



# CONTAINER REFRIGERATION UNIT TECHNICAL SPECIFICATIONS

## ThinLINE

### Model 69NT40-541

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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	Power Factor
-29°C (-20°F)	2,772 Watt	(11,000 Btu/h)	5.0 kW	0.55
-18°C (0°F)	5,166 Watt	(20,500 Btu/h)	6.4 kW	0.66
2°C (35°F)	8,820 Watt	(35,000 Btu/h)	10.8 kW	0.81

### 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

3,908 m<sup>3</sup>/h (2,300 ft<sup>3</sup>/min) @ 60 Hz

### 1.6. Unit Air Leakage

0.142 m<sup>3</sup>/h @ 50.8 mm wg (5 ft<sup>3</sup>/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 m<sup>2</sup> (4.46 ft<sup>2</sup>)  
 Fin Surface Area ..... 25.5 m<sup>2</sup> (275 ft<sup>2</sup>)  
 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 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 ..... Oakite Crysocoat-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)
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##### **High temperature safety**

Temperature setting.....	54°C (130°F)
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**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) 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, and removable hinge pins.
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
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, 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.

- \*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**

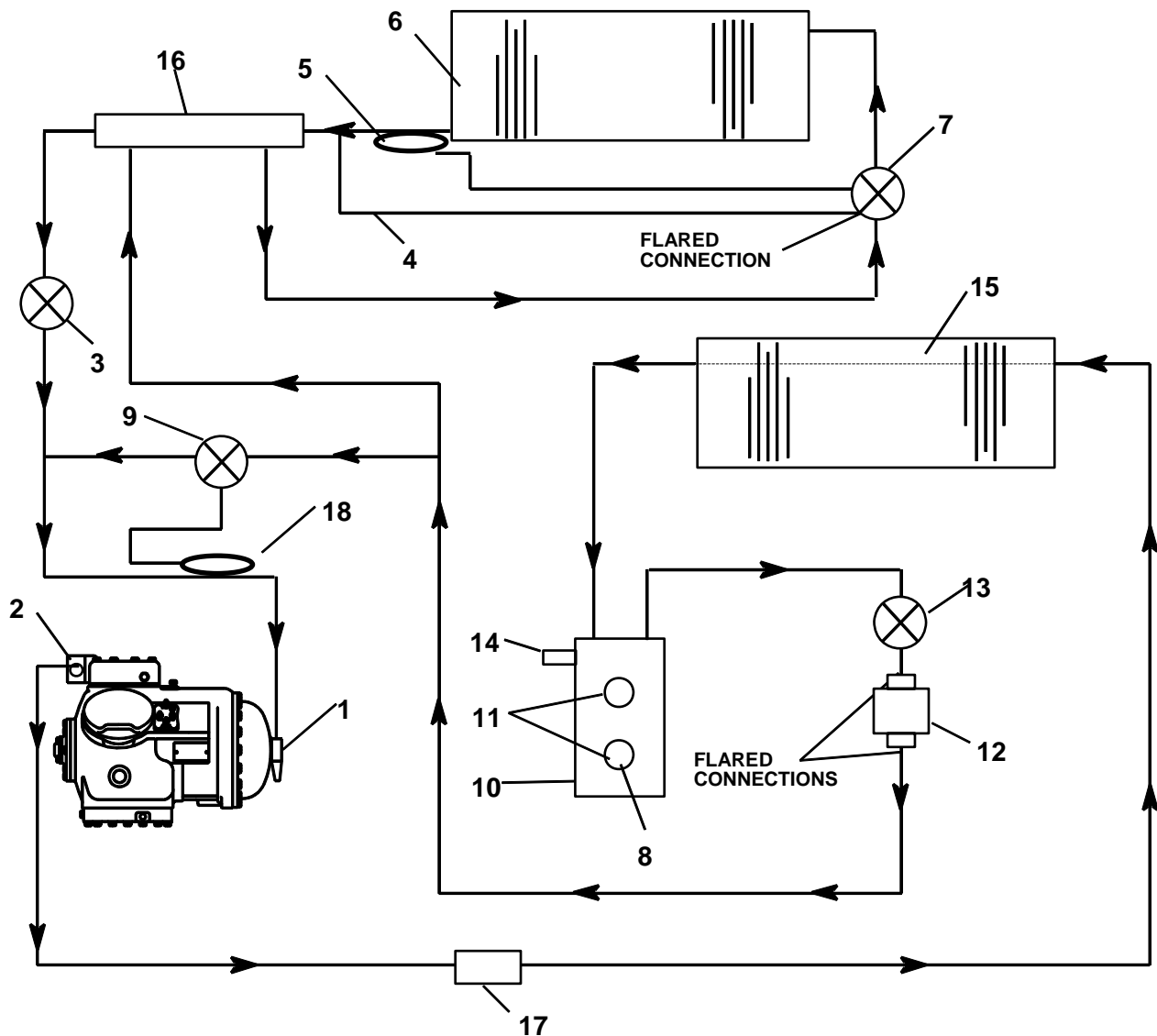
The basic unit is wired for 460/380V - 3 phase - 60/50 Hz. To also accommodate 230/190V - 3 phase - 60/50 Hz power (dual voltage), the unit utilizes a factory installed modular transformer. The module includes a 230V circuit breaker, 460V receptacle and 18m 8/4 SO black power cable.

**Operating Voltage Range**

- Mains ..... 200 to 250V, 3 ph @ 60 Hz  $\pm$  2.5%
- ..... 180 to 215V, 3 ph @ 50 Hz  $\pm$  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     | 10. Receiver                             |
| 2. Discharge Service Valve   | 11. Sight Glass                          |
| 3. Stepper Modulation Valve  | 12. Filter-Drier                         |
| 4. External Equalizer Line   | 13. Liquid Line Valve                    |
| 5. Expansion Valve Bulb      | 14. Fusible Plug (High Side)             |
| 6. Evaporator                | 15. Air-Cooled Condenser with Sub-Cooler |
| 7. Expansion Valve           | 16. Suction Line Heat Exchanger          |
| 8. Moisture-Liquid Indicator | 17. Discharge Pressure Regulator         |
| 9. Quench Valve              | 18. Quench Valve Bulb                    |