

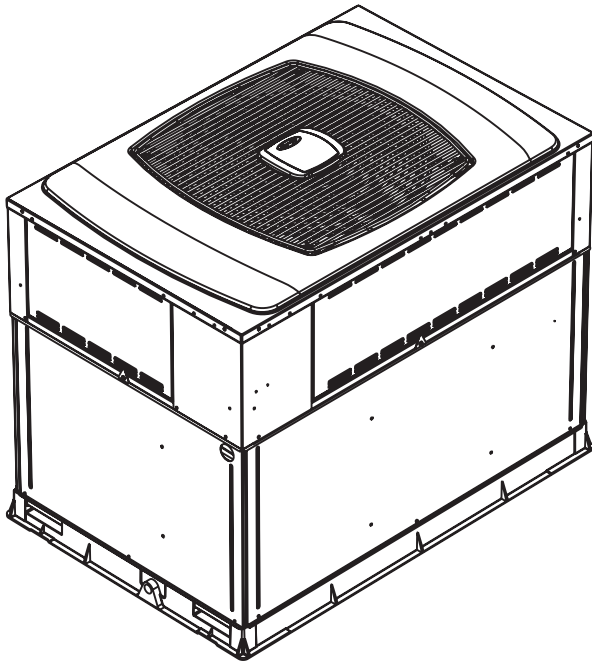
48CE/48CEN

Infinity™ 13 Single-Packaged Air Conditioner and Gas Furnace System with Puron® (R-410A) Refrigerant
2 to 5 Nominal Tons (024-060)



Turn to the Experts.™

Product Data



Unit 48CE

A05307

Single-Packaged Products with Energy-Saving Features and Puron® refrigerant.

- Direct Spark Ignition
- 13 SEER
- Up to 81% AFUE
- Low Sound Levels
- Variable-Speed Blower (Standard)
- Factory Installed TXV
- Stainless Steel Heat Exchanger (Limited Lifetime Warranty)

FEATURES/BENEFITS

One-piece heating and cooling units with low sound levels, easy installation, low maintenance, and dependable performance.

Puron® Environmentally-Sound Refrigerant is Carrier's unique refrigerant designed to help protect the environment. Puron refrigerant is an HFC refrigerant which does not contain chlorine that can harm the ozone layer. The most important advantage of Puron refrigerant is that it has not been banned in future air conditioning systems as the traditional refrigerant R-22

has been. Puron refrigerant is in service in over 100,000 systems proving highly reliable, environmentally sound performance.

IdealHumidity™ Technology featuring Infinity™ control and Variable-Speed Blower motor provides greater comfort, humidity control, and energy efficiency.

Variable-Speed Blower motors provide better comfort and energy efficiency. You can expect up to 30 times better dehumidification; economical constant fan for less than \$50 a year, which provides improved indoor air quality and more even temperatures from room to room; and reduced indoor noise due to lower air velocity. In addition, you'll realize improved installation flexibility with 3 different airflow choices for best overall comfort.

Easy installation

Factory-assembled package is a compact, fully self-contained, combination gas heating/electric cooling unit that is pre-wired, pre-piped, and pre-charged for minimum installation expense. These units are available in a variety of standard and optional heating/cooling size combinations with voltage options to meet residential and light commercial requirements. Units are lightweight and install easily on a rooftop or at ground level. The high tech composite unit base eliminates rust problems associated with ground level applications.

Convertible duct configuration

Unit is designed for easy use in either downflow or horizontal applications. Each unit is easily converted from horizontal to downflow with the two standard duct covers.

Efficient operation

High-efficiency design with SEERs (Seasonal Energy Efficiency Ratio) of 13.0 and AFUE (Annual Fuel Utilization Efficiency) ratings as high as 81%.

Energy-saving, direct spark ignition saves gas by operating only when the room thermostat calls for heating. Standard units are furnished with natural gas controls. A low-cost field installed kit for propane conversion is available for all units.

48CE/48CEN units are dedicated Low NOx units designed for California installations. These models meet the California maximum oxides of nitrogen (NOx) emissions requirement of 40 nanograms/joule or less as shipped from the factory and **MUST** be installed in California Air Quality Management Districts or any other location where a Low NOx rule exists.

Durable, dependable components

Compressors are designed for high efficiency. Each compressor is hermetically sealed against contamination to help promote longer life and dependable operation. Vibration isolation provides quiet operation. Compressors have internal high-pressure and overcurrent protection.

Monoport inshot burners produce precise air-to-gas mixture, which provides for clean and efficient combustion. The large

monoport on the inshot (or injection type) burners seldom, if ever, requires cleaning. All gas furnace components are accessible in one compartment.

Turbo-tubular™ heat exchangers are constructed of 409 stainless steel for corrosion resistance and optimum heat transfer for improved efficiency. The tubular design permits hot gases to make multiple passes across the path of the supply air.

In addition, dimples located on the heat exchanger walls force the hot gases to stay in close contact with the walls, improving heat transfer.

Direct-drive, variable-speed blower motor is standard on all 48CE models.

Direct-drive, PSC condenser fan motors are designed to help reduce energy consumption and provide for cooling operation down to 55°F outdoor temperature. Motormaster® II low-ambient kit is available as a field-installed accessory.

Infinity™ User Interface designed to work as a system with Carrier's single-packaged product.

Refrigerant system is designed to provide dependability. Liquid refrigerant filter driers are used to promote clean, unrestricted operation. Each unit leaves the factory with a full Puron refrigerant charge. Refrigerant service connections make checking operating pressures easier.

Thermostatic Expansion Valve—A hard-shutoff, balance port TXV maintains a constant superheat at the evaporator exit (cooling cycle) resulting in higher overall system efficiency.

High- and Low-Pressure Switches give added safety and reliability to the compressor.

Indoor and outdoor coils are computer designed for optimum heat transfer and cooling efficiency. The indoor coil is fabricated from copper tube and aluminum fins and is located inside the unit for protection against damage. The outdoor coil is internally mounted on the top tier of the unit. Copper fin coils and pre-coated fin coils are available from the factory by special order. These coils are recommended in applications where aluminum fins are likely to be damaged due to corrosion. They are ideal for seacoast applications.

Low sound ratings ensure a quiet indoor and outdoor environment with sound ratings as low as 72 dB. (See page 4.)

Easy to service cabinets provide easy single-panel accessibility to serviceable components during maintenance and installation. The basepan, with integrated drain pan, provides easy ground level installation with or without a mounting pad. Convenient handholds are provided to manipulate the unit on the job site. A nesting feature ensures a positive basepan to roof curb seal when the unit is roof mounted. A convenient 3/4-in. wide perimeter flange makes frame mounting on a rooftop easy.

Warranty—The 48CE heat exchangers come with a Limited Warranty for lifetime of original owner in single family residence; 15 years in other residential and commercial applications. Five-year limited warranty on entire unit. Contact your dealer for details.

Standard metal duct covers with insulation come with the unit and cover the horizontal duct openings. These can be left in place if the units are converted to downflow.

Downflow operation is easily provided in the field to allow vertical ductwork connections. The basepan utilizes knockout style seals on the bottom openings to ensure a positive seal in the horizontal airflow mode.

Infinity Gas Control (IGC) board provides safe and efficient control of heating and simplifies trouble-shooting through its built-in diagnostic function.

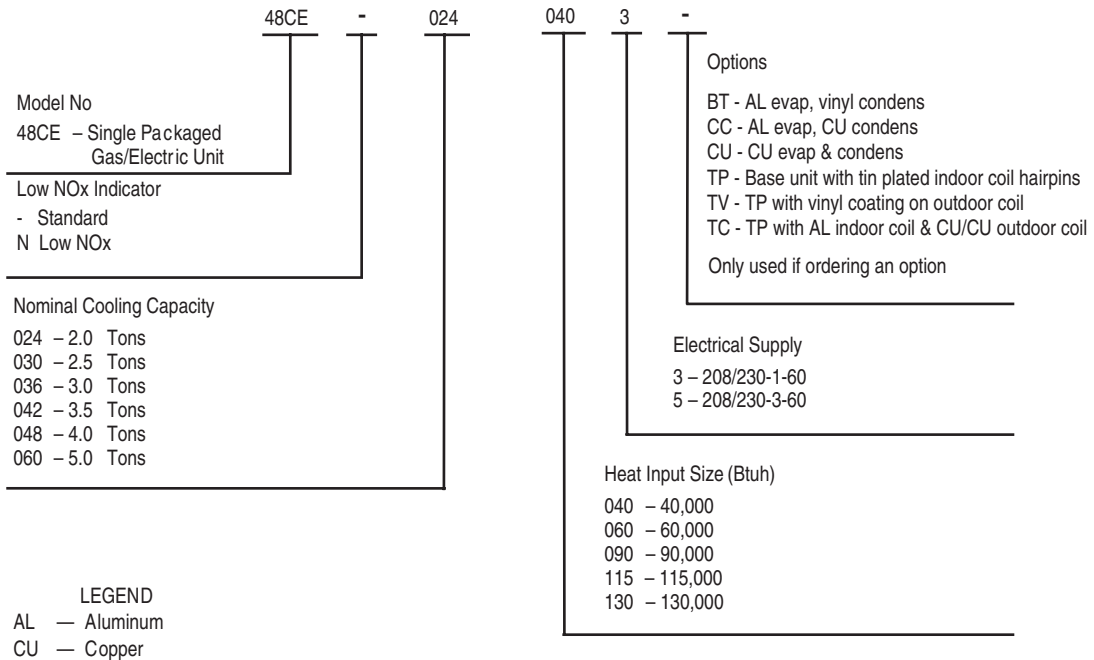
Cabinets are constructed of heavy-duty, phosphated, zinc-coated, pre-painted steel capable of withstanding 500 hrs of salt spray. Interior surfaces of the evaporator and electric heater compartments are insulated with foil-faced insulation, which keeps the conditioned air from being affected by the outdoor ambient temperature and provides improved indoor air quality. (Conforms to American Society of Heating, Refrigeration and Air Conditioning Engineers No. 62P.) The sloped drain pan minimizes standing water in the drain, which is provided with an external drain.

Louvered grille provides hail and vandalism protection for the coil.

