1)(3)-12	MD Dairy	H ₂ O		18000	23	1.59	0.78	0.74	0.74		
D6N3-8	MD Dairy	E		11600	20	1.06	0.52	0.46	0.46	7.93	230
D6N3-8	MD Dairy	H ₂ O		11600	20	1.06	0.52	0.46	0.46		
D6N3-12	MD Dairy	E		17400	20	1.59	0.78	0.74	0.74	11.54	230
D6N3-12	MD Dairy	H ₂ O		17400	20	1.59	0.78	0.74	0.74		
D6R(1)(3)-4	MD Dairy	E		5800	23	1.06	0.52	0.30	0.30	3.30	230

D6 Electrical Model Table, D6R(1)(3)-4 Through D6RL(G)1-6

Model	Description	Def	Parallel Btuh Unlighted Shelves	Parallel Btuh Lighted Shelves	Evap Temp	Std Fan Amps	PSC Fan Amps	Nose Light Amps T8 115V	Canopy Light Amps T8 @ 115V Per Row	Def Amps	Def Volts
D6R(1)(3)-4	MD Dairy	H,O		5800	23	1.06	0.52	0.30	0.30		
D6R(1)(3)-6	MD Dairy	E		8700	23	1.59	0.78	0.46	0.46	5.61	230
D6R(1)(3)-6	MD Dairy	H,O		8700	23	1.59	0.78	0.46	0.46		
D6R(1)(3)-8	MD Dairy	E		11600	23	2.12	1.04	0.46	0.46	7.93	230
D6R(1)(3)-8	MD Dairy	H,O		11600	23	2.12	1.04	0.46	0.46		
D6R(1)(3)-12	MD Dairy	E		17400	23	3.18	1.56	0.74	0.74	11.54	230
D6R(1)(3)-12	MD Dairy	H,O		17400	23	3.18	1.56	0.74	0.74		
D6RL(1)(3)-4	MD Dairy	E		6000	23	1.06	0.52	0.30	0.30	3.30	230
D6RL(1)(3)-4	MD Dairy	H,O		6000	23	1.06	0.52	0.30	0.30		
D6RL(1)(3)-6	MD Dairy	E		9000	23	1.59	0.78	0.46	0.46	5.61	230
D6RL(1)(3)-6	MD Dairy	H,O		9000	23	1.59	0.78	0.46	0.46		
D6RL(1)(3)-8	MD Dairy	E		12000	23	2.12	1.04	0.46	0.46	7.93	230
D6RL(1)(3)-8	MD Dairy	H,O		12000	23	2.12	1.04	0.46	0.46		
D6RL(1)(3)-12	MD Dairy	E		18000	23	3.18	1.56	0.74	0.74	11.54	230
D6RL(1)(3)-12	MD Dairy	H,O		18000	23	3.18	1.56	0.74	0.74		
D6RL(G)(1)(3)-4	MD DAIRY	H,O	5360		20	1.06	0.52			3.30	230
D6RL(G)1-6	MD DAIRY	H,O	8040		20	1.59	0.78		0.46	5.61	2300

UNIT INSTALLATION

Electrical Connections

For safety purposes and to reduce the potential for injury or death to installation personnel, and to reduce the potential to harm the equipment during the installation process, all warnings and cautions for electrical installation are repeated. Please read and understand all warning and cautions before proceeding with the electrical installation. If the installer should have any questions regarding the electrical installation, please contact the Kysor//Warren Service Representative.



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.



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



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. If they are not completely seated, an electrical arc could occur which will cause the lamp holders or the shelf light receptacles to melt and become an electrical hazard. Care must be taken during cleaning and stocking processes to insure that the bulbs and shelf cords are not dislodged.



Caution: Ensure all National Electric Codes (NEC) and local electric codes are understood and followed. Failure to follow all existing codes may result in equipment damage and may void the equipment warranty. Adherence to electrical codes for field wiring is the responsibility of the installing electrical contractor.

All field connections are made in the electrical raceway. Make sure that proper voltage is supplied to your case. Check case nameplate for the required voltage for fans, anti-sweat heaters, lights and defrost heaters.

ALL CASES MUST BE GROUNDED. The case data chart shows the electrical ratings for your case. This is the same information that appears on your refrigeration nameplate. The case data chart is located in Chapter 2.



Note: Fan motors must operate continuously and panel must be marked sufficiently to prevent the fan motors and anti-sweat heaters from being turned off accidentally. When cases are multiplexed, add the total of these amperage values to determine wire size and circuit protection. Anti-condensate controllers can be used to control the anti-condensate heater.

On electric defrost models, the defrost heater amperages of all cases on the defrost circuit should be added together, and if their rating exceeds the defrost time clock or condensing unit breaker capacity, a defrost relay and circuit breaker must be employed and furnished by others. Make sure that proper wire size and branch circuit protection are employed for safe operation.

Electrical Termination Location

All electrical connections are made in the electrical raceway (see following figure). The wires are clearly identified for termination purposes as follows:

Electrical Terminations (Inside of Electrical Raceway)



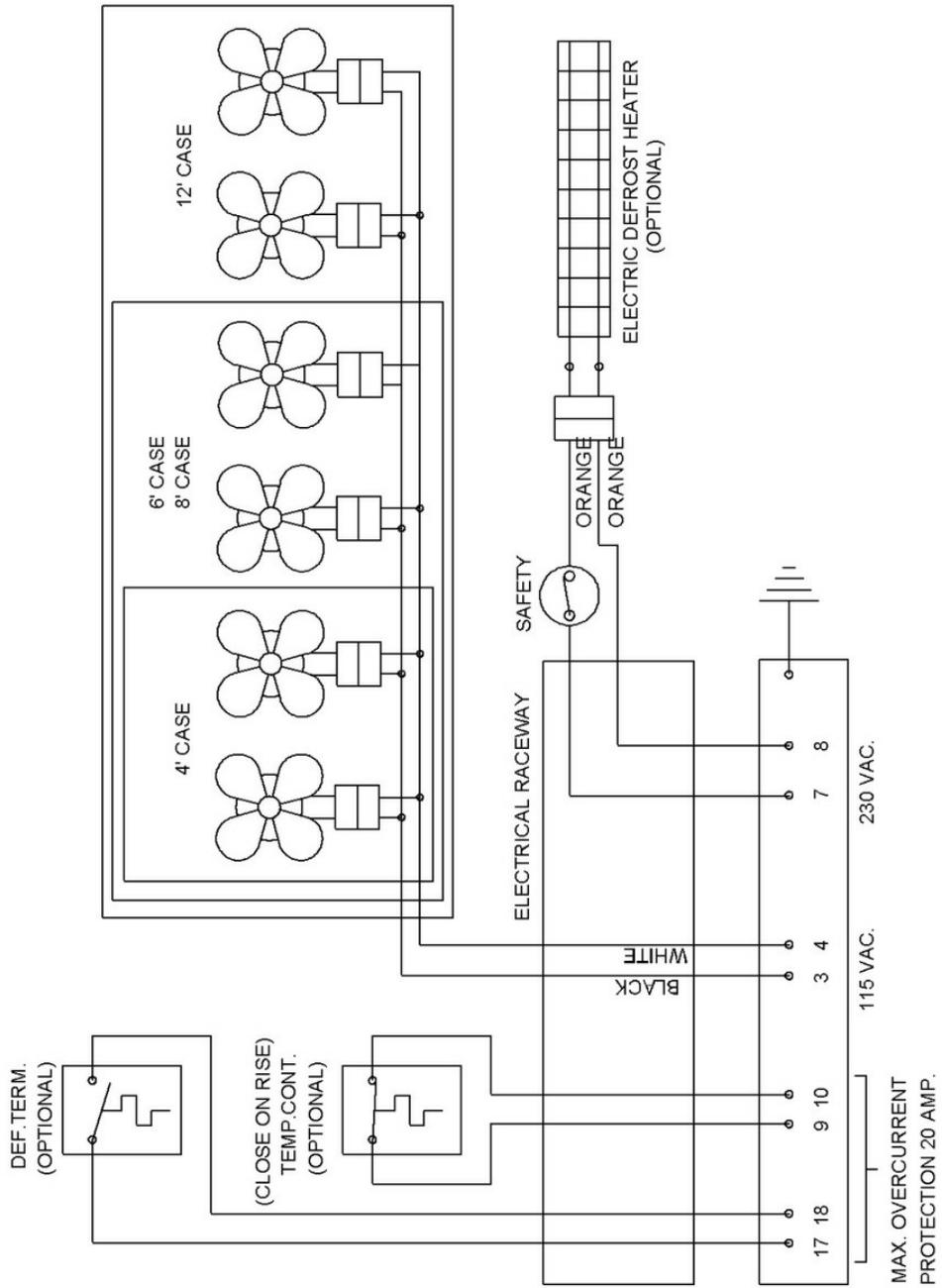
1. Refrigeration fan motors are labeled with the numbers 3 and 4.
2. Lighting terminations are labeled with the numbers 5 and 6.

