



# CONTAINER REFRIGERATION UNIT TECHNICAL SPECIFICATIONS



**Model 69NT40-541-500**

Jan 2015



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**1. UNIT PERFORMANCE**

**1.1. Net R-134a Refrigeration Cooling Capacity**

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

Air to Evaporator	Cooling Capacity		Power
-29°C (-20°F)	3,100 Watt	(10,600 Btu/h)	5.0 kW
-18°C (0°F)	6,010 Watt	(20,500 Btu/h)	6.4 kW
2°C (35°F)	10,250 Watt	(35,000 Btu/h)	10.8 kW

**1.2. Evaporator Airflow (Downward)**

High Speed: 5,437 m<sup>3</sup>/h @ 19.0 mm wg\* (3,200 ft<sup>3</sup>/min @ 0.75 inch wg) @ 60 Hz

Low Speed: 2,379 m<sup>3</sup>/h @ 6.4 mm wg\* (1,400 ft<sup>3</sup>/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 cmh (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**

4,757 m<sup>3</sup>/h (2,800 ft<sup>3</sup>/min) @ 60 Hz

**1.6. Unit Air Leakage**

0 m<sup>3</sup>/h @ 50.8 mm wg (5 ft<sup>3</sup>/h @ 2 inch wg)

**1.7. Unit Heat Leakage**

3 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**

481 kg (1060 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:

98-02641, Rev A ..... Installation and Dimension

98-02640, Rev A ..... TIR Plan

**2.3. Electrical**

Operating Voltage Range..... 400 to 500 V, 3 ph @ 60 Hz ± 2.5%  
360 to 460 V, 3 ph @ 50 Hz ± 2.5%

Power Cable (460V)..... 18 meter (59.4 ft) yellow 11/4 cable; 105°C (221°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

**2 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..... Aluminized coated Steel vessel with two brass sightglasses, one dry eye.

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: 2008(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 +50°C (-22°F to +122°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 ..... 270 Watt (0.36hp)

Electrical ..... Three phase

Type..... Totally enclosed, non-vented

Speed ..... 1,725 rpm @ 60 Hz

Shaft Material..... Stainless steel type 303/304/316

Frame Size ..... 48

Finish ..... Engineered marine finish of electrocoat epoxy paint.

Thermal Protection..... Internal, automatic reset

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

Nominal Rating (high/low) ..... 470/60 Watt (0.63/0.08hp)

Electrical ..... Three-phase

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 ..... 2  
Tube Material ..... Copper, patented enhanced internal crosshatched surface.  
Fin Material ..... Copper, patented wave design  
Tube/Fin Coating ..... Patented Acrylic Electrocoat  
Fin Spacing ..... 18 per 25.4 mm (1 inch)  
Face Area ..... 0.45 m<sup>2</sup> (4.8 ft<sup>2</sup>)  
Fin Surface Area ..... 23.8 m<sup>2</sup> (256 ft<sup>2</sup>)  
Tubesheets ..... Copper

**4.5. Evaporator Coil**

Attitude ..... 30 from horizontal  
Tube Material ..... Copper, patented enhanced internal crosshatched surface.  
Fin Material ..... Aluminum  
Face Area ..... 0.63 m<sup>2</sup> (6.73ft<sup>2</sup>)  
Fin Surface Area ..... 48.5 m<sup>2</sup> (522 ft<sup>2</sup>)  
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 ..... Parco Cleaner-PC2323

**4.6. Condenser Fan**

Type..... Axial, 9 blade  
Number..... 1  
Drive ..... Direct via stainless steel motor shaft  
Diameter ..... 495 mm (19.5 inch)  
Material..... 15% glass filled nylon

**4.7. Evaporator Fans**

Type..... Vane axial, 7 blade  
Number..... 2  
Drive ..... Direct via stainless steel motor shaft  
Diameter ..... 339 mm (13.3 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 ..... Blue  
 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 (HTT)**

Temperature setting ..... 54°C (130°F)

##### **Circuit Breaker (CB1)**

Trips at..... 29 amps

##### **Fuses**

Control Circuit



Rating ..... 7.5 A (x2)  
 Type..... Auto blade, SAE J1284  
 Microprocessor  
 Rating ..... 5 A (x2)  
 Type..... Auto blade SAE J1284

**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) below 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/m<sup>3</sup> (2 lbs/ft<sup>3</sup>)
- 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

**6.2. Coatings**

- Main frame, compressor ..... Chemical cleaning, Chromate base and compartment, control box and door coating, Uni-coat of grill, panels (triglycidylisocyanurate) polyester paint, electrostatically applied powder process, oven baked.
- Filter drier..... Baked powder paint
- Pressure relief device,..... Hand applied vinyl or high pressure switch, polyurethane protective coating.
- exposed refrigerant lines,
- liquid line charging valve,
- 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.

\*Vent position sensing

## **8. LISTING OF OPTIONS INCLUDED AND INSTALLED IN THE UNIT**

### **Power-Up Rechargeable Battery**

A rechargeable battery pack is provided to allow access to the microprocessor operator-adjustable parameters when no mains power is present. This allows the user to adjust parameters such as set point, defrost interval and current limit. User can also retrieve DataCorder data when not connected to mains power. The battery pack includes the battery housing which fits into the controller module and Ni-Cad batteries that recharge when the unit is on.

The DataCorder will wake up and record information on a regular (selectable) interval when in the USDA cold treatment mode. Battery provides a minimum of 72 hours of service from full charge when operating at -18°C (0°F) at 1 hour logging intervals.

### **Dehumidification Control**

The unit is equipped with the ability to dehumidify. The function is selected via code select method, and indicated by the flashing of the supply probe indicator light. The set point range is 60% to 95%. The sensor is located near the evaporator fan motor (right side facing unit). Sensor accuracy is +/-3% from 20 to 90% relative humidity and +/-4% from 90 to 100% humidity. Dehumidification is achieved by energizing the heaters during the cool mode. Heaters are not energized when out of the control temperature set point range.

### **USDA Cold Treatment**

The unit is prepared for the recording of three pulp temperatures for the purpose of meeting the USDA cold treatment criteria. An optional fourth probe can be added, but is not included as a USDA cold treatment requirement. For the connection of the USDA pulp probes, Deutsch HD10-3-96 P style receptacles are provided. The optional probes are thermistor type. Connectors are mounted on the controller side of the evaporator sheet metal.

### **TransFresh Port Provision**

For ease of field installation of the TransFresh system, unit penetrations for the purge port are included.

### **XtendFRESH Provision**

The unit has the XtendFRESH provision. For ease of field installation of the XtendFRESH modified atmosphere system, essential wiring, and sensor connections are included.

### **Enhanced Stainless Steel Fasteners**

To prevent discoloration due to corrosion, stainless steel 316 fasteners are used.



### **Evaporator Tubing Coating**

External copper tubing on the evaporator coil will be coated with a varnish.

### **QUEST Power-Saving Mode (with default setting: OFF)**

QUEST power-saving mode maintains cargo temperature based on setpoint protocols for perishable cargoes. QUEST cycles the compressor on/off and fans from high to low speeds according to the specific protocol for the setpoint.

### **Power Line Remote Monitoring Provision**

Unit is *provisioned* to install ISO high data rate Remote Communicating Device, (RCD) in the field. Buyer agrees that Seller warranty does not include PPG devices.

### **Anti-tamper Refrigerant Seals**

Unit is fitted at the factory with anti-tamper refrigerant seals at the three service port locations (suction, discharge and liquid) in order to hinder unauthorized access to the refrigeration system.

### 9. REFRIGERATION PIPING DIAGRAM