TABLE OF CONTENTS

FEATURES/BENEFITS	1-2
MODEL NUMBER NOMENCLATURE	3
ARI CAPACITIES	4
PHYSICAL DATA	5-6
OPTIONS AND ACCESSORIES	7
BASE UNIT DIMENSIONS	8-9
ACCESSORY DIMENSIONS	10
SELECTION PROCEDURE	11
PERFORMANCE DATA	12-15
TYPICAL PIPING AND WIRING	16
APPLICATION DATA	17
ELECTRICAL DATA	17
TYPICAL WIRING SCHEMATICS	18-19
CONTROLS	20
GUIDE SPECIFICATIONS	21-22

MODEL NUMBER NOMENCLATURE



48CE

ARI* CAPACITIES

Cooling Capacities, Efficiencies and Sound Ratings

Unit 48CE	Nominal Tons	Standard CFM	Net Cooling Capacities (Btuh)	EER @A**	SEER†	Sound Ratings‡ (dBA)
024040 024060	2	800	24,000	11	13.0	72
030040 030060	2-1/2	1000	28,800	11	13.0	72
036060 036090	3	1200	36,000	11	13.0	74
042060 042090	3-1/2	1400	41,000	11	13.0	74
048090 048115 048130	4	1600	45,000	11	13.0	78
060090 060115 060130	5	1750	57,000	11	13.0	78

Heating Capacities and Efficiencies

Unit 48CE	Heating Input (Btuh)	Output Capacity (Btuh)	Temperature Rise Range (°F)	AFUE
024040 030040	40,000	31,000	20-50	80.1
024060 030060 036060 042060	60,000	46,000 46,000 46,000 47,000	35-65 35-65 25-55 25-55	78.4 78.4 78.7 78.7
036090 042090 048090 060090	90,000	70,000 71,000 70,000 70,000	35-65 35-65 25-55 25-55	79.9 79.9 78.6 78.6
048115 060115	115,000	92,000	35-65	81.1
048130 060130	130,000	104,000 103,000	40-70	80.3

LEGEND

dba—Sound Levels (decibels)

db—Dry Bulb

SEER—Seasonal Energy Efficiency Ratio

wb—Wet Bulb

COP—Coefficient of Performance

HSPF—Heating Season Performance Factor

* Air Conditioning & Refrigeration Institute.

** "A" conditions—80°F indoor db/67°F indoor wb & 95°F outdoor db.

† Rated in accordance with U.S. Government DOE Department of Energy) test procedures and/or ARI Standards 210/240–94.

‡ Tested in accordance with ARI Standard 270–95 (not listed in ARI).

Notes:

1. Ratings are net values, reflecting the effects of circulating fan heat. Ratings are based on:

Cooling Standard: 80°F db, 67°F wb indoor entering air temperature and 95°F db outdoor entering air temperature.

2. Before purchasing this appliance, read important energy cost and efficiency information available from your retailer.



PHYSICAL DATA

UNIT SIZE	024040	024060	030040	030060	036060	036090	042060	042090
NOMINAL CAPACITY (ton)	2	2	2-1/2	2-1/2	3	3	3-1/2	3-1/2
OPERATING WEIGHT (lb.)	362	362	362	362	384	384	415	415
COMPRESSORS	Scroll							
Quantity	1							
REFRIGERANT (R-410A)	7.3	7.3	8.0	8.0	9.5	9.5	10.7	10.7
Quantity (lb.)								
REFRIGERANT METERING DEVICE	TXV							
CONDENSER COIL								
Rows...Fins/in.	2...21	2...21	2...21	2...21	2...21	2...21	2...21	2...21
Face Area (sq ft)	11.95	11.95	11.95	11.95	13.7	13.7	15.4	15.4
CONDENSER FAN								
Nominal Cfm	2700	2700	2700	2700	2800	2800	2800	2800
Diameter (in.)	22	22	22	22	22	22	22	22
Motor Hp (Rpm)	1/8 (825)	1/8 (825)	1/8 (825)	1/8 (825)	1/8 (825)	1/8 (825)	1/8 (825)	1/8 (825)
EVAPORATOR COIL								
Rows...Fins/in.	3...15	3...15	3...15	3...15	4...15	4...15	3...15	3...15
Face Area (sq ft)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
INDOOR BLOWER								
Nominal Airflow (Cfm)	Variable based on Comfort Roll back (see User Interface instructions for more information).							
Comfort Efficiency	700	700	875	875	1050	1050	1225	1225
Max	800	800	1000	1000	1200	1200	1400	1400
Size (in.)	10x10	10x10	10x10	10x10	11x10	11x10	11x10	11x10
Motor HP (RPM)	1/2	1/2	1/2	1/2	3/4	3/4	3/4	3/4
FURNACE SECTION*								
Burner Orifice No. (Qty...Drill Size)	2...44	2...38	2...44	2...38	2...38	3...38	2...38	2...38
Natural Gas								
Burner Orifice No. (Qty...Drill Size)	2...50	2...46	2...50	2...46	2...46	3...46	2...46	2...46
Propane Gas								
HIGH--PRESSURE SWITCH (psig)	650 +/- 15							
Cut-out	420 +/- 25							
Reset (Auto)								
LOW--PRESSURE SWITCH (Liquid Line) (psig)	20 +/- 5							
Cut-out	45 +/- 10							
Reset (auto)								
RETURN--AIR FILTERS (in.)†	20x24x1	20x24x1	20x24x1	20x24x1	24x30x1	24x30x1	24x36x1	24x36x1
Throwaway								

Continued next page.

48CE

PHYSICAL DATA CONTINUED

48CE

UNIT SIZE	048090	048115	048130	060090	060115	060130
NOMINAL CAPACITY (ton)	4	4	4	5	5	5
OPERATING WEIGHT (lb.)	465	465	465	515	515	515
COMPRESSORS Quantity	Scroll 1					
REFRIGERANT (R-410A) Quantity (lb.)	11.25	11.25	11.25	13.5	13.5	13.5
REFRIGERANT METERING DEVICE	TXV					
CONDENSER FAN Nominal Cfm Diameter (in.) Motor Hp (Rpm)	3300 22 1/4 (1100)	3300 22 1/4 (1100)	3300 22 1/4 (1100)	3300 22 1/4 (1100)	3300 22 1/4 (1100)	3300 22 1/4 (1100)
CONDENSER COIL Rows...Fins/in. Face Area (sq ft)	2...21 17.4	2...21 17.4	2...21 17.4	2...21 19.3	2...21 19.3	2...21 19.3
EVAPORATOR COIL Rows...Fins/in. Face Area (sq ft)	4...15 4.7	4...15 4.7	4...15 4.7	4...17 5.7	4...17 5.7	4...17 5.7
INDOOR BLOWER Nominal Airflow (Cfm)	Variable based on Comfort Roll back (see User Interface instructions for more information).					
Comfort Efficiency Max	1400 1600	1400 1600	1400 1600	1750 2000	1750 2000	1750 2000
Size (In.) Motor HP (RPM)	11x10 3/4	11x10 3/4	11x10 3/4	11x10 1	11x10 1	11x10 1
FURNACE SECTION* Burner Orifice No. (Qty...Drill Size) Natural Gas Burner Orifice No. (Qty...Drill Size) Propane Gas	3...38 3...46	3...33 3...42	3...31 3...41	3...38 3...46	3...33 3...42	3...31 3...41
HIGH-PRESSURE SWITCH (psig) Cut-out Reset (Auto)	650 +/-15 420 +/-25					
LOW-PRESSURE SWITCH (Liquid Line) (psig) Cut-out Reset (auto)	20 +/-5 45 +/-10					
RETURN-AIR FILTERS (in.)† Throwaway	24x36x1	24x36x1	24x36x1	24x36x1	24x36x1	24x36x1

*Based on altitude of 0 to 2000 ft.

† Required filter sizes shown are based on the larger of the ARI (Air Conditioning and Refrigeration Institute) rated cooling airflow or the heating airflow velocity of 300 ft/minute for throwaway type or 450 ft/minute for high-capacity type. Air filter pressure drop for non-standard filters must not exceed 0.08 in. wg.

OUTDOOR SOUND: OCTAVE BAND DATA—DECIBELS (dBA)

MODEL NO.	48CE					
	024	030	036	042	048	060
Frequency (Hz)						
125	58.8	58.8	60.7	56.7	62.4	63.5
250	63.5	63.5	63.3	62.8	69.9	67.6
500	67.2	67.2	66.8	67.8	71.3	71.8
1000	66.9	66.9	66.5	67.4	73.4	75.5
2000	63.7	63.7	64.2	63.7	70.0	71.0
4000	58.3	58.3	60.3	57.7	66.3	68.1
8000	50.0	50.0	53.0	50.8	60.1	59.9

OPTIONS AND ACCESSORIES

Factory-installed options

Coil options include tin-plated* indoor hairpins, copper/copper and vinyl-coated construction for refrigerant coils. Units are shipped standard with copper tube/aluminum fin construction. See model number nomenclature for coil options.

*Tin-plated indoor coils are built with special hairpins that are designed to resist both general pitting corrosion and excessive indoor corrosion (Formicary Corrosion).

Field-installed accessories

Manual Air Damper (25% open)
Solid-State Time Guard® II Device
Filter Rack
Flat Roof Curbs (8-in. and 14-in.)
Square-to-Round Duct Transition Kit
Infinity™ User Interface
Crankcase Heater
Low-Ambient Kit (Motormaster II Control)
LP to Natural Conversion Kit
High Altitude Kit
LP Conversion Kit
Lifting Kit
Compressor Hard Start Kit (for use on single-phase units only)

Manual outside air damper includes hood and filter rack with adjustable damper blade for up to 25% outdoor air.

Flat roof curbs in both 8 in. and 14 in. sizes are available for roof mounted applications.

Square-to-round duct transition kit enables 024-048 size units to be fitted to 14 in. round ductwork.

Compressor hard start kit assists compressor start-up by providing additional starting torque on single-phase units and prolongs compressor motor life.

Infinity User Interface coupled with the system's variable-speed indoor blower delivers Carrier's patented IdealHumidity technology that allows for even greater humidity control. Along with more precisely controlling temperature and humidity, the Infinity User Interface offers full seven-day programmability allowing you to further customize your comfort and energy savings.

Lifting kit includes 4 metal brackets that are available to assist in lifting this product onto a roof application.

LP (liquid propane) conversion kit allows for conversion from natural gas to liquid propane fuel.

High altitude kit is for use at 2001 to 6000 ft above sea level. Kit consists of natural gas orifices that compensate for gas heat operation at high altitude.