Installation of Electrical Wiring

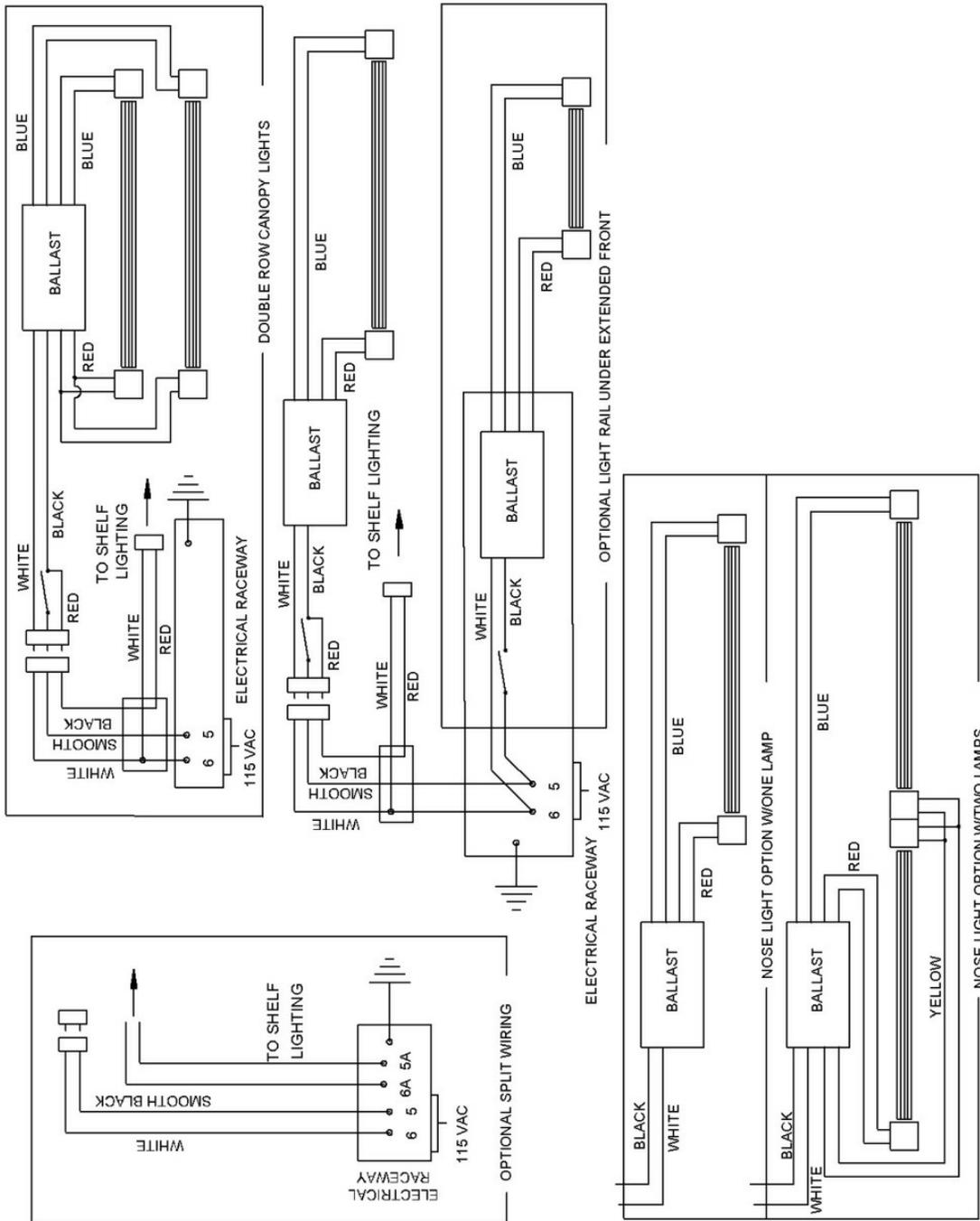
The following figures are provided to give guidance on the installation and connection associated with this product line. Ensure the proper wiring diagram is selected for the case to be installed or maintained.

