1. UNIT PERFORMANCE .....................................................................................................2
   1.1. Net R-134a Refrigeration Cooling Capacity.......................................................... 2
   1.2. Evaporator Airflow (Downward) .......................................................................... 2
   1.3. Electric Resistance Heating .................................................................................. 2
   1.4. Fresh Air Renewal - 50 Hz @ Zero Ext. Static Pressure (Standard position) .......... 2
   1.5. Condenser Airflow ............................................................................................... 2
   1.6. Unit Air Leakage .................................................................................................. 2
   1.7. Unit Heat Leakage .............................................................................................. 2
   1.8. Low Sound ......................................................................................................... 2
   1.9. Bulkhead Resistance ......................................................................................... 2

2. UNIT PHYSICAL DATA ...............................................................................................3
   2.1. Unit Weight ......................................................................................................... 3
   2.2. Dimensions and Drawing references (Standard) .................................................. 3
   2.3. Electrical ............................................................................................................. 3
   2.4. Refrigeration Piping (Refer to Refrigeration Piping Diagram) .............................. 3

3. UNIT DESIGN ............................................................................................................4
   3.1. Guidelines ........................................................................................................... 4
   3.2. Operating Conditions ......................................................................................... 4

4. COMPONENT DESCRIPTION .....................................................................................4
   4.1. Compressor ......................................................................................................... 4
   4.2. Condenser Fan Motor ......................................................................................... 4
   4.3. Evaporator Fan Motors (2) ................................................................................. 4
   4.4. Condenser Coil ................................................................................................... 5
   4.5. Evaporator Coil .................................................................................................. 5
   4.6. Condenser Fan ................................................................................................... 5
   4.7. Evaporator Fans ............................................................................................... 5
   4.8. Heaters (Defrost and Heating) ............................................................................ 5
   4.9. Electrical Controls Circuitry ............................................................................... 6
   4.10. Safety Devices .................................................................................................. 6

5. UNIT CONTROL SYSTEM .........................................................................................8
   5.1. Temperature Controller/DataCorder ................................................................... 8
   5.2. Cooling Capacity Control ............................................................................... 8
   5.3. Defrost ............................................................................................................. 8

6. MATERIALS AND COATINGS ..............................................................................9
   6.1. Materials ........................................................................................................... 9
   6.2. Coatings ......................................................................................................... 9

7. FEATURES FOR POST-PRODUCTION INSTALLATION .......................................10

8. REFRIGERATION PIPING DIAGRAM ....................................................................11
1. UNIT PERFORMANCE

1.1. Net R-134a Refrigeration Cooling Capacity

At 38°C (100°F) ambient temperature and 60 Hz Power Supply:

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Cooling Capacity</th>
<th>Power</th>
<th>Power Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>-29°C (-20°F)</td>
<td>2,772 Watt (11,000 Btu/h)</td>
<td>5.0 kW</td>
<td>0.55</td>
</tr>
<tr>
<td>-18°C (0°F)</td>
<td>5,166 Watt (20,500 Btu/h)</td>
<td>6.4 kW</td>
<td>0.66</td>
</tr>
<tr>
<td>2°C (35°F)</td>
<td>8,820 Watt (35,000 Btu/h)</td>
<td>10.8 kW</td>
<td>0.81</td>
</tr>
</tbody>
</table>

1.2. Evaporator Airflow (Downward)

High Speed: 5,437 m³/h @ 19.0 mm wg* (3,200 ft³/min @ 0.75 inch wg) @ 60 Hz
Low Speed: 2,379 m³/h @ 6.4 mm wg* (1,400 ft³/min @ 0.25 inch wg) @ 60 Hz

*Static pressure measured external to the unit.

1.3. Electric Resistance Heating

5,627 Watt (19,200 Btu/h) @ 460 V, 60 Hz (Including fan motor heat.)

1.4. Fresh Air Renewal - 50 Hz @ Zero Ext. Static Pressure (Standard position)

Flow rate: 0 - 180 cm³/h (106 cfm), Maximum rate meets the ATO requirement. Rate is also affected by the container design. Adjustable disc is located on upper left access panel

1.5. Condenser Airflow

3,908 m³/h (2,300 ft³/min) @ 60 Hz

1.6. Unit Air Leakage

0.142 m³/h @ 50.8 mm wg (5 ft³/h @ 2 inch wg)

1.7. Unit Heat Leakage

3.9 W/°K (7.4 Btu/h/°F) calculated

1.8. Low Sound

Does not exceed 78 dB(A) 1.5 meter in front and 1.2 meter above lower corner castings @ 380 V, 50 Hz.