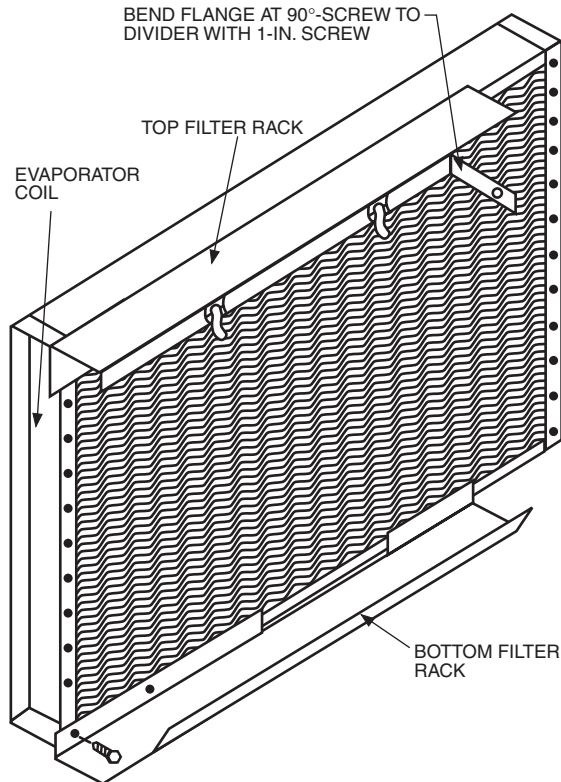
LP to natural gas conversion kit allows conversion back to natural gas.

Crankcase heater provides anti-floodback protection for low-load cooling applications.

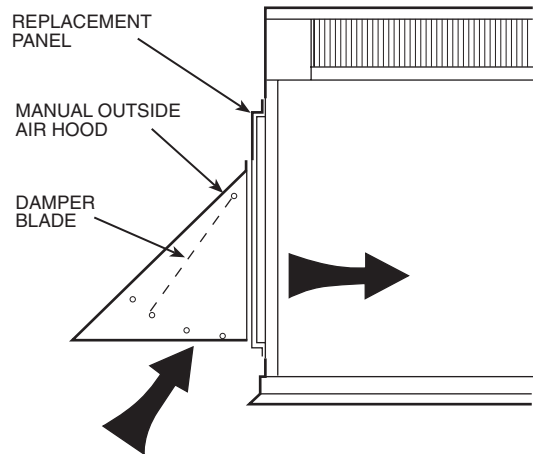
Low-ambient kit (Motormaster® II control) allows the use of mechanical cooling down to outdoor temperatures as low as 0°F.

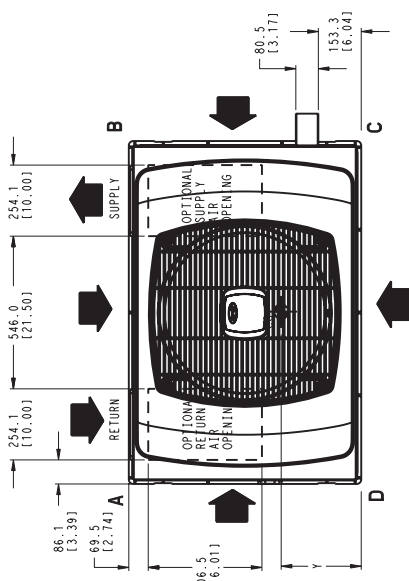
Filter rack features easy installation, serviceability, and high-filtering performance for vertical or horizontal applications.

FILTER RACK



MANUAL OUTSIDE AIR DAMPER





TOP VIEW

UNIT	ELECTRICAL CHARACTERISTICS		UNIT HT. "A"	CENTER OF GRAVITY MM/IN		
	LBS.	KG.		X	Y	Z
48CE02404/060	362	164.2	991.1 [39.02]	508.0 [20.0]	489.0 [19.3]	447.0 [17.6]
48CE03004/060	362	164.2	991.1 [39.02]	508.0 [20.0]	489.0 [19.3]	447.0 [17.6]
48CE03600/090	384	174.2	1041.9 [41.02]	508.0 [20.0]	355.6 [14.0]	330.2 [13.0]

CORNER WEIGHT LBS./KG.	ELECTRICAL CHARACTERISTICS			
	A	B	C	D
024	78/35.4	78/35.4	72/32.7	134/60.8
030	78/35.4	78/35.4	72/32.7	134/60.8
036	79/35.8	89/40.4	72/32.7	144/65.3

REQUIRED CLEARANCES TO COMBUSTIBLE MATL.

- TOP OF UNIT.....355.6 [14.00]
- DUCT SIDE OF UNIT.....1066.8 [42.00]
- SIDE OPPOSITE DUCTS.....355.6 [14.00]
- BOTTOM OF UNIT.....127.0 [5.00]
- ELECTRIC HEAT PANEL.....914.4 [36.00]

NEC. REQUIRED CLEARANCES.

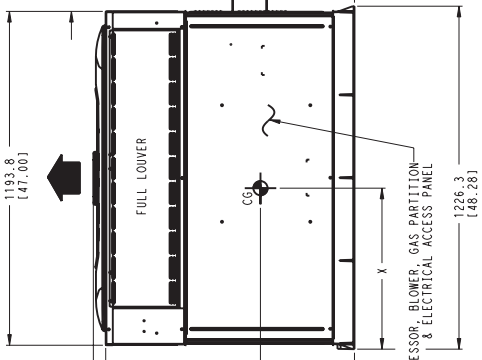
- BETWEEN UNITS, POWER ENTRY SIDE.....1066.8 [42.00]
- UNIT AND UNGROUNDED SURFACES, POWER ENTRY SIDE.....914.0 [36.00]
- UNIT AND BLOCK OR CONCRETE WALLS AND OTHER GROUNDED SURFACES, POWER ENTRY SIDE.....1066.8 [42.00]

REQUIRED CLEARANCE FOR OPERATION AND SERVICING

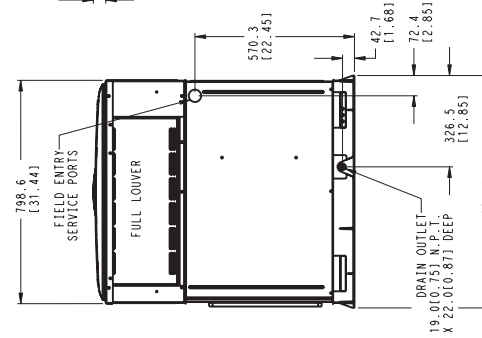
- EVAP. COIL ACCESS SIDE.....914.0 [36.00]
- POWER ENTRY SIDE.....914.0 [36.00]
- (EXCEPT FOR NEC REQUIREMENTS)
- UNIT OPPOSITE DUCTS.....914.0 [36.00]
- DUCT PANEL.....304.8 [12.00]*

*MINIMUM DISTANCES IF UNIT IS PLACED LESS THAN 304.8 [12.00] FROM WALL SYSTEM, THEN SYSTEM PERFORMANCE MAYBE COMPROMISED.

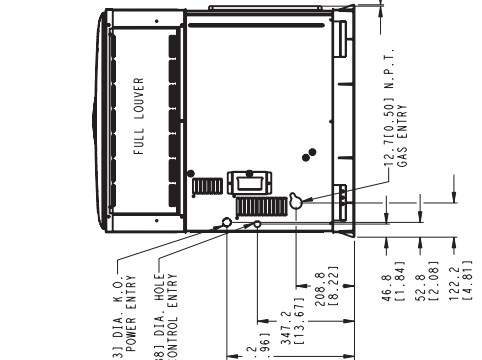
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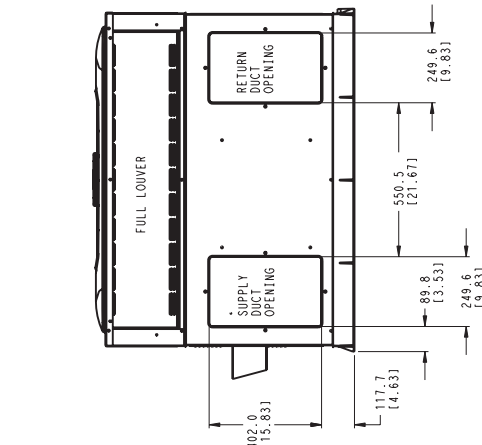
FRONT VIEW



LEFT SIDE VIEW



RIGHT SIDE VIEW



REAR VIEW

A06019

48CE024-036 Unit Dimensions

48CE

48CE

UNIT	ELECTRICAL CHARACTERISTICS				CENTER OF GRAVITY MM/IN					
	208-230-1-60, 208/230-3-60	208-230-1-60, 208/230-3-60	208-230-1-60, 208/230-3-60	208-230-1-60, 208/230-3-60	LBS.	KG.	"A"	X	Y	Z
48CE042060/090	415	188.2	1091.7	142.98	505.5	119.9	398.8	15.7	421.6	16.6
48CE048090/115/130	465	210.9	1142.5	144.98	505.5	119.9	398.8	15.7	457.2	18.0
48CE060090/115/130	515	233.6	1193.3	146.98	505.5	119.9	398.8	15.7	442.0	17.6

REQUIRED CLEARANCES TO COMBUSTIBLE MATL.