UNIT INSTALLATION

Wiring Diagram

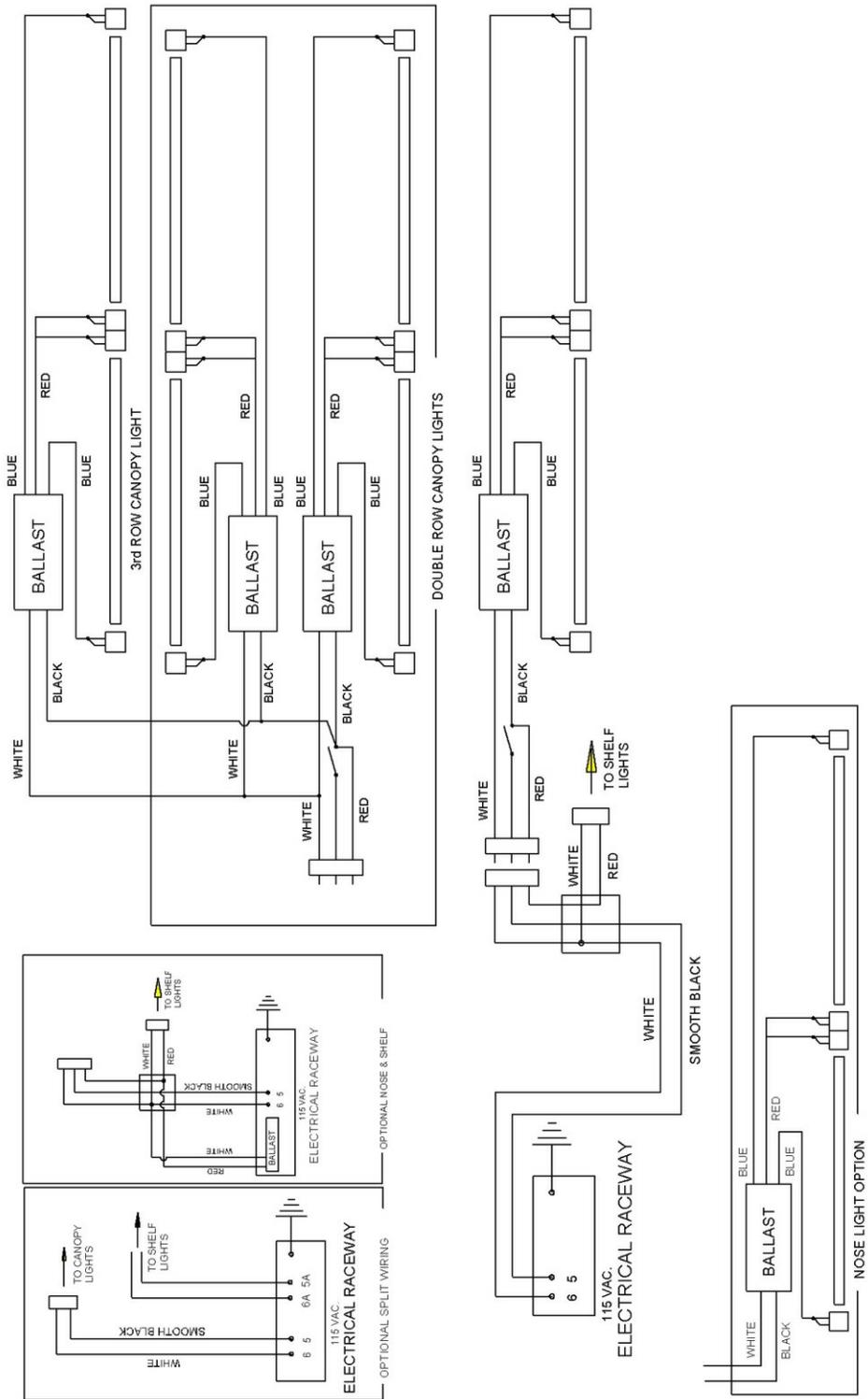


Wiring Diagram - Canopy One (1) and Two (2) Light Rows

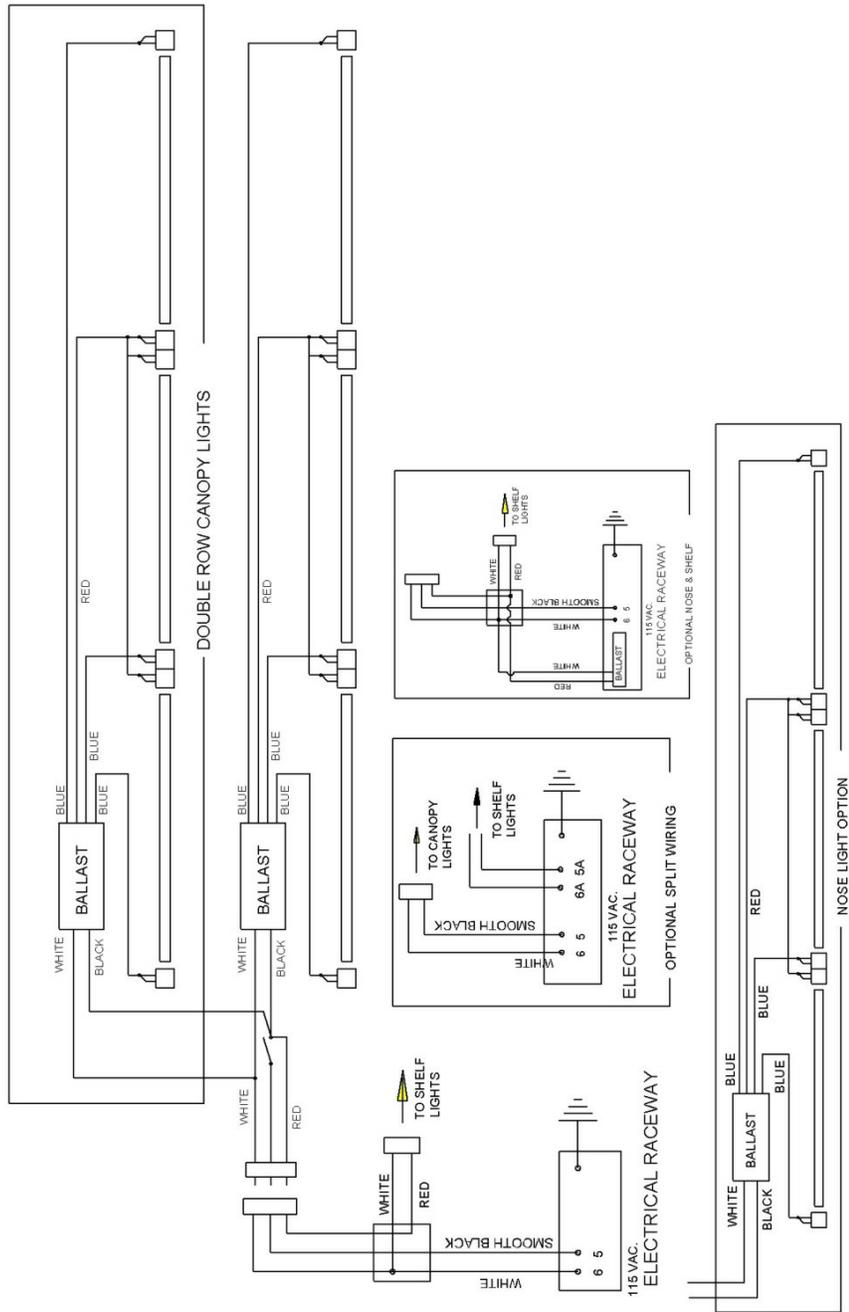


UNIT INSTALLATION

Wiring Diagram - Canopy Two (2) and Three (3) Light Rows

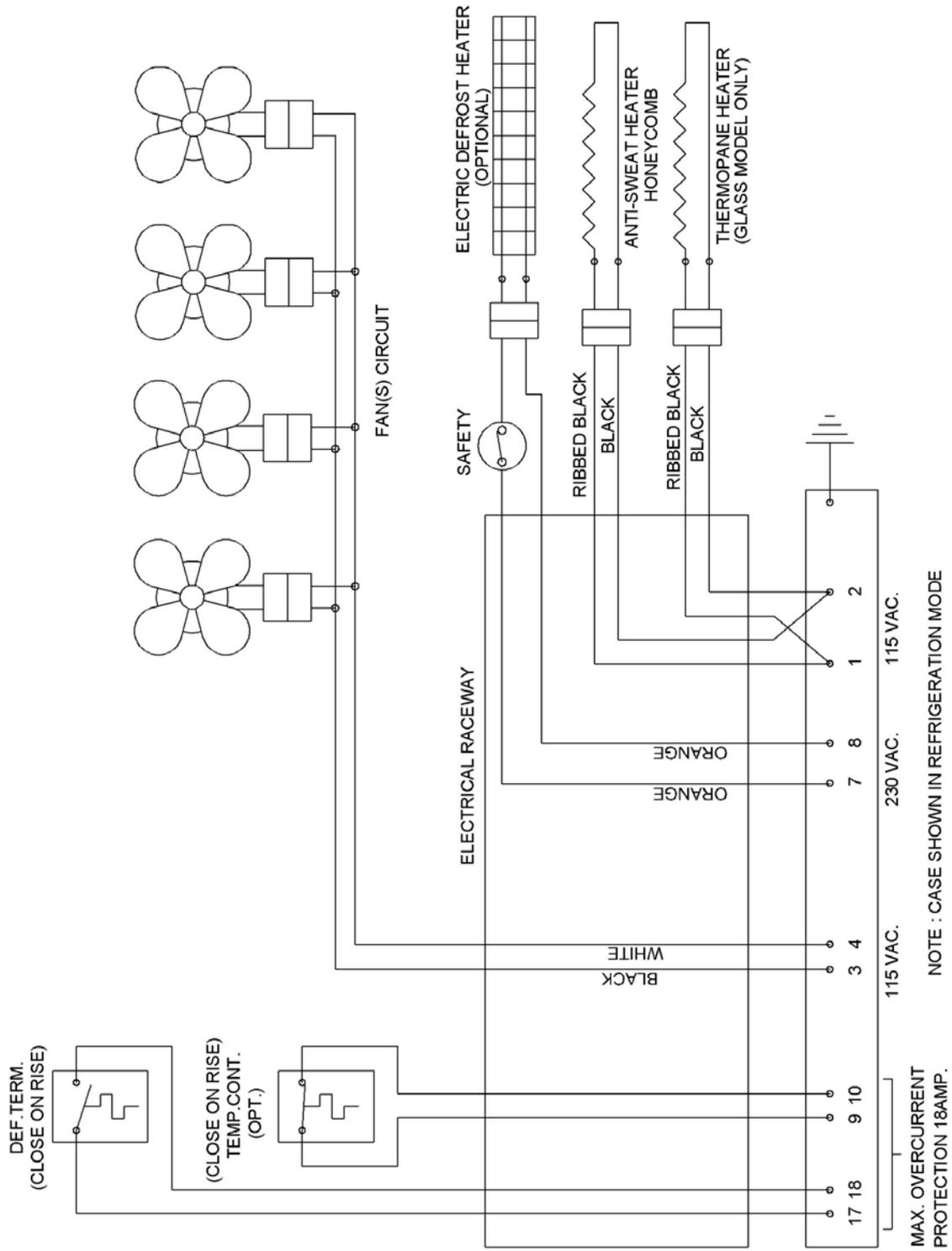


Wiring Diagram - Canopy Two (2) Light Rows and Nose Light



UNIT INSTALLATION

Wiring Diagram - Off Cycle Defrost



Case Refrigeration Fan Motors and Lighting.

The case electrical wiring for the refrigeration fan motors and lighting are all terminated within the electrical raceway as identified above. Connect the electrical wiring as follows:



Note: It is recommended that the refrigeration fan motors and the lighting are fused/CB independently at the AC service cabinet.

1. Read, understand, and follow all Warnings, Cautions, and Notes that pertain to the installation of the electrical connections to the case.
2. Gain access to the electrical raceway following the procedures in the Disassembly chapter of this manual for the kickplate removal.
3. Follow all NEC and local codes to provide AC to the case at the termination point located on the left front of the case beneath the kickplate within the electrical raceway. Wire size is dependant upon the type of case (load) and the distance of the case from the AC service. Refer to the applicable case electrical table provided in Chapter 3 of this manual.
4. Connect the input AC to the case following all NEC and local codes.
5. Connect an isolated ground to the case ground provided. Case ground is identified by the green wire.
6. Install the case kickplate using the instructions contained in the assembly chapter of this manual.



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.

Electric Defrost

When electric defrost has been ordered, the case has been pre-wired at the factory for this option.

Refrigeration Piping and Dehydration



WARNING! Seal around lines after connections are made. Keep direct flame from bottom of case, as heat will disintegrate the bottom and insulation. Use a heat shield when brazing near the bottom of the cases.

UNIT INSTALLATION

Location

The refrigeration lines are located under the deck pans on the cases. 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. See the section “Recommended Piping Practices” for additional details on piping.

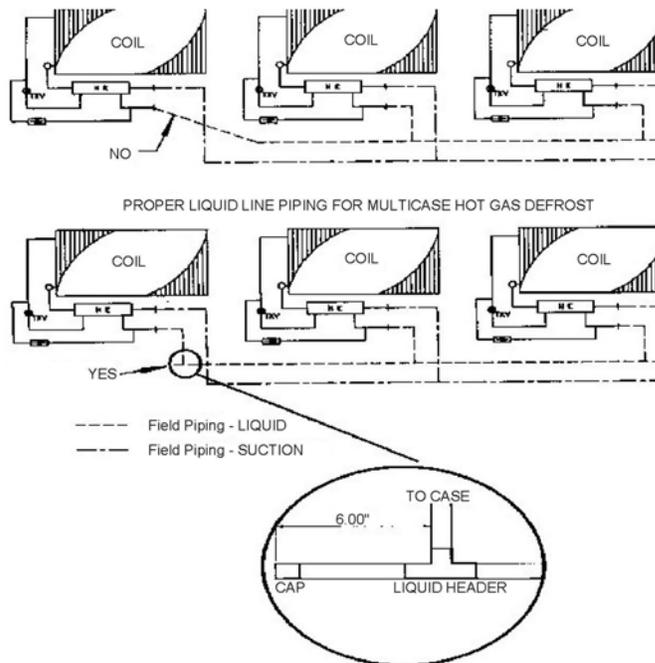
Case-to-Case Connections

Opening a Ferrule Hole

The refrigeration lines are located under the deck pans on the D6 cases. A refrigeration outlet is provided in the front right hand end of the D6 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. See the section “Recommended Piping Practices” for additional details on piping.

Recommended Piping Instructions

Piping Diagram



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 droppage.
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.

UNIT INSTALLATION

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.
- c. Maybe 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.

Dehydration of Refrigerant Lines

Please read carefully before placing system into operation. To prevent scaling due to brazing, dry nitrogen should be allowed to flow through lines at 2 psig while brazing operations are taking place. After laying refrigerant lines, they should be blown out with dry nitrogen before making final connection at fixture or condensing unit to prevent any foreign matter being left in the lines.



Caution: During service of this equipment, precautions should be taken to prevent loss of refrigerant to the atmosphere.

After the case has been pressure-tested and proven leak-free, it is recommended that the case be dehydrated with a vacuum pump to 1000 microns for the first two evacuations and 500 microns on the third. The triple evacuation method requires evacuating the system three successive times and breaking the first two vacuums with dry nitrogen. The third vacuum would be broken with the refrigerant specified for the system.

Installation Completion

After installation is complete, ensure the case is functioning properly per the operational checkout procedure provided in Chapter 6 and, if required, adjust the expansion valve and superheat per Chapter 4.

ADJUSTMENTS

This chapter provides the adjustments that can be made to the Kysor//Warren case.

Expansion Valve and Superheat

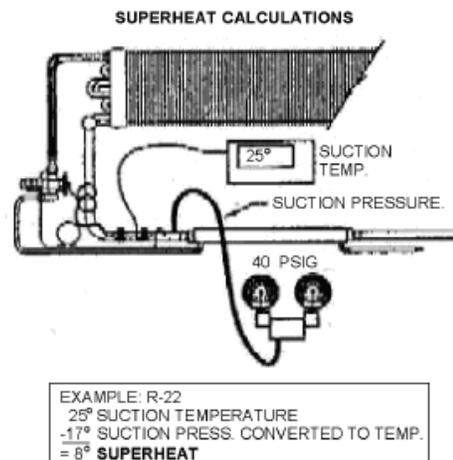


Caution: During service of this equipment, precautions should be taken to prevent loss of refrigerant to the atmosphere.

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 unit, 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.

Superheat Calculations



ADJUSTMENTS

Shelves

Shelves can be adjusted/installed into various positions in the case using the installation points on the case backing. To adjust/move the shelves, refer to the shelf installation procedure located in the Installation chapter of this manual.

Leveling Cases

All cases must be located on a firmly based floor and leveled within plus or minus 1/16 in. Use shims provided to support and level the entire length of your case(s). All legs of the case must be properly adjusted and in contact with the floor. Cases must be level and fully supported along all planes to prevent the case from sagging in the middle and to allow proper drainage. To properly level the case, perform the following:



Caution: It is important to properly level the case to prevent case damage from sagging and to allow for proper drainage. Remember, the case could be loaded with several thousand pounds of merchandise that will allow the case to sag if not properly supported.



Note: Perform the case leveling procedure prior to connecting the electrical, drains, or refrigeration lines.

1. Determine the highest area on the floor in the area where the case(s) are to be installed to determine where to set the first case. If only one case is to be installed, disregard this procedure.
2. Install first case into position over the high spot in the room or area. Refer to the installation procedure located in the Installation chapter of this manual.
3. Level the first case. Use the shims that are in the case that were wrapped in shrink wrap and were provided when the case was shipped. Shims must be positioned every 3 ft. To ensure the case is properly leveled, check the case first from side to side, middle, and then plum the case up and down and top to bottom. Position shims to allow for complete support of the case, including the middle of the case. It may be necessary to lift the case on its lift points using a pry bar (i.e., Johnson bar). These pry bars provide for lifting up to 5,000 lbs.
4. Repeat procedure for all subsequent cases in the line up.

SERVICE INSTRUCTIONS



Service instructions are provided to allow for proper servicing of the case. This includes instructions for servicing refrigerant levels. Always follow the service instructions to limit the possibility of damaging the case or the case components.