1.9. Bulkhead Resistance

13,000 kg (28,660 lbs)
2. UNIT PHYSICAL DATA

2.1. Unit Weight

538 kg (1185 lbs)

2.2. Dimensions and Drawing references (Standard)

Unit Height: ................................. 2,235 mm (88.00 inch)
Unit Width: .................................. 2,026 mm (79.75 inch)
Unit Depth: .................................. 416 mm (16.38 inch)

Applicable Drawings:
98-02325, Rev. - ......................... Installation and Dimension
98-02327, Rev. - ......................... TIR Plan

2.3. Electrical

Operating Voltage Range ........... 400 to 500 V, 3 ph @ 60 Hz ± 2.5%
                                 360 to 430 V, 3 ph @ 50 Hz ± 2.5%

Power Cable (460V) ................... 18 meter (59.4 ft) yellow 10/4 SO Hypalon; 90°C 
                                 (194°F) rating.

Power Plug ................................. Type CEE17 with earth @ 3h position 
                                 Rated 32 A @ 440 VAC.

Circuit Breaker ............................ Must hold 25 A. Must trip at 29 A

- Address system of wire marking on all wiring (except controller). Control wires to 
  be white, power wires to be red, ground wires to be green with yellow stripe.
- Wire is tin plated multi-strand copper
- Fan motors are single phase

2.4. Refrigeration Piping (Refer to Refrigeration Piping Diagram)

Refrigerant and Oil ........................ R-134a and POE oil
Refrigeration Circuits ................. Solid copper tube
Service Ports .............................. SAE J639 R-134a connections are used on 
                                 compressor service valves and liquid line.
Receiver Assembly ....................... Consists of receiver, brass service valve and fusible 
                                 plug.
Receiver Vessel ............................ Copper with two brass sightglasses, one dry eye. 
                                 Coated with acrylic electrocoat system.
Control Components ..................... Stepper modulation valve provides continuous 
                                 capacity control and increased low temperature 
                                 capacity, quench TXV for compressor cooling.
Heat Exchanger ........................... Copper, suction-side
3. **UNIT DESIGN**

3.1. **Guidelines**

ISO 1496/2-1996(E); ATP; ARI; TIR; AMCA

3.2. **Operating Conditions**

- **Ocean Environment**: Salinity and high relative humidity, severe atmospheric conditions (temperature, wind, rain, spindrift variations).
- **Rolling**: Amplitude of 30° on each side, period of 13 seconds
- **Pitching**: Amplitude of 6°, period of 8 seconds
- **Permanent List**: 10° on each side
- **Shock**: Acceleration, longitudinal of 2g; vertical of 5g
- **Vibration**: As encountered by the following types of transport: naval, land (vehicular) and rail.
- **Ambient Range**: -30°C to +54°C (-22°F to +130°F)

4. **COMPONENT DESCRIPTION**

4.1. **Compressor**

- **Model**: Carrier 06DR241
- **Thermal Protection**: Internal, automatic reset
- **Standard Speed**: 1,750 rpm @ 60 Hz
- **Gas Displacement @ 1750 rpm**: 41 cfm
- **Oil Pump**: Reversible, gear
- **Finish**: Shotblast, iron phosphate surface preparation, electrocoat polyester base, electrostatic polyester powder paint topcoat.

4.2. **Condenser Fan Motor**

- **Nominal Rating**: 560 Watt (3/4hp)
- **Type**: Totally enclosed, non-vented
- **Speed**: 1,725 rpm @ 60 Hz
- **Shaft Material**: Stainless steel type 303/304/316
- **Frame Size**: 56
- **Finish**: Engineered marine finish of electrocoat epoxy paint.
- **Thermal Protection**: Internal, automatic reset

4.3. **Evaporator Fan Motors (2)**

- **Nominal Rating (high/low)**: 627/82 Watt (0.84/0.11hp)
- **Type**: Totally enclosed
- **Speed (high/low)**: 3,450/1,725 rpm @ 60 Hz
- **Shaft Material**: Stainless steel type 303/304/316
- **Frame Size**: 48
Thermal Protection ..................... Internal, automatic reset