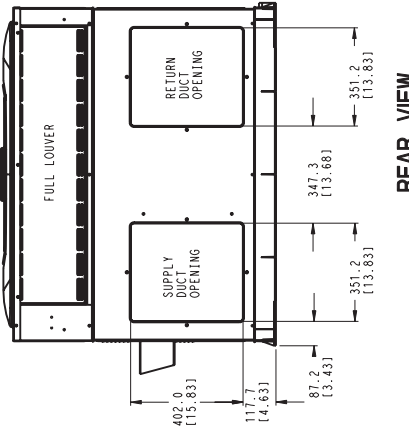
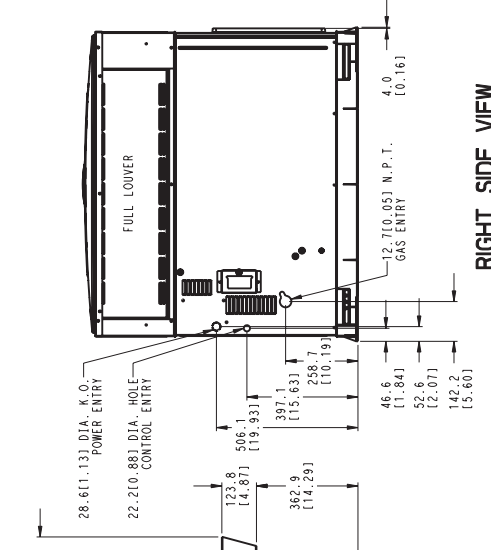
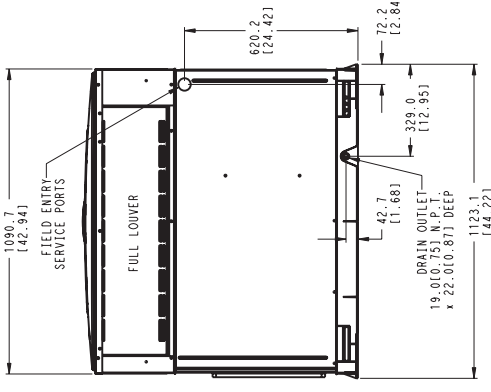
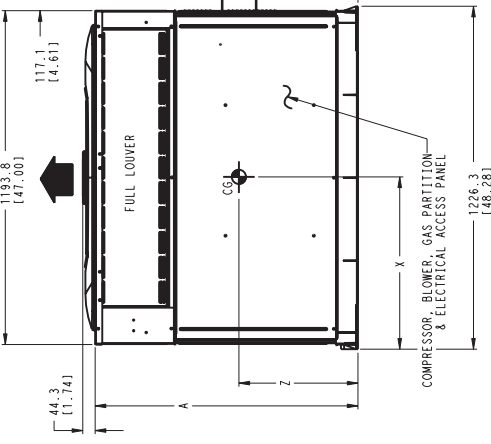
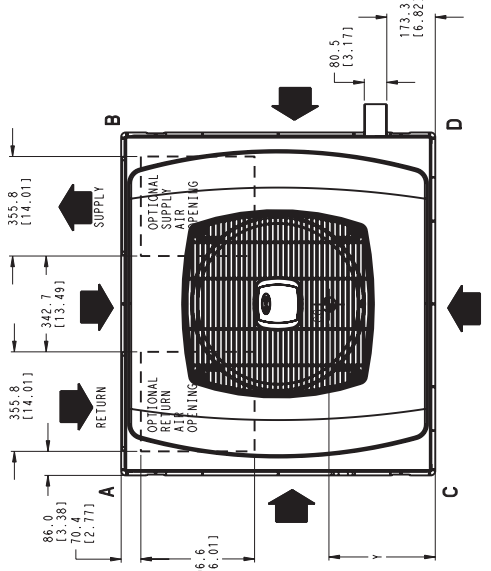
	MILLIMETERS (IN)
TOP OF UNIT	355.6 (14.00)
DUCT SIDE OF UNIT	355.6 (14.00)
SIDE OPPOSITE DUCTS	50.8 (2.00)
BOTTOM OF UNIT	355.6 (14.00)
ELECTRIC HEAT PANEL	112.7 (4.43)
NEC. REQUIRED CLEARANCES	914.4 (36.00)

CORNER WEIGHT	LBS./KG.			
	A	B	C	D
042	91/41.3	65/29.5	111/50.3	148/67.1
048	103/46.7	77/34.9	123/55.8	162/73.5
060	113/51.3	82/37.2	138/62.6	182/82.6

REQUIRED CLEARANCE FOR OPERATION AND SERVICING

	MILLIMETERS (IN)
EVAP. COIL ACCESS SIDE	914.0 (36.00)
COMPRESSOR ACCESS SIDE (EXCEPT FOR NEC. REQUIREMENTS)	914.0 (36.00)
UNIT TOP (FOR NEC. REQUIREMENTS)	914.0 (36.00)
SIDE OPPOSITE DUCTS	914.0 (36.00)
DUCT PANEL	304.8 (12.00)

*MINIMUM DISTANCES IF UNIT IS PLACED LESS THAN 304.8 (12.00) FROM WALL SYSTEM, THEN SYSTEM PERFORMANCE MAY BE COMPROMISED.

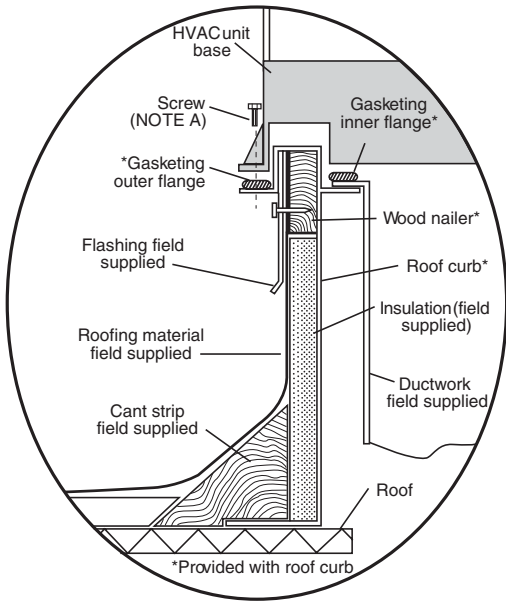


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48CE042-060 Unit Dimensions

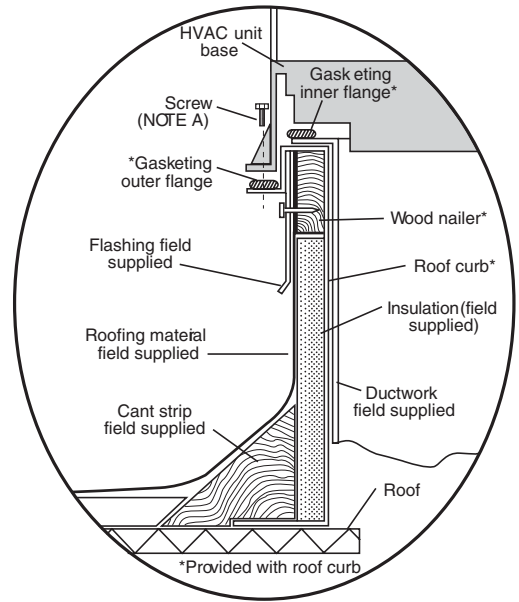
ACCESSORY DIMENSIONS

48CE



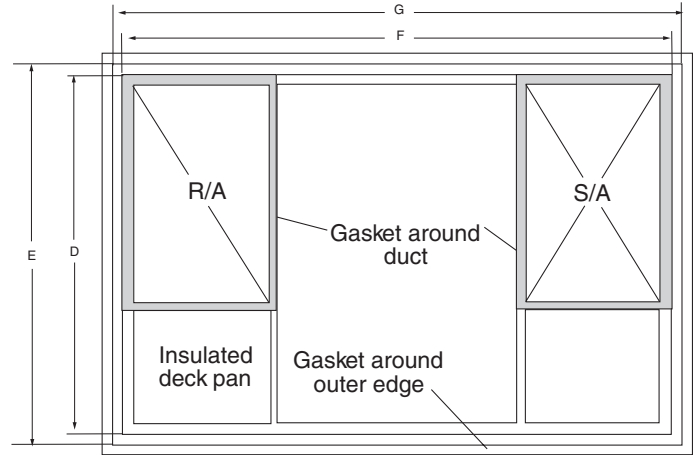
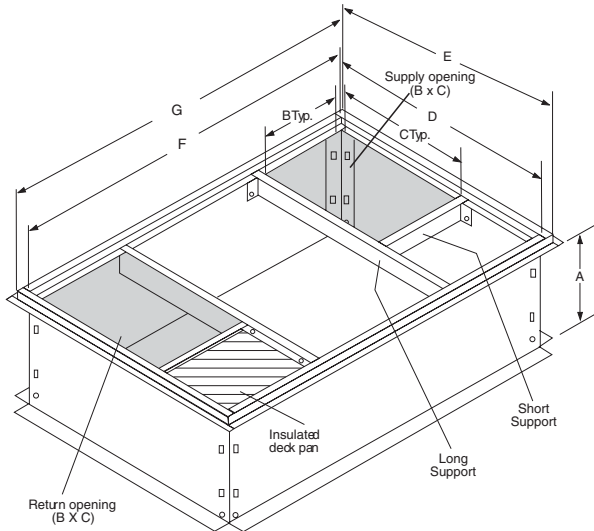
Roof Curb for Small Cabinet

Note A: When unit mounting screw is used, retainer bracket must also be used.



Roof Curb for Large Cabinet

Note A: When unit mounting screw is used, retainer bracket must also be used.

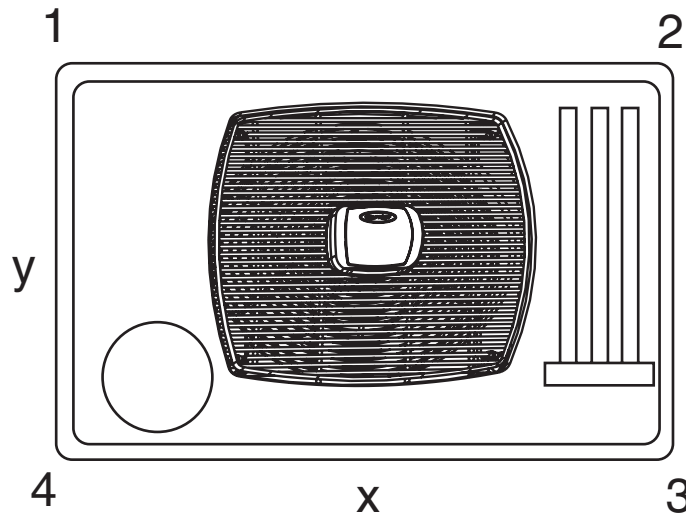


UNIT SIZE	ODS CATALOG NUMBER	A IN. (MM)	B IN. (MM)	C IN. (MM)	D IN. (MM)	E IN. (MM)	F IN. (MM)	G IN. (MM)
48CE024-036	CPRFCURB006A00	8 (203)	11 (279)	16-1/2 (419)	28-3/4 (730)	30-3/8 (771)	44-5/16 (1126)	45-15/16 (1167)
	CPRFCURB007A00	14 (356)	11 (279)	16-1/2 (419)	28-3/4 (730)	30-3/8 (771)	44-5/16 (1126)	45-15/16 (1167)
48CE042-060	CPRFCURB008A00	8 (203)	16-3/16 (411)	17-3/8 (441)	40-1/4 (1022)	41-15/16 (1065)	44-7/16 (1129)	46-1/16 (1169)
	CPRFCURB009A00	14 (356)	16-3/16 (411)	17-3/8 (441)	40-1/4 (1022)	41-15/16 (1065)	44-7/16 (1129)	46-1/16 (1169)

NOTES:

1. Roof curb must be set up for unit being installed.
2. Seal strip must be applied, as required, to unit being installed.
3. Dimension in () are in millimeters.
4. Roof curb is made of 16-gauge steel.
5. Table lists only the dimensions, per part number, that have changed.
6. Attach ductwork to curb (flanges of duct rest on curb).
7. Insulated panels: 1-in. thick fiberglass 1 lb. density.
8. Dimensions are in inches.
9. When unit mounting screw is used (see Note A), a retainer bracket must be used as well. This bracket must also be used when required by code for hurricane or seismic conditions. This bracket is available through Micrometl.