Refrigerant

Refrigerant levels can be adjusted by certified refrigeration technicians following the instructions provided in the Installation and Operation Manual for Parallel Compressor Units, Manual Part Number 31E08001. For single compressor units, refer to the Installation and Operation Manual for that compressor unit.

OPERATION

The following paragraphs give the procedures to follow for the proper loading and operation of the case.

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.**

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.

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.

Normal Operation

During normal operation of the case the case will perform as described in the Installation and Operation Manual for Parallel Compressor Units, Manual Part Number 31E08001. For single compressor units, refer to the Installation and Operation Manual for that compressor.

Off-Cycle Defrost

Off-time defrost is standard on these models. The fans run continuously and defrost termination is by time (fail-safe). Recommended off-cycle defrost is four (4) per 24 hours with a 40 minute fail-safe.

Electric Defrost Models

For optional electric defrost, 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. Recommended electric defrost is four (4) per 24 hours with a 30 minute fail-safe.

OPERATION

Hot Gas Defrost Models

On 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 unit. 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. Recommended hot gas defrost is four (4) per 24 hours with a 20 minute fail-safe.

Operation Checklist

In addition to the usual standard practices for installing your case, please pay particular attention to the following:

1. Have all cracks been sealed using commercially available, silicone caulking compound?
2. Has refrigeration line entry been caulked inside and out to seal off the two air bands?
3. Are both upper and lower fans running? Check all plugs to ensure the plugs are tight and are completely engaged.
4. Is the defrost control set for the proper setting as recommended by the case defrost recommended settings provided in Chapter 6, Operation?
5. Measure the amperage on all three legs on the three phased defrost receptacle during the defrost cycle. The amperage used on each leg should be equal, +/-10% (balance the load voltage on all three legs).
6. Are all other connections, including flare connections, tight?

TROUBLESHOOTING

Defrost

A quick check of adequate defrost can be made by checking the air movement across the cases. Smoke should move gently from the discharge air honeycomb to the return air grill, but an iced-up coil will be immediately apparent by little or no air current leaving the honeycomb.

Case Icing

If operation of the case seems normal but the case seems to ice up every three to four weeks, the drain connection to the case and cleanliness of the drain should be checked. Improper drainage (as a result of improper drain treatment) will show itself as icing every few weeks or so.

Though it is not likely, should icing of the coil or drain pan ever occur, the coil and pan must be thoroughly and completely defrosted before proper operation may be expected.

Unit Will Not Cool

If the case will not cool perform the following:

1. Verify no heating or air conditioning vents are interfering with the thermostatic controls or affecting the case temperature. If OK, proceed to step 2. If not OK, follow recommended installation instructions contained in the Installation chapter of this manual.
2. Verify case discharge or return air grills are not blocked or otherwise obstructed. If OK, proceed to step 3. If not OK, remove obstruction(s) and verify the proper operation of the case. Refer to the Operation chapter of this manual.
3. Verify coils are clean. If OK, proceed to step 4. If not OK, remove obstruction(s) and verify the proper operation of the case. Refer to the Operation chapter of this manual.
4. Verify temperature control is adjusted to proper setting. OK? Proceed to step 5. If not OK, troubleshoot the temperature controls, including the thermostat, expansion valve, and expansion valve as applicable.
5. Check fans for proper operation. OK? Proceed to step 6. If not OK, troubleshoot fans and check for proper voltage to the fans. Remove and replace fans as necessary. Refer to the Removal chapter of this manual. Verify case temperature is lowered and for proper operation. Refer to the Operation chapter of this manual.
6. Check refrigerant level to case. OK? Contact your Kysor//Warren Service Representative. If not OK, go to step 7.

TROUBLESHOOTING

7. Check for line or compressor leakage. Leakage can be located by heavy deposits of oil on lines or compressor. OK? Go to step 8. If not OK, repair lines or replace compressor and proceed to step 8.
8. Service refrigerant. Dehydrate the refrigerant lines and adjust refrigerant level using the instructions contained in the appropriate chapters of this manual and in the Parallel Compressor Units Installation and Operation Manual, P/N 31E08001. After maintenance is complete, verify case temperature is lowered and the case operates properly. Refer to the Operation chapter of this manual.

Unit Is Too Cold

If the case temperature is lower than the temperature control and freezing of product occurs perform the following:

1. Verify temperature control is adjusted to proper setting temperature. Not OK? Adjust temperature control to the proper setting. OK? Troubleshoot the thermostatic controls, including the thermostat and expansion valve as applicable or contact your Kysor//Warren Service Representative.

Case or System

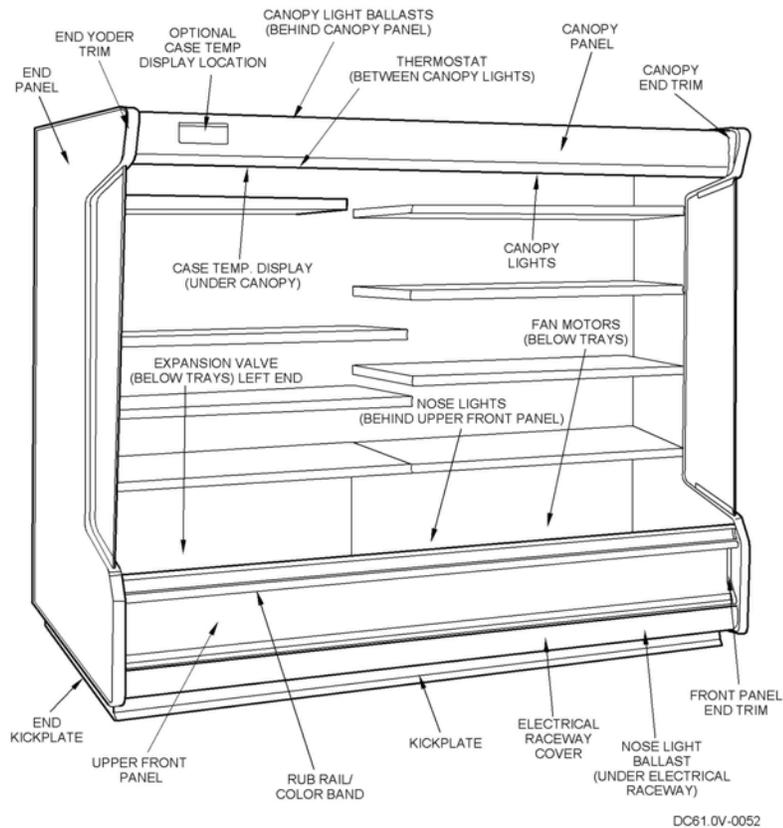
Case or system troubleshooting is limited to the troubleshooting of the case temperature listed above.

REMOVAL/DISASSEMBLY



Note: Although the procedures may give complete disassembly information, only disassemble to the extent necessary to perform the repair. Keep all hardware that is removed. This hardware will be used for installation of the component after repair.

Front case Location Diagram



The following steps are given to facilitate repair of the case or the case components.

Shelf

Several shelves may be equipped in any given case. Only remove the shelf that requires maintenance. To remove the shelf assembly, perform the following:

1. If equipped with optional shelf lights, unplug the shelf lights from the case wiring harness located on the left side of the back panel.
2. Remove shelf from brackets.

REMOVAL/DISASSEMBLY

3. Remove PTM from shelf.
4. Remove brackets from shelf standard.

Lower Front Panel

Not equipped on these models.

Upper Front Panel

The upper front panel is located on the upper, front of the case. The 2500 series and the 3000 series utilize different upper front panels. To remove the upper front panel, perform the following:

2500 Series Upper Front Panel

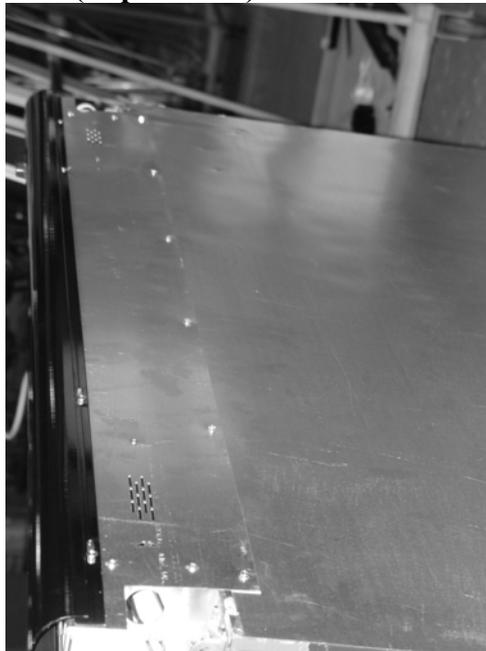
1. Remove the screws securing the color band to the case.
2. Remove the upper front panel.

3000 Series Upper Front Panel

1. Slide the upper front panel to the right or to the left to remove it from the case.
2. Remove the rub rail from the top portion of the tub.

Canopy Panel

Canopy Panel Mounting Screws (Top of Case)



The canopy panel is located on the top of the D6 cases and does not require removal for routine maintenance. Removal is not necessary to facilitate maintenance to the canopy. If removal of the canopy and shelf lamp ballasts are required, refer to that procedure later in this manual. To remove the canopy panel, perform the following:

1. Remove the trim on the front of the canopy panel. Refer to the removal procedure later in this
2. The canopy panel is secured to the case with several screws (quantity is dependant upon the type of D6 case) located on the top of the D6 case. Remove screws securing the canopy panel to the case.
3. Remove canopy panel.

Kickplates

There are variances in kickplate configurations, dependant upon the line up of the cases. All cases are equipped with a center kickplate. For cases that have left or right end panels, an additional kickplate is provided for finishing the ends.

Kickplate (Center)

The kickplate is located on the bottom, front of the case between the raceway and the floor. To remove the kickplate, perform the following:

1. Remove the kickplate trim by following the case trim removal procedures.
2. Remove the end kickplate (if applicable).
3. Remove the screws securing the kickplate to the case.
4. Remove kickplate.

End Kickplate (Left or Right End)

The end kickplate is located on the bottom, end of the case between the raceway and the floor. To install the end kickplate, perform the following:

1. Remove the end kickplate trim by following the case trim removal procedures.
2. Remove the screws securing the end kickplate to the case.
3. Remove end kickplate.

REMOVAL/DISASSEMBLY

Case Trim

This paragraph provides the instructions for removing the various case trim located throughout the case and is dependant upon configuration/line up.