4.4. Condenser Coil

Number of Rows ...................... 3
Tube Material ....................... Copper, patented enhanced internal cross-hatched surface.
Fin Material .......................... Copper, patented wave design.
Tube/Fin Coating .................. Patented Acrylic Electrocoat
Fin Spacing ......................... 14 per 25.4 mm (1 inch)
Face Area ............................ 0.414 m² (4.46 ft²)
Fin Surface Area ..................... 25.5 m² (275 ft²)
Tubesheets (4) ....................... Copper

4.5. Evaporator Coil

Attitude ............................... 30° from horizontal
Tube Material ....................... Copper, patented enhanced internal cross-hatched surface.
Fin Material .......................... Aluminum
Face Area ............................. 0.63 m² (6.73 ft²)
Fin Surface Area ..................... 48.5 m² (522 ft²)
Number of circuits ............... 16
Tube Sheets ......................... Aluminum (mounting hardware is 300-series stainless steel).
Fin Spacing .......................... 8 per 25.4 mm (1 inch)
Tube/Fin Treatment ............... Oakite Cryscoat-747, or Parco Cleaner-PC2323

4.6. Condenser Fan

Type .......................... Axial, 9 blade
Number ......................... 1
Drive ................................ Direct via stainless steel motor shaft
Diameter ......................... 445 mm (17.5 inch)
Material ....................... 15% glass filled nylon

4.7. Evaporator Fans

Type .......................... Vane axial, 11 blade
Number ......................... 2
Drive ................................ Direct via stainless steel motor shaft
Diameter ......................... 330 mm (13 inch)
Material ....................... 15% glass filled nylon

4.8. Heaters (Defrost and Heating)

Main Heater Rods ................... Six U-shaped tubular with stainless steel sheath.
Rated 750 Watt each @ 230 VAC.
4.9. Electrical Controls Circuitry

Control Circuit Transformer
Control Circuit Voltage................24 VAC (1 ph. @ 460 VAC, 60 Hz)
(nominal).............................20 VAC (1 ph. @ 380 VAC, 50 Hz)
Rating .........................................205 VA (24 V) plus 105 VA (18 V x2).
Insulation ....................................Class H

Indicator Lights
Function/Color:
Cool ............................................White
Defrost ........................................Orange
Heat ...........................................Orange
In-range .................................Green
Alarm ........................................Red
Supply Air Control...............Yellow
Return Air Control ............Yellow

Contactors
Full load amp rating @ 600 VAC:
Condenser Fan ...........................12 A
Evaporator Fan ...........................12 A
Compressor .................................30 A
Heater .........................................12 A

Main On-Off Switch
Location .....................................External face of unit
Type ............................................Toggle switch (bayonet)
Protection ..............................O-ring sealed shaft
Rating ..........................................10 A @ 115 VAC

4.10. Safety Devices

High pressure switch, settings:
Cut-out ..........................................2,413 kPa ± 69 kPa (350 psig ±10 psig)
Cut-in ...........................................1,724 kPa ± 69 kPa (250 psig ±10 psig)

Fusible Plug pressure relief device
Temperature setting .........................99°C (210°F)

High temperature safety
Temperature setting.........................54°C (130°F)
**Circuit Breaker (CB1)**

Trips at ........................................ 29 amps

**Fuses**

Control Circuit

<table>
<thead>
<tr>
<th>Rating</th>
<th>7.5 A (x2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Auto blade, SAE J1284</td>
</tr>
</tbody>
</table>

Microprocessor

<table>
<thead>
<tr>
<th>Rating</th>
<th>5 A (x2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Auto blade SAE J1284</td>
</tr>
</tbody>
</table>
5. UNIT CONTROL SYSTEM

5.1. Temperature Controller/DataCorder

Manufacturer...............................Division of UTC (USA)
Type............................................ML3 Microprocessor
Controlling and
Recording Range........................-30°C to +30°C (-22°F to +86°F)
Controller (2) and
Recording (2) Probes..................Precision 10,000 Ohm Thermistor
Probe locations ...........................Air entering the evaporator coil (return) and air leaving the evaporator coil (discharge).
Recorder memory .......................Minimum 1-year of trip information.
Interrogation................................5-pin connector (Veam or equivalent), unit front.