48CE CORNER WEIGHTS



48CE

A06129

Model 48CE	CORNER WEIGHTS (SMALL CABINET)				Model 48CE	CORNER WEIGHTS (LARGE CABINET)			
	Unit	024	030	036		Unit	042	048	060
	Total Weight	362	362	384		Total Weight	415	465	515
	Corner Weight 1	78	78	79		Corner Weight 1	91	103	113
	Corner Weight 2	78	78	89		Corner Weight 2	65	77	82
	Corner Weight 3	72	72	72		Corner Weight 3	111	123	138
	Corner Weight 4	134	134	144		Corner Weight 4	148	162	182

SELECTION PROCEDURE

Determine cooling and heating requirements at design conditions:

Given:

REQUIRED COOLING CAPACITY (TC) 34,500 BTUH
 SENSIBLE HEAT CAPACITY (SHC) 26,000 BTUH
 REQUIRED HEATING CAPACITY (SHC) 36,000 BTUH
 CONDENSER ENTERING AIR TEMPERATURE 95°F
 INDOOR-AIR TEMPERATURE 80°F EDB, 67°F EWB
 EVAPORATOR AIR QUANTITY 1200 CFM
 ELECTRICAL CHARACTERISTICS 230-1-60

Select unit based on required cooling capacity

Enter Net Cooling Capacities table at condenser entering temperature of 95°F. The 036 unit at 1200 cfm and 67°F ewb (entering wet bulb) will provide a total capacity of 36,000 Btuh and a SHC of 27,200 Btuh. Calculate SHC correction, if required, using Note 4 under Cooling Capacities tables.

Select heating capacity of unit to provide design condition requirement

In the Heating Capacities and Efficiencies table on page 4, note that the unit 036090 will provide 70,000 Btuh with an input of 90,000 Btuh.

Select unit that corresponds to power source available

The Electrical Data table shows that the unit is designed to operate at 208/230-1-60.

PERFORMANCE DATA-STANDARD ECM INDOOR MOTOR

Cooling Extended Performance Table

48CE024

Temp (°F) Outdoor Air Entering Condenser		Evaporator Air – CFM/BF							
		700 / 0.02				800 / 0.03			
		Evaporator Air Ewb (°F)							
		62	63*	67	72	62	63*	67	72
75	TC	23.4	23.9	25.9	28.4	24.0	24.5	26.5	29.1
	SHC	20.3	19.8	17.6	14.7	21.9	21.3	18.7	15.4
	kW	1.6	1.6	1.8	1.8	1.7	1.7	1.8	1.8
85	TC	22.3	22.7	24.8	27.3	22.9	23.3	25.3	27.9
	SHC	19.9	19.2	17.0	14.2	21.4	20.7	18.1	14.9
	kW	1.8	1.8	2.0	2.0	1.9	1.9	2.0	2.0
95	TC	21.3	21.8	23.5	26.0	21.8	22.2	24.0	26.5
	SHC	19.3	18.8	16.5	13.6	20.8	20.2	17.6	14.3
	kW	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
105	TC	20.0	20.5	22.2	24.6	20.5	20.9	22.6	25.0
	SHC	18.8	18.1	15.8	13.1	20.2	19.5	16.9	13.7
	kW	2.4	2.4	2.3	2.3	2.4	2.4	2.4	2.4
115	TC	18.6	19.1	20.7	22.9	19.2	19.5	21.1	23.3
	SHC	18.2	17.4	15.3	12.3	19.4	18.8	16.3	13.0
	kW	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
125	TC	17.1	17.5	19.3	21.1	17.8	18.0	19.4	21.4
	SHC	17.8	17.0	14.5	11.7	18.5	18.1	15.5	12.3
	kW	2.8	2.8	3.0	3.0	2.9	2.9	3.0	3.0

48CE

Cooling Extended Performance Table

48CE030

Temp (°F) Outdoor Air Entering Condenser		Evaporator Air – CFM/BF							
		875 / 0.06				1000 / 0.07			
		Evaporator Air Ewb (°F)							
		62	63*	67	72	62	63*	67	72
75	TC	27.9	28.6	30.7	33.6	28.8	29.4	31.6	34.5
	SHC	24.1	20.0	20.6	16.8	26.0	21.2	22.1	17.8
	kW	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
85	TC	26.9	27.5	29.5	32.3	27.6	28.1	30.2	33.1
	SHC	23.8	19.5	20.3	16.4	25.6	20.8	21.7	17.4
	kW	2.3	2.3	2.4	2.4	2.3	2.4	2.4	2.4
95	TC	25.6	26.2	28.2	30.8	26.3	26.8	28.8	31.5
	SHC	23.1	19.1	19.9	16.0	24.7	20.5	21.3	16.9
	kW	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
105	TC	24.3	24.7	26.6	29.2	25.1	25.3	27.2	29.7
	SHC	22.4	18.6	19.3	15.4	23.8	19.9	20.8	16.3
	kW	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
115	TC	22.8	23.2	24.9	27.3	23.8	23.6	25.3	27.7
	SHC	21.7	18.0	18.8	14.8	22.3	19.3	20.2	15.7
	kW	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
125	TC	21.4	21.4	24.9	27.3	23.8	23.6	25.3	27.7
	SHC	20.7	17.3	18.8	14.8	22.3	19.3	20.2	15.7
	kW	3.5	3.5	3.2	3.2	3.2	3.2	3.2	3.2

See page 14 for cooling notes.

PERFORMANCE DATA CONTINUED-STANDARD ECM INDOOR MOTOR

Cooling Extended Performance Table

48CE036

Temp (°F) Outdoor Air Entering Condenser		Evaporator Air – CFM/BF							
		1050 / 0.04				1200 / 0.05			
		Evaporator Air Ewb (°F)							
		62	63*	67	72	62	63*	67	72
75	TC	34.8	35.5	38.4	42.4	36.4	36.9	39.8	43.8
	SHC	30.4	24.7	25.7	20.9	34.3	27.5	28.7	22.8
	kW	2.5	2.6	2.6	2.6	2.7	2.7	2.7	2.8
85	TC	33.2	34.0	36.7	40.5	34.8	35.2	37.9	41.8
	SHC	29.6	24.1	25.0	20.2	33.5	26.8	28.0	22.1
	kW	2.8	2.9	2.9	2.9	3.0	3.0	3.0	3.0
95	TC	31.5	32.3	34.8	38.5	33.3	33.4	36.0	39.7
	SHC	29.4	23.3	24.2	19.5	32.5	26.1	27.2	21.4
	kW	3.1	3.2	3.2	3.2	3.3	3.3	3.3	3.4
105	TC	29.7	30.4	33.0	36.4	31.7	31.5	33.9	37.4
	SHC	28.8	22.5	23.5	18.8	31.1	25.3	26.5	20.6
	kW	3.5	3.5	3.5	3.5	3.6	3.6	3.7	3.7
115	TC	28.1	28.5	30.8	34.0	30.0	29.4	31.7	34.9
	SHC	27.8	21.7	22.7	18.0	29.7	24.5	25.7	19.8
	kW	3.8	3.9	3.9	3.9	4.0	4.0	4.0	4.0
125	TC	26.5	26.4	28.5	31.5	28.1	27.2	29.3	32.3
	SHC	26.2	20.9	21.9	17.1	27.8	23.5	24.7	18.9
	kW	4.2	4.3	4.3	4.3	4.4	4.4	4.4	4.4

48CE

Cooling Extended Performance Table

48CE042

Temp (°F) Outdoor Air Entering Condenser		Evaporator Air – CFM/BF							
		1225 / 0.07				1400 / 0.08			
		Evaporator Air Ewb (°F)							
		62	63*	67	72	62	63*	67	72
75	TC	40.5	41.2	44.2	48.4	41.5	42.1	45.1	59.4
	SHC	35.4	29.0	30.0	24.3	37.9	30.8	31.9	25.6
	kW	3.0	3.0	3.0	3.1	3.0	3.0	3.0	3.1
85	TC	38.7	39.4	42.3	46.3	39.7	40.2	43.2	47.2
	SHC	34.6	28.2	29.2	23.6	37.0	30.0	31.1	24.8
	kW	3.3	3.3	3.4	3.4	3.3	3.3	3.4	3.4
95	TC	36.9	37.5	40.3	44.1	37.8	38.2	41.0	44.9
	SHC	33.8	27.4	28.4	22.8	35.9	29.1	30.3	24.0
	kW	3.7	3.7	3.7	3.8	3.7	3.7	3.7	3.8
105	TC	34.9	35.4	38.0	41.6	36.0	36.0	38.7	42.3
	SHC	32.7	26.5	27.6	22.0	34.3	28.3	29.4	23.2
	kW	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
115	TC	32.8	33.1	35.5	38.9	34.0	33.7	36.1	39.5
	SHC	31.4	25.6	26.6	21.0	32.8	27.3	28.5	22.2
	kW	4.5	4.5	4.5	4.6	4.5	4.5	4.5	4.6
125	TC	30.6	30.5	32.7	35.7	31.7	31.0	33.2	36.2
	SHC	29.6	24.5	25.5	20.0	30.6	26.1	27.3	21.1
	kW	4.9	4.9	4.9	5.0	4.9	4.9	4.9	5.0

See page 14 for cooling notes.