Kickplate Trim

The kickplate trim is located on the front of the kickplate. To install the kickplate trim, perform the following:

1. Remove the kickplate trim by sliding the trim out of the retaining slots in the kickplate.

End Kickplate Trim

The end kickplate trim is located on cases with ends on them. To remove the end kickplate trim, perform the following:

1. Remove the end kickplate trim by sliding the trim out of the retaining slots in the end kickplate.
2. Remove end kickplate trim.

Canopy/Colorband/Upper Front Trim

The canopy/colorband/upper front trim is located on all cases. Remove the canopy/colorband/upper front trim as follows:

1. Remove the canopy/colorband/upper front trim by sliding the trim out of the retaining slots in the canopy/colorband/upper front panel.
2. Remove canopy/colorband/upper front trim.

Joint Trim

The joint trim is located between the joints that occur when joining one case to another case. To remove the joint trim, perform the following:

1. Remove the screws that secure the joint trim to the case(s).
2. Remove joint trim.

Rub Rail

The rub rail is located on the front of the tub. To remove the rub rail, perform the following:

1. Remove the rub rail by sliding the trim out of the retaining slots in the case.
2. Remove rub rail.

Case Temperature Display



Note: There are several ways to monitor the case temperature. This includes an analog (dial) display, a digital display, or electronically monitored. The following procedures are for the removal of the analog or digital display.

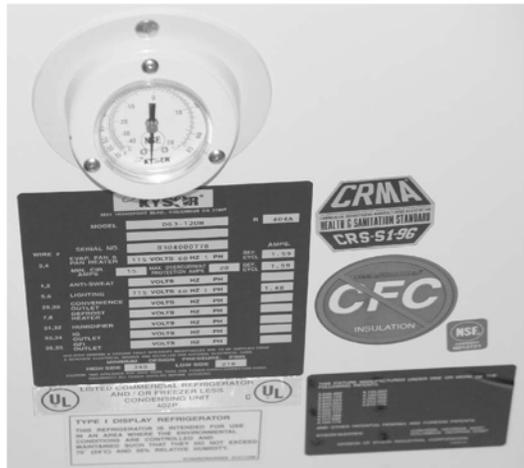
Analog Case Temperature Display and Probe

When equipped with an analog case temperature display, the display is located on the inside, top of the case. Refer to the following figure. To remove the analog case temperature display, perform the following:



Note: The probe for the analog case temperature display is an integral part of the display.

Analog Case Temperature Display and Probe



1. Remove the screws securing the analog case temperature display to the case.
2. Remove the analog case temperature display just far enough to gain access to the electrical pigtail.

REMOVAL/DISASSEMBLY

4. Remove analog case temperature display.

Digital Case Temperature Display and Probe

When equipped with an digital case temperature display, the display is located on the inside, top, front of the case, or on the canopy panel. To remove the digital case temperature display, perform the following:



Note: The probe for the digital case temperature display is an integral part of the display.

Digital Case Temperature Display and Probe



Digital Case Temperature Display Probe



1. Remove the screws securing the digital case temperature display to the case.

2. Remove the digital case temperature display just far enough to gain access to the electrical pigtail.
3. Disconnect electrical pigtail.
4. Remove digital case temperature display.

Fan Blade/Motor (Typical)

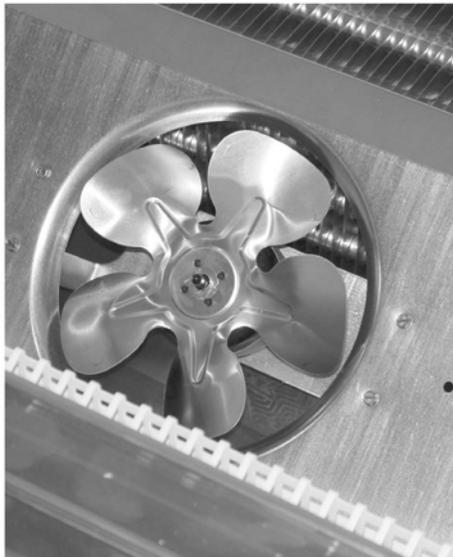
Fan Blade (Typical)

The fan blade is located on the fan assembly, which includes the fan blade and motor, and is located on the inside, bottom of the case. To remove the fan blade, perform the following:



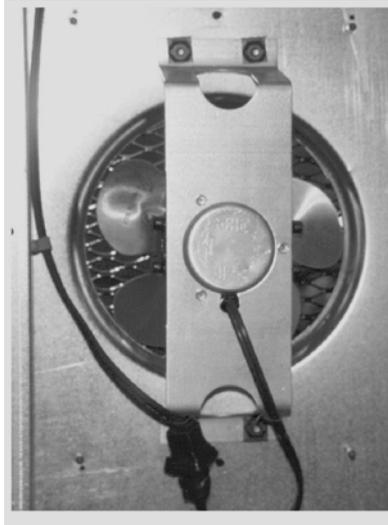
Note: Removal of the fan blade does not require removal of the entire fan assembly or motor.

Fan Motor and Blade — Top View



REMOVAL/DISASSEMBLY

Fan Motor and Blade — Bottom View



WARNING! Always disconnect the electrical power at the main disconnect when servicing or replacing any electrical component. Failure to disconnect the electrical power may result in personal injury or death.

1. Turn off the power to the case at the AC source/CB panel.
2. Remove wire racks and bottom deck pans to gain access to the fans.
3. Remove the hardware securing the fan blade to the fan motor.
4. Remove fan blade.

Fan Motor (Typical)

The fan motors employed are permanently oiled for the life of the motor and requires no periodic maintenance. They are wired according to the wiring diagram and must run continuously.



Note: Three different types of fan motors have been used for D6 cases. They are ECM, permanent split capacitor, and shaded pole. All three mount into the case the same way, however they require different mounting brackets. Ensure the proper replacement part is ordered.

The fan motor is installed on the fan plenum assembly inside the case, below the deck pans. Quantity of motors is dependant upon the case size ordered. To remove the fan motor, perform the following:

1. Remove fan blade in accordance with the above paragraph.

2. Disconnect fan from wiring harness.
3. Remove the four screws securing the fan motor assembly (fan motor with mounting basket) to the case.
4. Slide the fan motor assembly to the right or left, just far enough to allow the fan motor bracket to clear the case.
5. Remove the fan motor assembly just far enough to gain access to the fan motor electrical pigtail.
6. Disconnect the fan motor electrical pigtail from the fan motor.
7. Remove the fan motor assembly from the case.
8. On the bottom of the fan motor assembly, remove the screws securing the fan motor to the fan motor bracket.
9. Remove fan motor.

Thermostat and Thermostat Probe



Note: There are several ways to control the case temperature and therefore a case thermostat may or may not be installed.

Thermostat Control

When equipped, the thermostat is located inside the light rail on the left side of the case. The associated thermostat bulb is located behind the 4.0 in. hole plug on the left side of the case. To remove the thermostat and probe, perform the following:

Thermostat Control



REMOVAL/DISASSEMBLY

1. Remove the fluorescent lights located in front of the thermostat control.
2. Disconnect the thermostat control electrical pigtail from the case wiring harness, including probe wiring.
3. Remove thermostat.

Thermostat Bulb

The associated thermostat bulb is located behind the 4.0 in. hole plug on the left side of the case. To remove the thermostat probe, perform the following:

Thermostat Probe Location



1. Remove the thermostat probe access panel.
2. Remove the thermostat probe just far enough to gain access to the electrical pigtail.
3. Disconnect the thermostat probe from the electrical pigtail.
4. Remove thermostat probe.

Expansion Valve

The expansion valve is an integral part of the system and is located under the wire racks and bottom display pans. It is located on the left side of the case (forward looking aft) to the coil from the distributor lines.

Expansion Valve Location



1. Remove wire racks and bottom display pans to gain access to the expansion valve.
2. Contact the Kysor//Warren Service Representative for additional information.

Electronic Ballasts



WARNING! Always disconnect the electrical power at the main disconnect when servicing or replacing any electrical component. Failure to disconnect the electrical power may result in personal injury or death.

The following procedures provide information to remove the nose light ballast or the canopy and shelf lamp ballasts.

Nose Light Ballast

The nose light ballast is located in the bottom raceway on the right hand side. To remove the nose light ballast, perform the following:



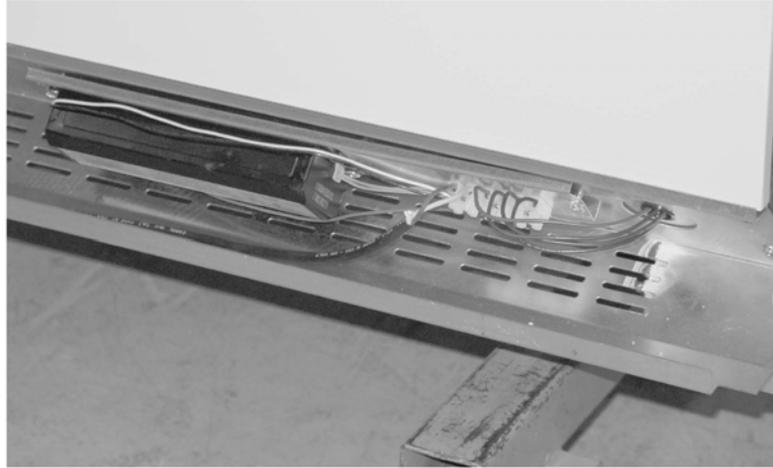
Note: The switch for the nose light is separate from the canopy and shelf lighting. The nose light switch is located on the rail.



Note: A nose light is not recommended for the QD6 series of cases.

REMOVAL/DISASSEMBLY

Nose Light Ballast Location



1. Disconnect the electrical power to the merchandiser.
2. Remove the lower front panel by lifting it up and out.
3. Remove screws attaching the raceway cover, then remove the cover.
4. Disconnect light ballast from wiring termination block.
5. Remove the screws securing the light ballast assembly to the case.
6. Remove light ballast.
7. Service or replace the ballast per the Installation chapter of this manual.

Canopy and Shelf Lamp Ballast

These ballasts are located at the top of the merchandiser inside the canopy. The switch in the canopy operates both the canopy and the shelf lamps. The rail lamp has a separate switch.

1. Disconnect the power to the merchandiser.
2. Remove fluorescent lamps from the canopy.
3. Remove the screws that secure the lamp panel.
4. Grasping the light panel at the area where the top of the panel and the top of the merchandiser meet, pull back and down until the panel swings freely.
5. Remove the screws securing the light ballast(s) assembly to the case.