5.2. Cooling Capacity Control

**Chilled Mode, Set Point Above -10°C (14°F)**
Type of Capacity Control ............Suction modulation
Control logic................................PID control algorithm
Control range ..............................±0.25°C (± 0.45°F)
Heating: energize ..........................0.5°C (0.9°F) below set point
                              de-energize ..........................0.2°C (0.36°F) above set point

**Frozen Mode, Set Point Below -10°C (14°F)**
Type of Capacity Control ............Compressor on/off
Heating .......................................Locked out

5.3. Defrost

Type............................................Electrical heating
Intervals ......................................Selectable, timed or automatic
Selected intervals .......................3, 6, 9, 12 or 24 hours
Automatic....................................If selected, the unit microprocessor will determine the defrost interval based on the previous defrost length and previous defrost interval. Minimum defrost interval will be 3 hours and maximum 24 hours.

Defrost termination .....................(DTS) coil temperature sensor
Manual initiation.........................Press the manual defrost key on the unit keypad for (5) seconds.

Time delay maintains the in-range light energized throughout the defrost cycle and for 30 minutes after termination of defrost.
6. MATERIALS AND COATINGS

6.1. Materials

Main frame ................. 5000 and 6000 aluminum
Evaporator Compartment .... Riveted, formed 3000 or 5000 Aluminum
Motor mounts/stators .......... A380 series die cast aluminum
Control box ...................... "Weather tight" design
   Door ................................ Aluminum, includes treated polycarbonate window,
   Gasket ................................ Closed cell neoprene
Access Panels ..................... Two aluminum faced, insulated and gasketed
      panels. The upper left (cable side) panel houses
      the air exchange assembly.
Insulation (Foam) .............. Non-CFC blown (R-134a)
   Average thickness .......... 57.2 mm (2.25 inch)
   Nominal density ............. 32 kg/m³ (2 lbs/ft³)
Peripheral Air Seal .............. Flat PVC wiper.
Machine screws, hinges ....... ASTM type 300 stainless steel bolts/nuts/washers,
   and rivets.
Self-tapping screws .......... ASTM type 410 stainless steel with proprietary
   coating.
Charging/ service valves ....... Brass
Exposed dissimilar metals .... Fitted with mylar 0.25 mm (0.010 inch) thick
Discharge Pressure
   Regulating Valve .......... Copper body – internal components are brass and
      stainless steel

6.2. Coatings

Main frame, compressor ........ Chemical cleaning, Chromate base and compartment, conversion coating, One coat of
control box and door, ................... (triglycidylisocyanurate) polyester paint,
fan venturi and grill, panels ....... electrostatically applied powder process,
Filter drier ......................... Baked powder paint
Pressure relief device, .......... Hand applied vinyl or
high pressure switch, ............. polyurethane protective coating.
exposed refrigerant lines, exposed refrigerant lines,
liquid line charging valve, liquid line charging valve,
service valves, quench TXV service valves, quench TXV
7. FEATURES FOR POST-PRODUCTION INSTALLATION

Some options, not included during the original production, can be added in the field. The unit is designed to simplify installation of the following kit options unless the provision is specifically omitted.

* Rechargeable battery
* Dehumidification
* USDA
* Power Line Remote Monitoring
* Dual voltage by transformer module
* Vent position sensing
* Water cooled condenser

Receiver and water cooled condenser assemblies are interchangeable

Dual Voltage Option

The basic unit is wired for 460/380V - 3 phase - 60/50 Hz. To also accommodate 230/190V - 3 phase - 60/50 Hz power (dual voltage), the unit utilizes a factory installed modular transformer. The module includes a 230V circuit breaker, 460V receptacle and 18m 8/4 SO black power cable.

Operating Voltage Range

Mains .......................................... 200 to 250V, 3 ph @ 60 Hz ± 2.5%
.................................................... 180 to 215V, 3 ph @ 50 Hz ± 2.5%
Cable (230V)............................... 59.4 ft. (18m) black 8/4 SO Hypalon or equivalent jacketed 194°F (90°C) rating.
Power Plug (230V)...................... Mipco 634MP2 (factory installed)
Circuit Breaker (230V) ............... Must hold 50, trip 62 amps.

A stretchable rubber cord is provided to secure the cables in the unit.
8. REFRIGERATION PIPING DIAGRAM

1. Suction Service Valve
2. Discharge Service Valve
3. Stepper Modulation Valve
4. External Equalizer Line
5. Expansion Valve Bulb
6. Evaporator
7. Expansion Valve
8. Moisture-Liquid Indicator
9. Quench Valve
10. Receiver
11. Sight Glass
12. Filter-Drier
13. Liquid Line Valve
14. Fusible Plug (High Side)
15. Air-Cooled Condenser with Sub-Cooler
16. Suction Line Heat Exchanger
17. Discharge Pressure Regulator
18. Quench Valve Bulb