PERFORMANCE DATA CONTINUED-STANDARD ECM INDOOR MOTOR

Cooling Extended Performance Table

48CE048

Temp (°F) Outdoor Air Entering Condenser		Evaporator Air – CFM/BF							
		1400 / 0.06				1600 / 0.08			
		Evaporator Air Ewb (°F)							
		62	63*	67	72	62	63*	67	72
75	TC	44.7	45.3	49.0	53.9	46.0	46.6	50.3	55.3
	SHC	40.8	32.8	34.3	27.6	43.9	35.2	36.7	29.3
	kW	3.3	3.3	3.3	3.4	3.3	3.3	3.4	3.4
85	TC	42.4	43.0	46.5	51.2	43.7	44.1	47.7	52.4
	SHC	39.6	31.7	33.2	26.5	42.4	34.0	35.7	28.2
	kW	3.7	3.7	3.7	3.8	3.7	3.7	3.7	3.8
95	TC	40.0	40.6	44.0	48.5	42.3	41.8	45.0	49.5
	SHC	38.2	30.6	32.2	25.5	41.1	33.1	34.5	27.1
	kW	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.2
105	TC	37.9	38.1	41.2	45.5	39.7	39.1	42.1	46.4
	SHC	36.6	29.4	30.9	24.4	38.3	31.8	33.3	25.8
	kW	4.5	4.5	4.5	4.6	4.5	4.5	4.5	4.6
115	TC	36.6	35.5	38.3	42.3	37.1	36.2	39.1	43.0
	SHC	34.1	28.2	29.6	23.2	36.6	30.4	32.0	24.7
	kW	5.0	4.9	5.0	5.0	5.0	5.0	5.0	5.0
125	TC	33.1	32.6	35.3	38.8	34.6	33.3	35.9	39.5
	SHC	32.4	27.0	28.4	21.9	34.1	28.9	30.6	23.3
	kW	5.5	5.4	5.5	5.5	5.5	5.5	5.5	5.5

Cooling Extended Performance Table

48CE060

Temp (°F) Outdoor Air Entering Condenser		Evaporator Air – CFM/BF							
		1750 / 0.007				2000 / 0.01			
		Evaporator Air Ewb (°F)							
		62	63*	67	72	62	63*	67	72
75	TC	58.8	59.7	64.0	69.8	60.0	60.8	64.9	70.8
	SHC	53.6	51.8	44.5	35.4	57.6	55.4	47.1	36.8
	kW	4.2	4.3	4.3	4.4	4.4	4.4	4.5	4.6
85	TC	56.2	57.0	61.1	66.6	57.4	58.1	61.9	67.4
	SHC	52.4	50.5	43.2	34.2	56.3	54.2	45.8	35.6
	kW	4.7	4.7	4.8	4.9	4.8	4.9	5.0	5.0
95	TC	53.5	54.3	58.0	63.2	55.0	55.3	58.7	64.1
	SHC	51.1	49.2	41.9	32.9	55.0	52.9	44.5	34.4
	kW	5.1	5.2	5.3	5.3	5.2	5.3	5.5	5.5
105	TC	50.7	51.4	54.8	59.6	52.5	52.4	55.4	60.2
	SHC	49.8	47.9	40.6	31.6	52.5	51.6	43.2	33.0
	kW	5.7	5.7	5.8	5.9	5.8	5.8	6.0	6.1
115	TC	48.1	48.3	51.3	56.8	49.7	49.7	51.8	57.0
	SHC	48.1	46.6	39.2	30.6	49.7	49.7	41.8	31.7
	kW	6.2	6.3	6.4	6.4	6.4	6.4	6.6	6.6
125	TC	45.2	45.1	47.4	52.5	46.4	46.4	47.9	52.2
	SHC	45.2	45.1	37.6	28.9	46.4	46.4	40.2	29.7
	kW	6.8	6.9	7.0	7.0	7.0	7.0	7.2	7.2

LEGEND

BF — Bypass Factor
 edb — Entering Dry–Bulb
 Ewb — Entering Wet–Bulb
 kW — Total Unit Power Input
 ldb — Leaving Dry–Bulb
 lwb — Leaving Wet–Bulb
 SHC — Sensible Heat Capacity (1000 Btuh)
 TC — Total Capacity (1000 Btuh) (net)
 ECM — Electronic Computed Motor

*At 75°F entering dry bulb (Tennessee Valley Authority [TVA] rating conditions); all other at 80°F entering dry bulb.

NOTES:

1. Ratings are net; they account for the effects of the evaporator–fan motor power and heat.
2. Direct interpolation is permissible. Do not extrapolate.
3. The following formulas may be used:

$$t_{ldb} = t_{edb} - \frac{\text{Sensible capacity (Btuh)}}{1.10 \times \text{cfm}}$$

$$t_{lwb} = \text{Wet–bulb temperature corresponding to enthalpy air leaving evaporator coil (} h_{lwb} \text{)}$$

$$h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4.5 \times \text{cfm}}$$

Where: h_{ewb} = Enthalpy of air entering evaporator coil

4. The SHC is based on 80° F edb temperature of air entering evaporator coil. Below 80° F edb, subtract (corr factor x cfm) from SHC. Above 80° F edb, add (corr factor x cfm) to SHC. Correction Factor = $1.10 \times (1 + \text{BF}) \times (\text{edb} + 80)$.

PERFORMANCE DATA (CONT)

HIGH ALTITUDE COMPENSATION

NATURAL GAS ONLY

Orifice Conversion - 3.5 in. wc Manifold Pressure*

Altitude (ft)	Input (Btuh)	Output (Btuh)	Orifice Number†
0-2000	40,000	31,000	#44
	60,000	46,000	#38
	90,000	70,000	#38
	115,000	92,000	#33
	130,000	103,000	#31
2001-6000	32,075	24,858	#48
	48,547	37,219	#42
	72,820	56,638	#42
	90,094	72,075	#37
	102,630	81,315	#34

LIQUID PROPANE ONLY

Orifice Conversion - 3.5 in. wc Manifold Pressure*

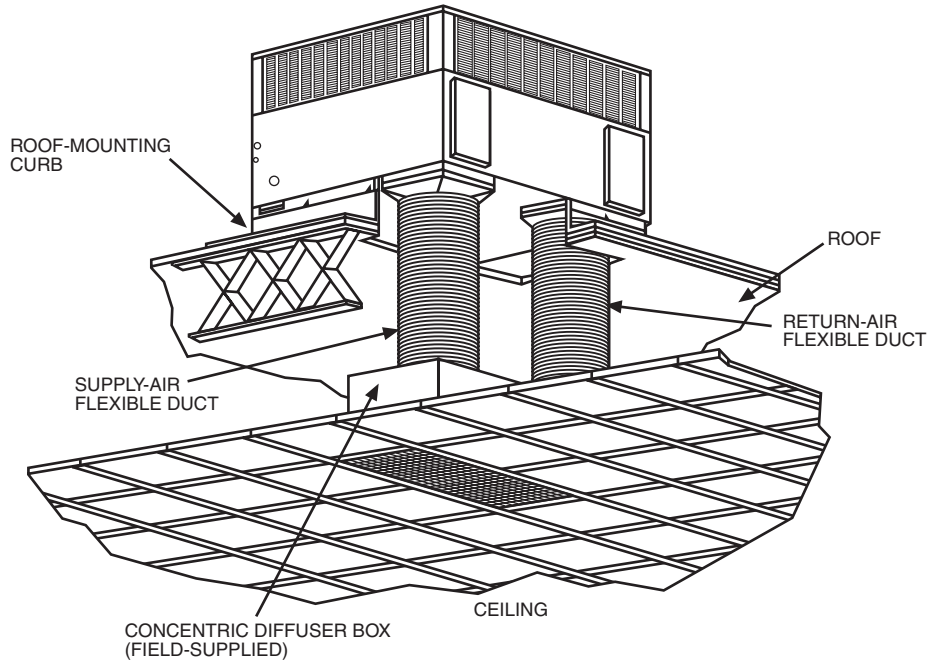
Altitude (ft)	Input (Btuh)	Output (Btuh)	Orifice Number†
0-2000	40,000	31,000	#50
	57,000	43,720	#46
	85,500	66,520	#46
	115,000	92,000	#42
	127,000	100,580	#41
2001-6000	33,834	26,221	#52
	49,238	37,766	#48
	73,856	57,461	#48
	94,571	75,657	#44
	101,284	80,214	#43

*As the height above sea level increases, there is less oxygen per cubic ft of air. Therefore, heat input rate should be reduced at higher altitudes.

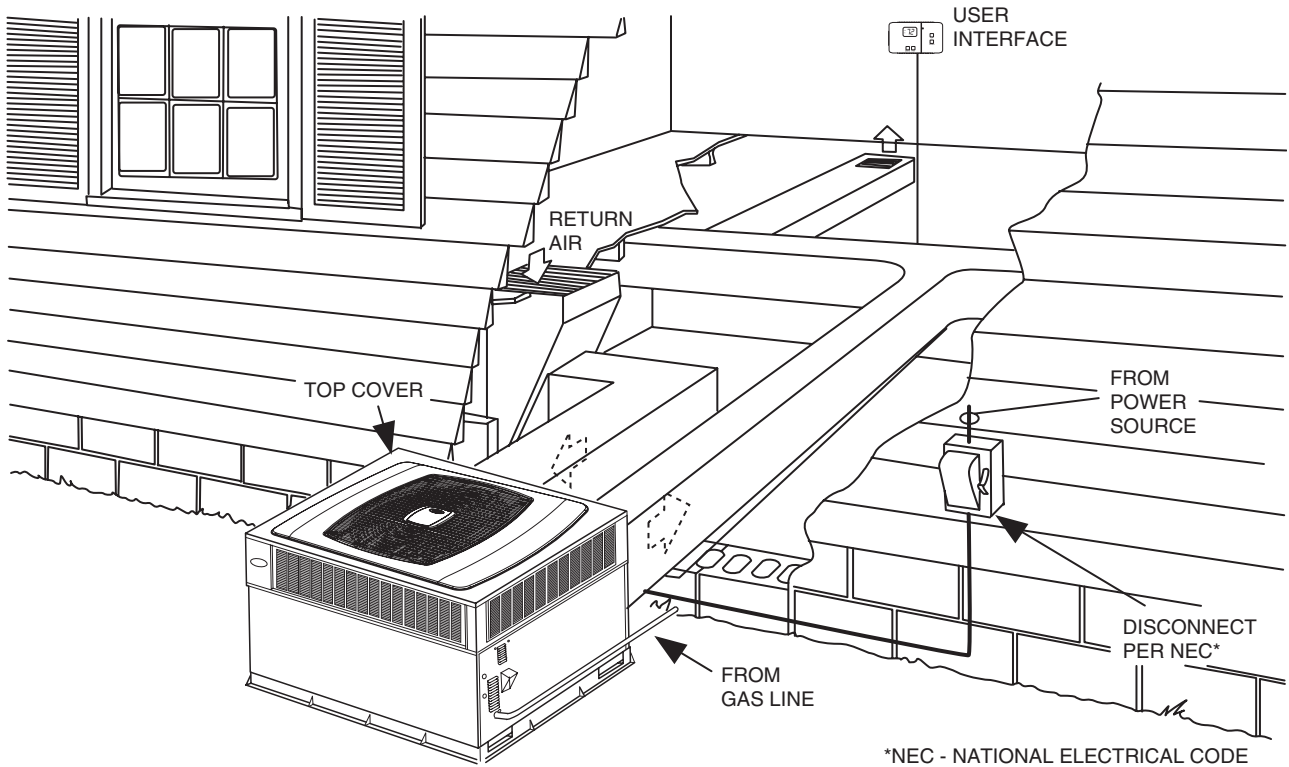
†Orifices available through your Carrier distributor.