6. Remove light ballast.
7. Service or replace the ballast per the Installation chapter of this manual.

Fluorescent Lamps



WARNING! Always disconnect the electrical power at the main disconnect when servicing or replacing any electrical component. Failure to disconnect the electrical power may result in personal injury or death.

Fluorescent lamps are located under the front rail and on the canopy. Remove the fluorescent lamps as follows:

Fig. 8-12. Fluorescent Lamps Location (Under Front Rail Illustrated)



Note: Fluorescent lamps are furnished with moisture resistant lamp holders, shields and end caps. Whenever a fluorescent lamp is replaced, be certain to reinstall the lamp shields and end caps.

The switch in the canopy operates both the canopy and the shelf lamps. The rail lamp switch is located on the rail.

1. Disconnect the power to the merchandiser.
2. Remove lamp shields and end caps, if required.
3. Remove fluorescent lamps from the canopy.

REMOVAL/DISASSEMBLY

Modular Electric Defrost Heater

These heaters are attached to the front of the modular coils and may be accessed by lifting the fan plenums. Remove the modular electric defrost heater as follows:

1. Disconnect the power to the merchandiser.
2. Remove wire display racks and bottom display pans from the section of the compartment being serviced.
3. Gain access to the area below the fan plenums by hinging up and fastening the modular fan plenum to the interior back panel with chain and hook provided.
4. Unplug the heater from the heater harness.
5. Remove the modular electric defrost heater from the face of the coil. Be sure to retain the attachment clips for use during installation of the new heater.

INSPECTION

This Inspection chapter provides the instructions to follow whenever maintenance is performed on the case.

Leakage

Inspect components (evaporator coil, expansion valve, filters, etc.), for any signs of leakage. Leakage can be identified by excessive build up of oil around the area that is leaking. If leakage is found, either tighten applicable fittings or remove and replace the components using the documentation for that compressor.

Lights

Ensure all lights are functioning. If lights are not functioning, troubleshoot system and remove and replace the applicable components using the instructions provided in the applicable chapters of this manual.

Shelf Alignment

Ensure all shelves are properly aligned and are at the same height. If a shelf is not aligned properly, remove the shelf, make the necessary adjustment to the shelf support, and then re-install the shelf.

Fans

Ensure all fan(s) are functioning properly. If fan(s) are not functioning, troubleshoot system per the Troubleshooting chapter of this manual.

Refrigerant Lines

Inspect refrigerant lines for any signs of leakage. Leakage can be identified by excessive build up of oil around the area that is leaking. If leakage is found, either tighten applicable fittings or remove and replace the defective refrigerant lines using the instructions provided in the applicable chapters of this manual.

Case Temperature

Inspect to ensure case temperature is properly maintained and that the case contents also maintain the proper temperature. Refer to the Operation chapter of this manual.

CLEANING

General Cleaning

General cleaning instructions for the shelves, case, and mirrors are provided in the general cleaning instructions provided in this 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. Because of this, cleaning instructions for specific components of the case are also included in this

Shelves and Case

Long life, satisfactory performance and minimum maintenance cost of this equipment is dependent on the care the product receives. This case should be emptied of product and a thorough cleaning of both the interior and exterior should be completed on a monthly schedule.



Caution: Do not allow product to sit in an unrefrigerated area.

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.



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.

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



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 unit:

- o Do not use solvent, oil or acidic-based cleaners on any interior surfaces as the surface may become damaged.
- o Do not use abrasive cleaners and scouring pads as these will mar the finish.
- o Never introduce water into the case faster than the waste outlet can release it.
- o **DO NOT USE STEAM OR HIGH PRESSURE SYSTEMS TO CLEAN THE CASE, AS SEALS MAY BE BROKEN WHICH WILL CAUSE THE CASE TO LEAK.**

CLEANING



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. Special care must also be taken to introduce moisture into the openings of the electrical wire-way located on the underside front of the case.

Mirrors



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.

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:

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

Fans



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.

Remove all dust, film, oil from the fans and fan blades using a commercially available cleaner. Follow the instructions provided for the cleaner that has been selected. After cleaning, ensure all electrical connections are dry and free of all foreign matter.

Drain Screens (When Equipped)



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.

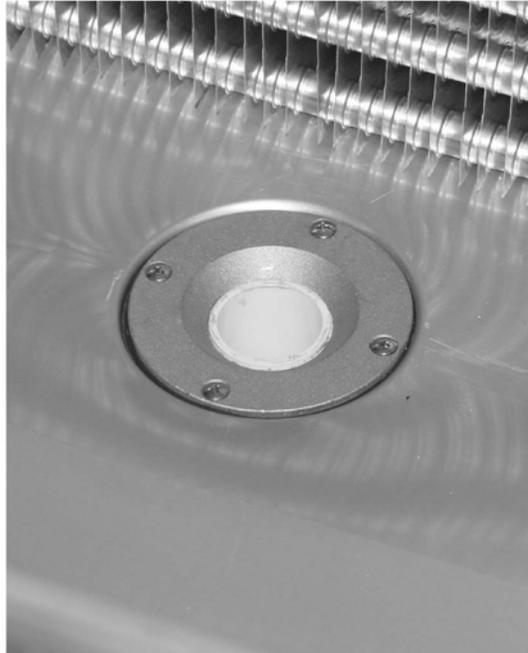
If the case has been equipped with drain screens, the screens will be located in the drain pans. Remove all foreign matter from drain screens to allow for unobstructed flow of water to the drain.

REPAIR

Damaged Drain Fitting

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

Drain Fitting



1. Use a drill with a 1 7/8" (48 mm) hole saw to drill out the bottom of the drain fitting. Be sure to drill completely through fitting and bottom liner.
2. Apply Teflon tape to threaded end of adapter and screw into threaded end of tee.
3. Apply an ABS and PVC compatible primer and sealer to adapter and inside of drain. Insert adapter into drain fitting.

Coil/Evaporator Leaking

The following procedure is for the field repair of the coil/evaporator. The coil/evaporator is shipped to the end user under pressure. If pressure is not present, perform the following:

1. Isolate the case in the line up that has been identified with a leaking coil/evaporator.

REPAIR

2. Isolate the leak in the coil/evaporator in the identified case by using pressurized air set at no more than 10 psi and a soap and water solution and a brush. Brush the solution over the coil/evaporator until the area that is leaking has been identified. Identify the area that is leaking with a grease pen or by the use of another available marking pen.
3. Clean the area around the leak with a mild detergent and water or another commercially available cleaning solvent.
4. Ensure the area around the leak is completely dry and free of all oil and grease.
5. Solder the area that was identified as leaking using good commercial practices. Contact your Kysor//Warren Service Representative if there are any questions regarding the type of solder to be used or the actual repair.
6. Verify the leak has been repaired, take the case out of isolation, and charge the system. Refer to the Parallel Compressor Units Operation and Maintenance Manual, Part Number 31E08001.

Electrical Connections

The following procedure is for the field repair of the electrical connections. If the case has electrical problems, perform the following:

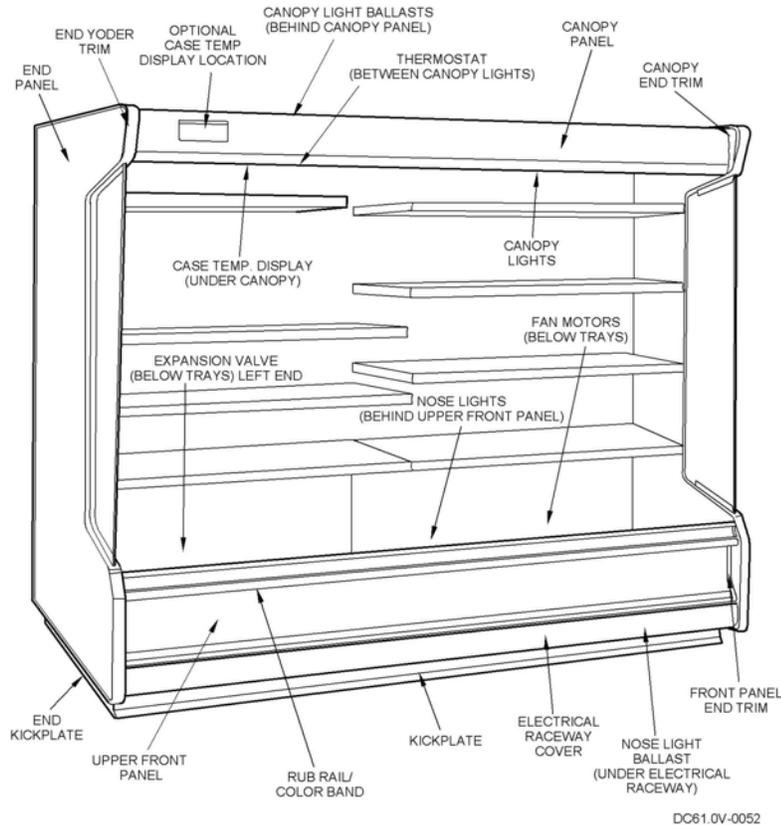
1. Identify the case with the electrical problem and remove power to that case.
2. Refer to that case electrical diagrams provided in this manual.
3. Check all fittings within that circuit to ensure the plugs are properly mated and there is no corrosion present on the pins and sockets of the plug or the mating connector.
4. If the plugs are properly mated and there is no corrosion present, use a digital multimeter to ohm each set of wires for the circuit that is inoperable, starting at the beginning and termination point for each circuit. Look for an open (infinity read on the meter). It is common practice to continue to isolate the circuit by following the wire back to the origination point and continuing to ohm the wire at each connection point.
5. Once the wire has been traced and the area requiring repair identified, repair the wire using good, commercial electrical practices. Contact your Kysor//Warren Service Representative if there are any questions regarding the actual repair.
6. Re-apply power to the case and verify the electrical system has been repaired.

INSTALLATION/ASSEMBLY



Note: Use the hardware that was removed during the disassembly of the case.

Front Case Location Diagram



The following steps are given to properly install the components of the case.

Shelf

To install the shelf assembly, perform the following:

1. Place brackets on shelf standard.
2. Install PTM on shelf.
3. Slide shelf onto brackets.
4. If optional shelf lights are equipped on the shelf, plug the wiring harness from the shelf into the case wiring harness located on the left side of the back panel.

INSTALLATION/ASSEMBLY

Lower Front Panel

Not equipped on these models.

