Carrier TRANSICOLD

CONTAINER REFRIGERATION UNIT TECHNICAL SPECIFICATIONS

ThinLINE

Model 69NT40-541

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Carrier
A United Technologies Company

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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^3/h @ 19.0 mm wg* (3,200 ft^3/min @ 0.75 inch wg) @ 60 Hz

Low Speed: 2,379 m^3/h @ 6.4 mm wg* (1,400 ft^3/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^3/h (2,300 ft^3/min) @ 60 Hz

1.6. Unit Air Leakage

0.142 m^3/h @ 50.8 mm wg (5 ft^3/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^2 (4.46 ft^2)
Fin Surface Area	25.5 m^2 (275 $ft^{2)}$
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^2 (6.73ft^2)
Fin Surface Area	48.5 m^2 (522 ft^2)
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

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^3 (2 lbs/ft^3)
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 base and compartment, control box and door, fan venturi and grill, panels	Chemical cleaning, Chromate conversion coating, One coat of (triglycidylisocyanurate) polyester paint, electrostatically applied powder process, oven baked.
Filter drier	Baked powder paint
Pressure relief device, high pressure switch, exposed refrigerant lines, liquid line charging valve, service valves, quench TXV	Hand applied vinyl or polyurethane protective coating.

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%

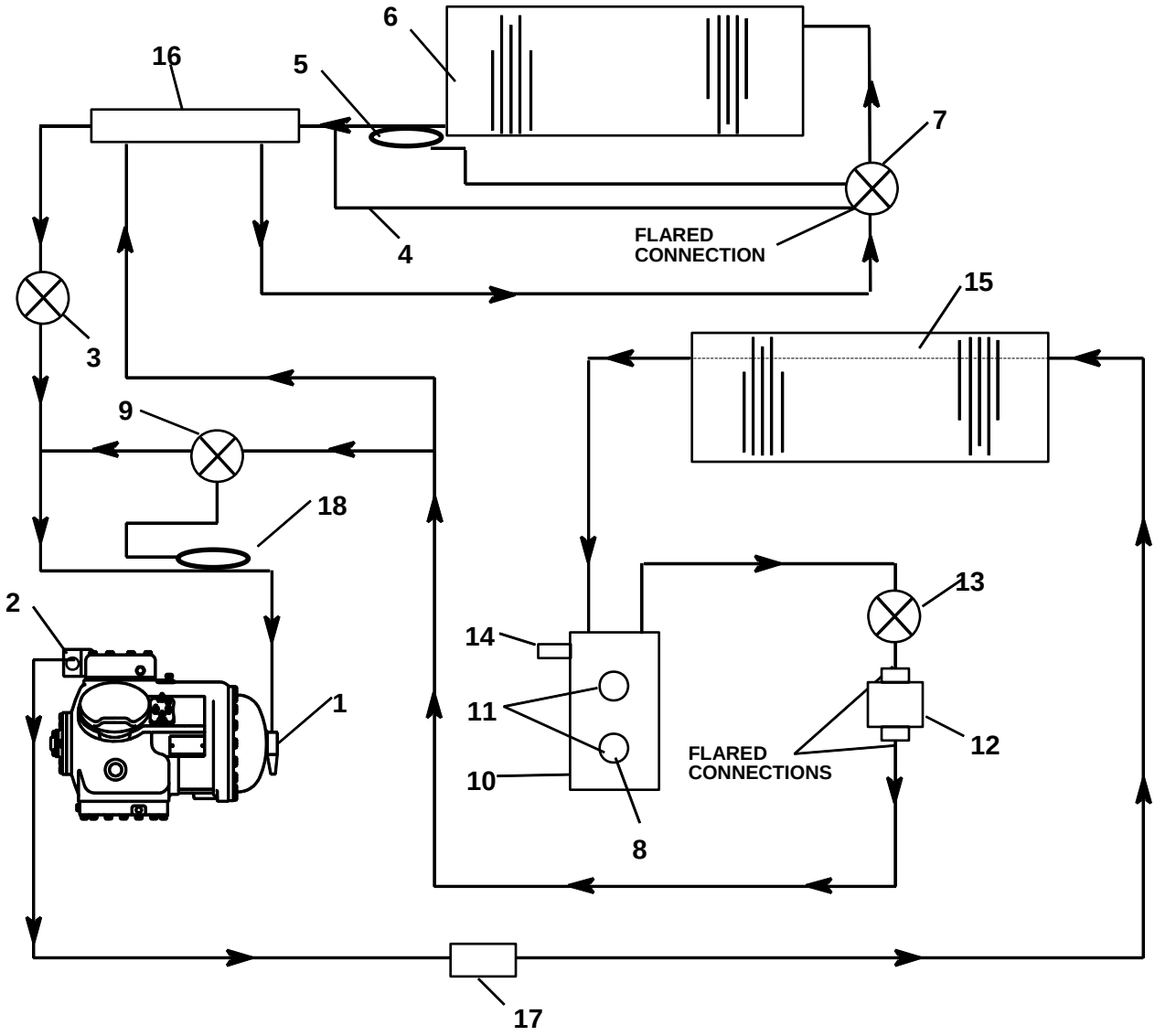
Cable (230V)..... 59.4 ft. (18m) black 8/4 SO Hypalon or equivalent jacketed 194°F (90°C) rating.

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