48CE

TYPICAL PIPING AND WIRING



C00023



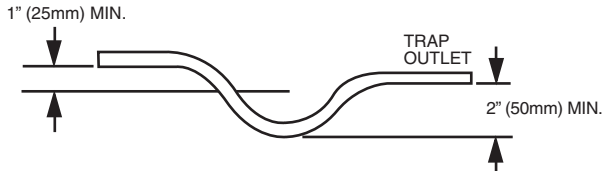
*NEC - NATIONAL ELECTRICAL CODE

A06091

48CE

APPLICATION DATA

Condensate trap— A 2-in. condensate trap must be field supplied.



Ductwork — Secure downflow discharge ductwork to roof curb. For horizontal discharge applications, attach ductwork to unit with flanges.

To convert a unit to downflow discharge — Units are equipped with factory-installed inserts in the downflow openings. Remove the inserts similar to removing an electrical knock-out. Leave on duct covers to seal the horizontal discharge openings in the unit. Units installed in horizontal discharge orientation do not require duct covers.

Minimum cooling ambient operating temperature — All standard units have a minimum ambient operating temperature of 55°F. With accessory low-ambient temperature kit, units can operate at temperatures down to 0°F.

Maximum operating outdoor air temperature — Maximum outdoor operating air temperature for cooling is 125°F.

ELECTRICAL DATA

Unit Size	V-PH-HZ	Voltage Range		Compressor		Outdoor Fan Motor	Indoor Fan Motor	Power Supply	
		Min	Max	RLA	LRA	FLA	FLA	MCA	Max Fuse or CKT BKR
024	208/230-1-60	187	253	13.5	61.0	0.8	4.3	22.0/22.0	35/35
030	208/230-1-60	187	253	15.9	73.0	0.8	4.3	25.0/25.0	40/40
036	208/230-1-60	187	253	16.9	83.0	0.8	6.8	28.7/28.7	45/45
	208/230-3-60	187	253	12.2	77.0	0.8	6.8	22.9/22.9	35/35
042	208/230-1-60	187	253	22.4	105.0	0.8	6.8	35.6/35.6	50/50
	208/230-3-60	187	253	15.4	88.0	0.8	6.8	26.9/26.9	40/40
048	208/230-1-60	187	253	21.3	109.0	1.6	6.8	35.0/35.0	50/50
	208/230-3-60	187	253	14.7	91.0	1.6	6.8	26.8/26.8	40/40
060	208/230-1-60	187	253	27.0	145.0	1.6	9.1	44.5/44.5	60/60
	208/230-3-60	187	253	18.1	123.0	1.6	9.1	33.3/33.3	50/50

LEGEND

- FLA — Full Load Amps
- LRA — Locked Rotor Amps
- MCA -- Minimum Circuit Amps
- MOCP — Maximum Overcurrent Protection
- RLA — Rated Load Amps



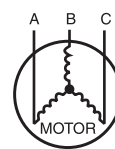
NOTES:

- In compliance with NEC (National Electrical Code) requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be Power Supply fuse. The CGA (Canadian Gas Association) units may be fuse or circuit breaker.
- Minimum wire size is based on 60 C copper wire. If other than 60 C wire is used, or if length exceeds wire length in table, determine size from NEC.
- Unbalanced 3-Phase Supply Voltage
Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percentage of voltage imbalance

$$\% \text{ Voltage imbalance} = 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

* Heater capacity (kW) based on heater voltage of 208v & 240v. If power distribution voltage to unit varies from rated heater voltage, heater kW will vary accordingly.

EXAMPLE: Supply voltage is 230-3-60.



- AB = 228 v
- BC = 231 v
- AC = 227 v

$$\begin{aligned} \text{Average Voltage} &= \frac{228 + 231 + 227}{3} \\ &= \frac{686}{3} \\ &= 229 \end{aligned}$$

Determine maximum deviation from average voltage.

- (AB) 229 - 228 = 1 v
- (BC) 231 - 229 = 2 v
- (AC) 229 - 227 = 2 v

Maximum deviation is 2 v.

Determine percent of voltage imbalance

$$\begin{aligned} \% \text{ Voltage Imbalance} &= 100 \times \frac{2}{229} \\ &= 0.8\% \end{aligned}$$

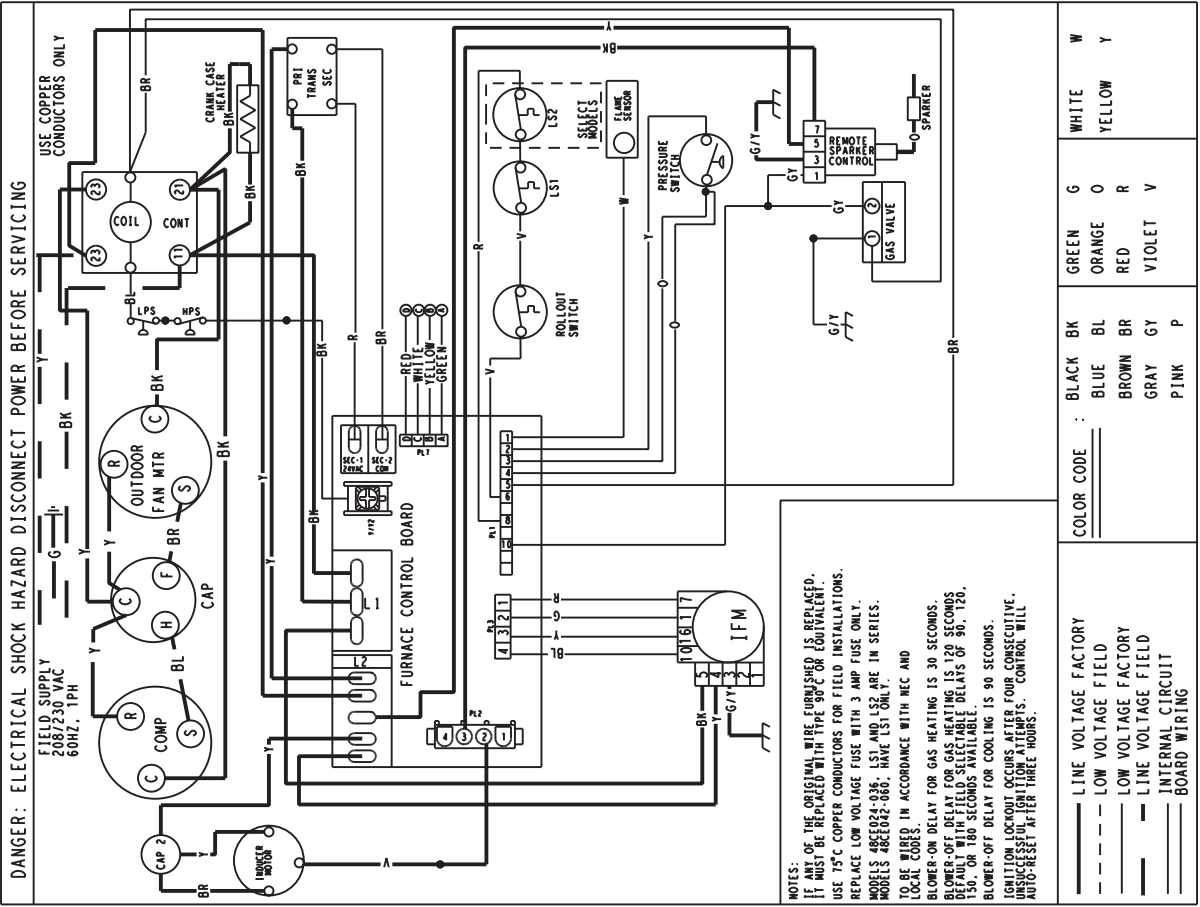
This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