Upper Front Panel

The upper front panel is installed on the upper, front of the case. The 2500 series and the 3000 series utilize different upper front panels. To install the upper front panel, perform the following

2500 Series Upper Front Panel

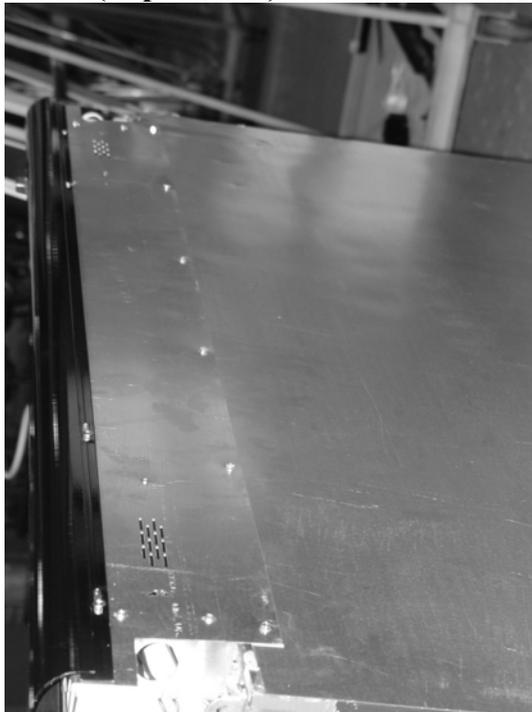
1. Place the front panel on top of the raceway and slide the color band over the top portion of the front panel, ensuring that the top of the color band is level.
2. Attach the color band to the case pre-punched holes with the screws.

3000 Series Upper Front Panel

1. Install the rub rail on the top portion of the tub.
2. Slide the upper front panel into the case.

Canopy Panel

Canopy Panel Mounting Screws (Top of Case)



The canopy panel is located on the top of the D6 cases and should not have been removed for routine maintenance. Removal was not necessary to facilitate maintenance to the canopy. To install the canopy panel, perform the following:

1. Install canopy panel into position on the case.
2. The canopy panel is secured to the case with several screws (quantity is dependant upon the type of D6 case) located on the top of the D6 case. Install screws securing the canopy panel to the case.
3. Install the trim on the front of the canopy panel. Refer to the installation procedure later in this

Kickplates

There are variances in kickplate configurations, dependant upon the line up of the cases. All cases are equipped with a center kickplate. For cases that have left or right end panels, an additional kickplate is provided for finishing the ends.

Kickplate (Center)

The kickplate is installed on the bottom, front of the case between the raceway and the floor. To install the kickplate, perform the following:

1. Install the kickplate into position and line up the holes in the kickplate with the pre-punched holes in the case.
2. Use screws to secure the kickplate to the case.
3. Install the end kickplate (if applicable).
4. Install the kickplate trim following the case trim installation procedure.

End Kickplate (Left or Right End)

The end kickplate is installed on the bottom, end of the case between the raceway and the floor. To install the end kickplate, perform the following:

1. Install the end kickplate into position and line up the holes in the end kickplate with the pre-punched holes in the kickplate (center).
2. Use screws to secure the end kickplate to the kickplate (center).
3. Install the kickplate trim following the case trim installation procedure.

INSTALLATION/ASSEMBLY

Case Trim

This paragraph provides the instructions for installing the various case trim located throughout the case and is dependant upon configuration/line up.

Kickplate Trim

The kickplate trim is located on the front of the kickplate. To install the kickplate trim, perform the following:

1. The kickplate joint trim mounts on the right side end of the kickplate, after the cases have been joined together and the kickplates have been mounted.
2. Slide the kickplate joint trim into the provided slots on the kick plate, ensuring the trim is fully engaged with the provided slots.

End Kickplate Trim

The end kickplate trim is located on cases with ends on them. To install the end kickplate trim, perform the following:

1. Install the end kickplate trim to the case end kickplates after the end kickplates have been securely mounted to the case.
2. Slide the end kickplate trim into the provided slots on the end kick plate, ensuring the trim is fully engaged with the provided slots and the trim is flush from the kickplate to the end kickplate.

Canopy/Colorband/Upper Front Trim

The canopy/colorband/upper front trim is installed on all cases. Install the canopy/colorband/upper front trim as follows:

1. Slide the canopy/colorband/upper front trim into the provided slots, ensuring the trim is fully engaged and the trim is flush from end to end.

Joint Trim

The joint trim is installed between the joints that occur when joining one case to another case. To install the joint trim, perform the following:

1. Center the joint trim over the joint.
2. Line up the holes in the joint trim with the pre-punched holes in the cases.
3. Secure the joint trim to the cases with screws.

Rub Rail

The rub rail is installed on the front of the tub. To install the rub rail, perform the following:

1. Slide the rub rail into the rub rail retaining slots on the case, ensuring the rub rail is level with the case.

Case Temperature Display



Note: There are several ways to review the case temperature. This includes an analog (dial) display, a digital display, or electronically monitoring. This procedure is for installation of the analog or digital display.

Analog Case Temperature Display and Probe

When equipped with an analog case temperature display, the display is located on the inside, top of the case. To install the analog case temperature display, perform the following:

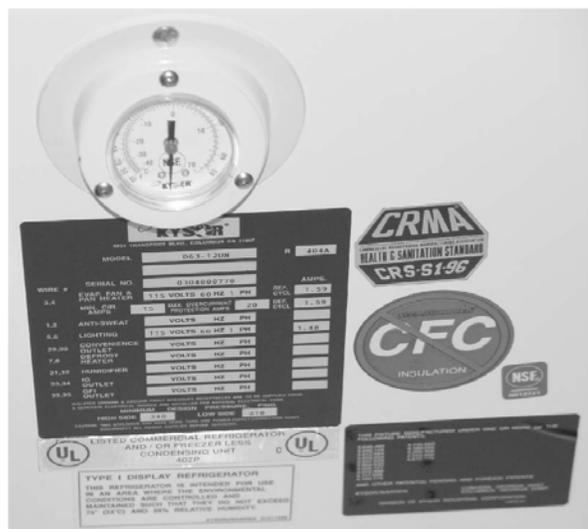


Caution: Use caution when installing the case temperature display and probe into the case. Ensure wiring is not accidentally pinched between the case and the case temperature display as the gage may not function properly.



Note: The probe for the analog case temperature display is an integral part of the display.

Analog Case Temperature Display and Probe



1. Connect electrical pigtail.

INSTALLATION/ASSEMBLY

2. Install the analog case temperature display to the case and secure with screws.
3. Perform the system operational checkout procedure located in the Operation chapter of this manual.

Digital Case Temperature Display and Probe

When equipped with an digital case temperature display, the display is located on the inside, top, front of the case. To install the digital case temperature display, perform the following:



Note: The probe for the digital case temperature display is an integral part of the display

Digital Case Temperature Display



Digital Case Temperature Display Probe



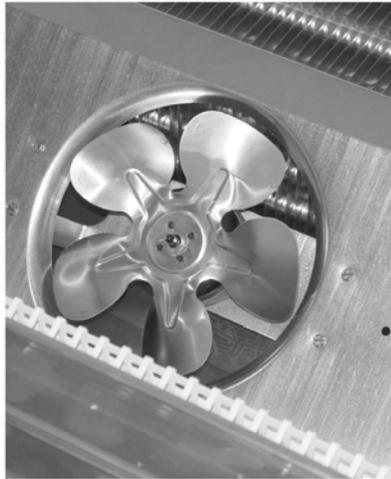
1. Connect electrical pigtail.
2. Install the digital case temperature display to the case and secure with screws.
3. Perform the system operational checkout procedure located in the Operation chapter of this manual.

Fan Blade/Motor (Typical)

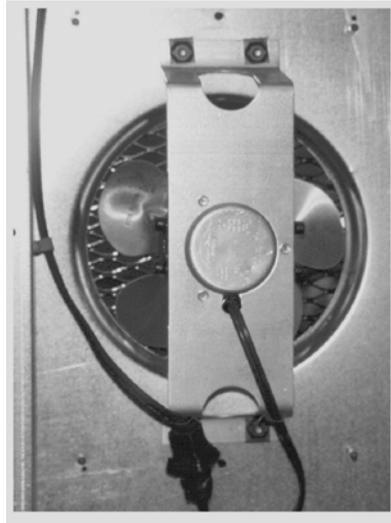
Fan Blade (Typical)

The fan blade is located on the fan assembly to the motor and is located on the inside, bottom of the case. To install the fan blade, perform the following:

Fan Motor and Blade — Top View



Fan Motor and Blade — Bottom View



INSTALLATION/ASSEMBLY

1. Ensure power to the case is OFF at the AC source/CB panel.
2. Ensure wire racks and bottom display pans have been removed to gain access to the fans.
3. Install fan blade into position.
4. Install the hardware securing the fan blade to the fan motor.
5. Perform the system operational checkout procedure located in the Operation chapter of this manual.
6. Install wire racks and pans.

Fan Motor

The fan motors employed are permanently oiled for the life of the motor and requires no periodic maintenance. They are wired according to the wiring diagram and must run continuously.



Note: Three different types of fan motors have been used for D6 cases. They are ECM, split capacitor, and shaded pole. All three mount into the case the same way, however they require different mounting brackets. Ensure the proper replacement part is ordered.

The fan motor is located on the fan plenum assembly inside the case below the deck pans. Quantity of motors is dependant upon the case size ordered. Refer to the figures in the Fan Blade section. To install the fan motor, perform the following:

1. Ensure the power to the case is OFF at the AC source/CB panel.
2. Ensure wire racks and bottom display pans have been removed to gain access to the fans.
3. Install the fan motor to the fan motor bracket and secure with four screws.
4. Connect the fan motor electrical pigtail to the fan motor.
5. Slide the fan motor assembly to the right or left, just far enough to allow the fan motor bracket to clear the case and then position the fan motor assembly into the case.
6. Install the four screws securing the fan motor assembly (fan motor with mounting basket) to the case.
7. Install the fan blade in accordance with the above paragraph.

8. Perform the system operational checkout procedure located in the Operation chapter of this manual. Verify that the blade is turning in the right direction.
9. Install wire racks and pans.

Thermostat and Thermostat Probe

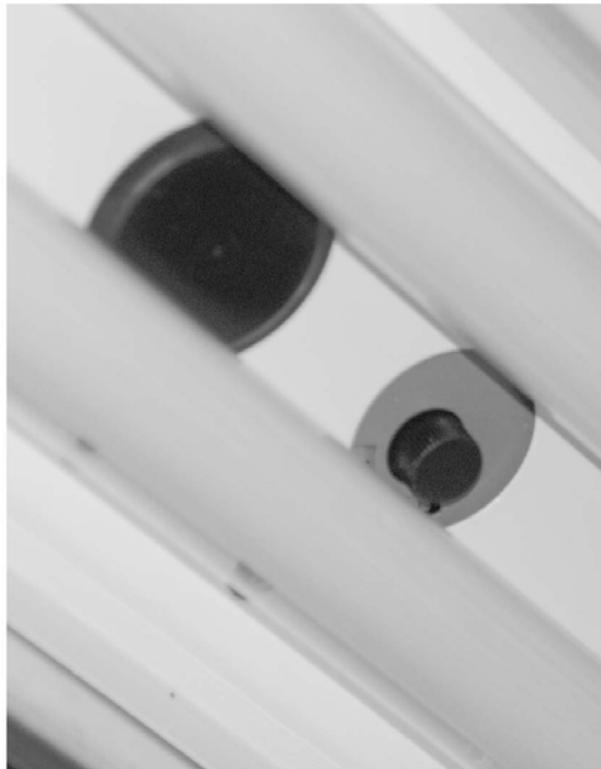


Note: There are several ways to control the case temperature and therefore a case thermostat may or may not be installed.

Thermostat Control

When equipped, the thermostat is located inside the light rail on the left side of the case. The associated thermostat bulb is located behind the 4.0 in. hole plug on the left side of the case. To install the thermostat and probe, perform the following:

Thermostat Control



1. Ensure the fluorescent lamps located in front of the thermostat control have been removed.
2. Connect thermostat control pigtail to the case electrical wiring, including probe wiring.
3. Install thermostat into position and secure with the hardware provided.

INSTALLATION/ASSEMBLY

4. Perform the system operational checkout procedure located in the Operation chapter of this manual.

Thermostat Bulb

The associated thermostat bulb is located behind the 4.0 in. hole plug on the left side of the case. To install the thermostat probe, perform the following:

Thermostat Probe Location



1. Ensure the thermostat probe access panel has been removed.
2. Connect the thermostat probe to the case electrical pigtail and coil the probe up inside the case access hole.
3. Install the thermostat probe access panel.
4. Perform the system operational checkout procedure located in the Operation chapter of this manual.

Expansion Valve

The expansion valve is an integral part of the system and is located under the wire racks and bottom display pans. It is located on the left side of the case (forward looking aft) to the coil from the distributor lines.

.Expansion Valve Location



1. The expansion valve is located below the wire racks and bottom display pans removed in the Disassembly chapter of this manual.
2. Contact the Kysor//Warren Service Representative for additional information.

Electronic Ballasts

The following procedures give instructions for replacing the nose light ballast or the canopy and shelf lamp ballasts.

Nose Light Ballast

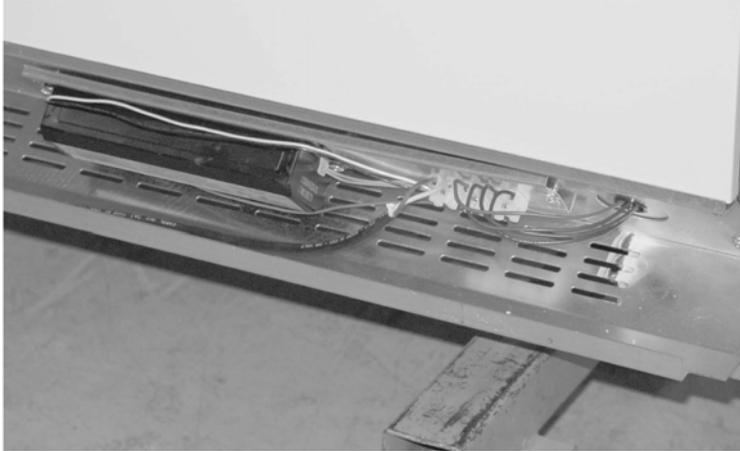
The nose light ballast is located in the bottom raceway on the right hand side. To gain access:



Note: The switch for the nose light is separate from the canopy and shelf lighting. The nose light switch is located on the rail.

INSTALLATION/ASSEMBLY

Nose Light Ballast Location



1. Replace the ballast removed in disassembly. Secure with the hardware provided/kept at disassembly.
2. Connect the light ballast to the wiring termination block.
3. Install the raceway cover and secure with the screws.
4. Install the front panel by pushing it up and then in.
5. Reconnect the electrical power.
6. Perform the system operational checkout procedure located in the Operation chapter of this manual.

Canopy and Shelf Lamp Ballast

These ballasts are located at the top of the merchandiser inside the canopy. The switch in the canopy operates both the canopy and the shelf lamps. The rail lamp has a separate switch.

1. Replace ballast removed in disassembly. Secure with the hardware provided/kept at disassembly.
2. Install light panel and secure with screws.
3. Install fluorescent lamps into the canopy. Refer to the following paragraph for fluorescent lamps.
4. Reconnect the electrical power.
5. Perform the system operational checkout procedure located in the Operation chapter of this manual.

Fluorescent Lamps

Fluorescent lamps are located under the front rail and on the canopy. Remove the fluorescent lamps as follows:

Fluorescent Lamps Location (Under Front Rail Illustrated)



Note: Fluorescent lamps are furnished with moisture resistant lamp holders, shields and end caps. Whenever a fluorescent lamp is replaced, be certain to reinstall the lamp shields and end caps.

The switch in the canopy operates both the canopy and the shelf lamps. The rail lamp switch is located on the rail.

1. Ensure the power to the merchandiser has been disconnected/removed at the AC service cabinet.
2. Install fluorescent lamps.
3. Install lamp shields and end caps, if required.
4. Perform the system operational checkout procedure located in the Operation chapter of this manual.

INSTALLATION/ASSEMBLY

Modular Electric Defrost Heater

The modular electric defrost heaters (not illustrated) are attached to the front of the modular coils and may be accessed by lifting the fan plenums. Install the modular electric defrost heater as follows:

1. Ensure the access to the area under the wire racks and bottom display pans and below the fan plenums.
2. Install new heater into position and secure with the hardware provided.
3. Connect heater electrical pigtail to the case electrical wiring.
4. Reposition fan plenum and reconnect power.
5. Perform the system operational checkout procedure located in the Operation chapter of this manual and verify proper operation of the modular electric defrost heater.
6. Install wire racks and pans.

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.



Note: Light bulbs supplied in cases manufactured in the past have been either T8 or T12. It is important that when ordering bulbs, give the Customer Service Department the serial number of your case or provide the size/style of the bulbs to be sure that the correct bulb style and ballast is ordered. If you require assistance, please call the Customer Service Department.



Note: Electronic ballasts for T8 bulbs supplied on cases manufactured starting July 2003 carry the Underwriters Laboratory "CC" rating. When part orders are received for T8 ballasts on cases manufactured prior to July 2003, the orders will be filled with the new "CC" rated ballasts.



Note: It is very important to call in with the serial number of the case when ordering valves. There are many different valves and each case may vary.

		4 FT	6 FT	8 FT	12 FT
(H)(Q)D6(N)(L) - DAIRY STANDARD & NARROW CASES					
Std Fan Motor (Non-Q and Q only)		09A10041 (Qty: 1)	09A10040 (Qty: 2)	09A10041 (Qty: 2)	09A10041 (Qty: 3)
PSC Fan Motor (Non-Q and Q only)		09A10055 (Qty: 1)	09A10097 (Qty: 2)	09A10055 (Qty: 2)	09A10055 (Qty: 3)
PSC Fan Motor (HQ only)		09A10102 (Qty: 1)	09A10055 (Qty: 2)	09A10102 (Qty: 2)	09A10102 (Qty: 3)
EC Fan Motor (Q and HQ only)	09A10107	1	2	2	3
Fan Blade 8" - 30° (Non-Q only)	09B10043	1	2	2	3
Fan Blade 8" - 40° (Q and HQ only)	09B10055	1	2	2	3
D6R(L)(G) - DAIRY REAR LOAD CASES					
Std Fan Motor	09A10041	3	3	4	6
PSC Fan Motor	09A10055	3	3	4	6
Fan Blade 8" - 30°	09B10043	3	3	4	6
(H)(Q)D6(R)(L)(G) - STANDARD CASES					
Deck Pan - Black HDPE	13A10622	2	3	4	6
Deck Pan - White HDPE	13A10623	2	3	4	6
Deck Pan - Painted	54N18237	2	3	4	6
Deck Pan - 430 SS	55M16029	2	3	4	6
Deck Pan - 304 SS	55M16166	2	3	4	6
(H)(Q)D6N(L)(G) - NARROW CASES					
Deck Pan - Painted	54N18536	2	3	4	6
Deck Pan - 430 SS	55M16127	2	3	4	6
Deck Pan - 304 SS	55M16183	2	3	4	6

Warranty

Rev. 4.1.2009

DIVISION OF KYSOR INDUSTRIAL CORPORATION 5201 Transport Boulevard Columbus,
Georgia 31907 706-568-1514

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 **KYSOR//WARREN'S** authorized dealer or 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.

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 unit used with refrigerated equipment unless same was sold and shipped by KYSOR//WARREN.**
- 2. When this equipment or any part thereof is damaged by accident, fire, flood, act of God, alteration, abuse, misuse, tampering, when the original model and serial number plate has been altered, defaced, or removed or used other than the recommended application by KYSOR//WARREN.**
- 3. When this equipment or any part thereof is subject to operation on low, high or improper voltages. Low and high voltage is defined as more than a 5% drop below or 10% higher than name plate voltage ratings. NOTE: Proper field supply voltage to the equipment is the responsibility of the owner (end user).**
- 4. To damage caused by overloading shelves or wire racks beyond the specified weight limits. The maximum weight limit for standard KYSOR//WARREN shelves and wire racks is 30lbs per square foot.**

5. When this equipment or any part thereof is damaged, or when operation is impaired, due to failure to follow installation manual.
6. **NOTE: Proper installation is the responsibility of the installer, owner (end user).**
7. **Operational issues caused by ambient environmental conditions outside of the specified limits. All KYSOR//WARREN equipment is specified to operate in a conditioned ambient environment not to exceed 75 degrees Fahrenheit or 55% relative humidity. NOTE: Providing specified ambient environmental conditions are the responsibility of the owner (end user).**
8. **To equipment with final destinations unknown to KYSOR//WARREN as indicated on the original sales order.**
9. **To labor cost for repair or replacement of parts.**
10. **To special or expedited freight or shipping charges or to customs duties to any country.**
11. **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.

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