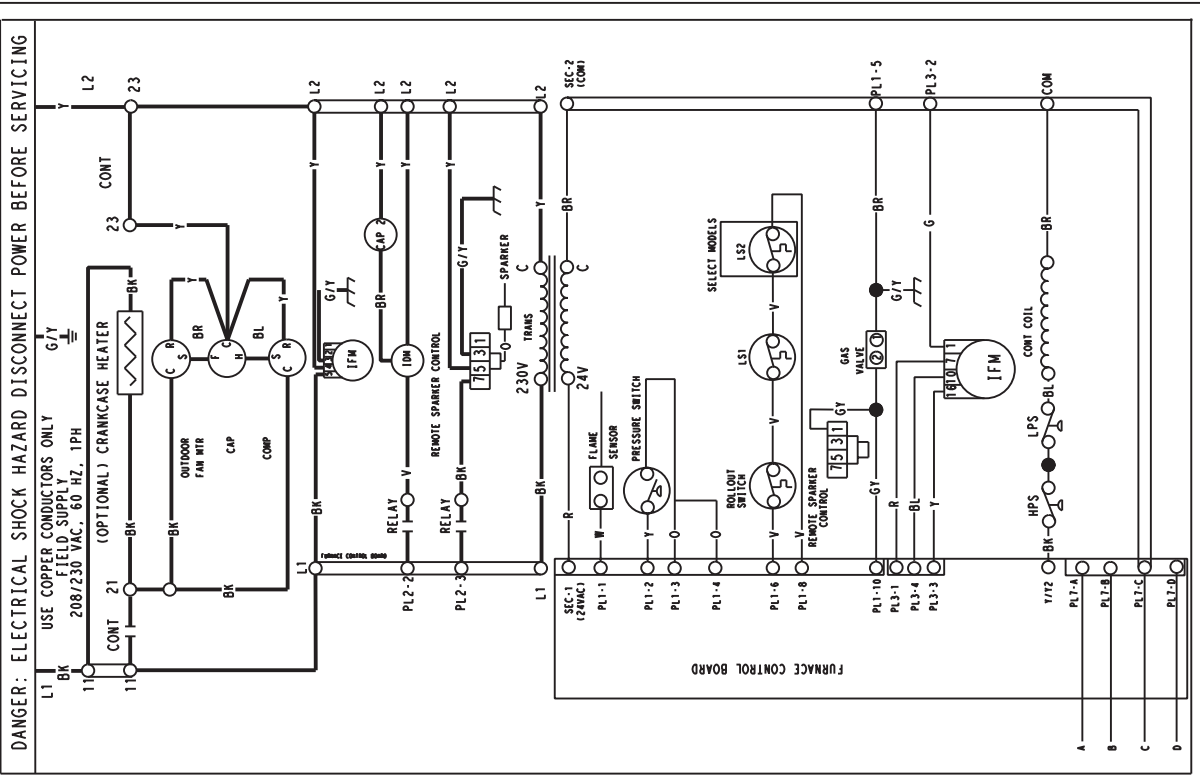
48CE

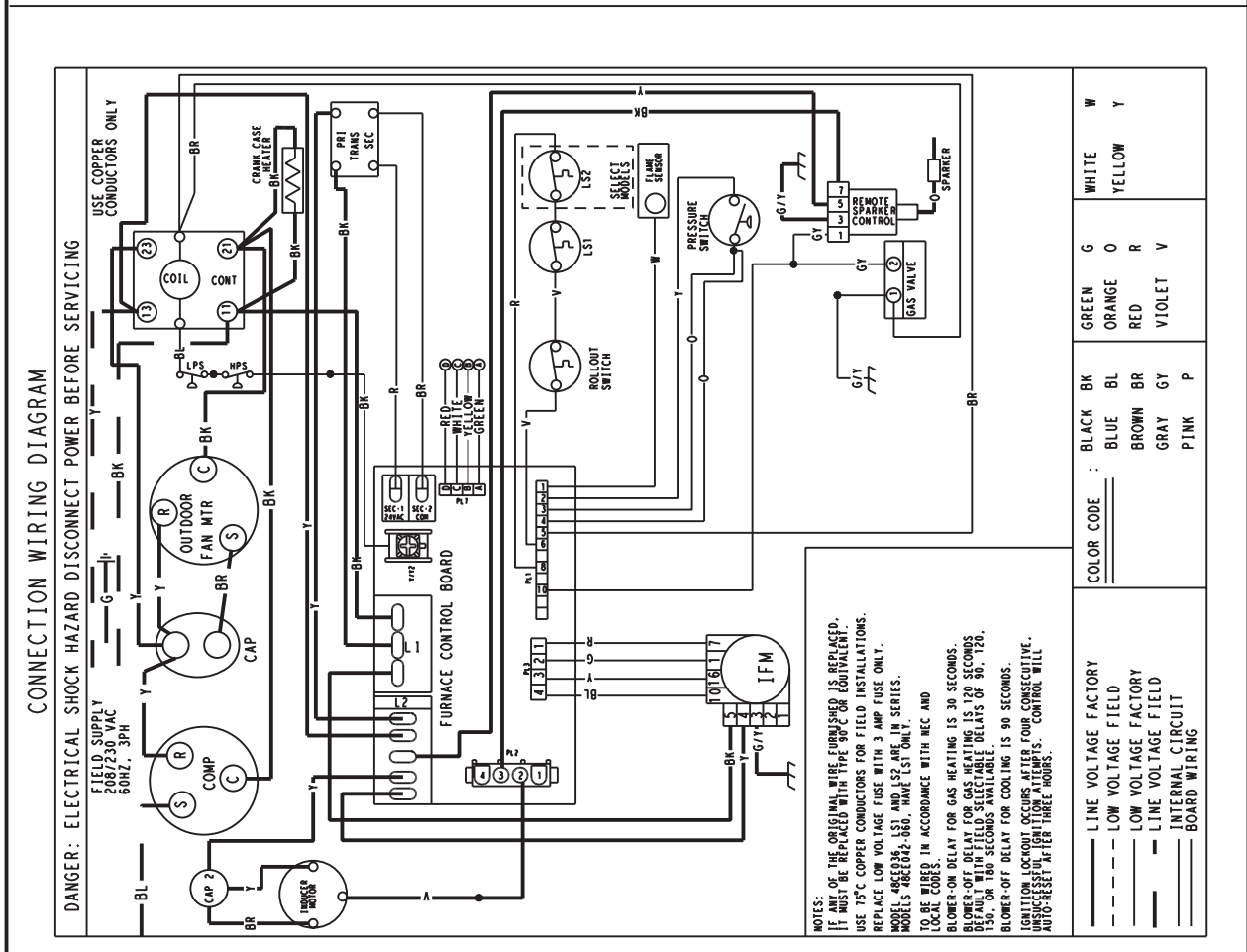
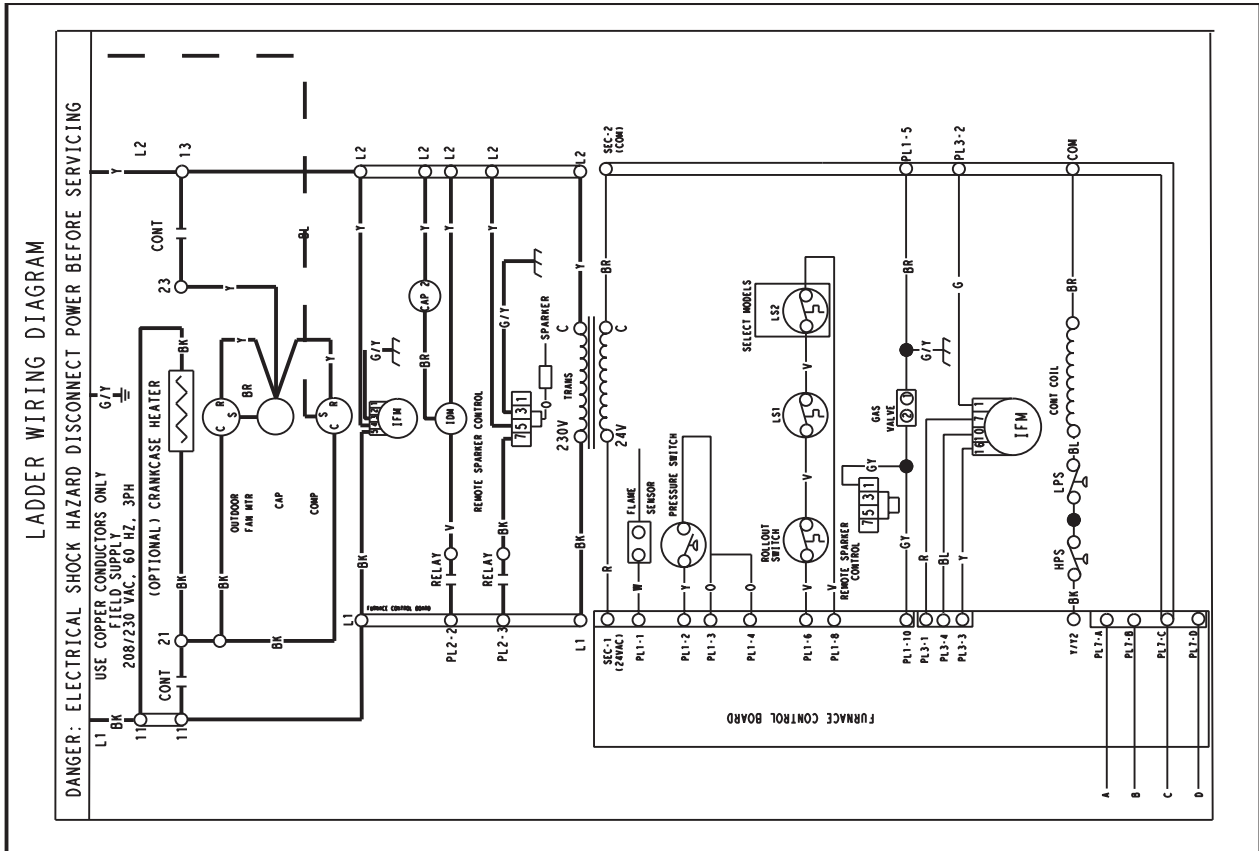
48CE

CONNECTION WIRING DIAGRAM



LADDER WIRING DIAGRAM





48CE

CONTROLS

Sequence of Operation

Heating—On a call for heating, the User Interface initiates the ignition sequence by starting the induced draft motor. When the pressure switch proves movement of combustion air, the burner sequence begins. This function is performed by the Infinity gas control (IGC). The evaporator fan motor is energized 38 seconds after flame is established. When the User Interface is satisfied, the burners stop firing and the evaporator fan motor shuts off after a preselected time-off delay.

Cooling—When the room temperature rises to a point that is slightly above the cooling control setting of the User Interface, the User Interface completes the circuit between terminal R to terminals Y and G. These completed circuits through the thermostat connect contactor coil (C) (through unit wire Y) and blower relay coil (BR) (through unit wire G) across the 24-v secondary of transformer (TRAN).

The normally open contacts of energized contactor (C) close and complete the circuit through compressor motor (COMP) to condenser (outdoor) fan motor (OFM). Both motors start instantly. The indoor blower will cycle on and off with a call for cooling according to the program in the User Interface.

NOTE: Once the compressor has started and then has stopped, it should not be started again until 5 minutes have elapsed. The cooling cycle remains “on” until the room temperature drops to a point that is slightly below the cooling control setting of the User Interface. At this point, the User Interface “breaks” the circuit between terminal R to terminals Y and G. These open circuits de-energize contactor coil C and relay coil BR. The condenser and compressor motors stop. After a preselected delay, the blower motor stops. The unit is in a “standby” condition, waiting for the next “call for cooling” from the User Interface.

The ECM indoor blower operation with a call for fan operation in the cooling mode will operate at the airflow specified by the User Interface.

GUIDE SPECIFICATIONS

SINGLE-PACKAGED GAS HEATING/ELECTRIC COOLING UNITS CONSTANT VOLUME APPLICATION

HVAC GUIDE SPECIFICATIONS

SIZE RANGE: 2 TO 5 TONS, NOMINAL (COOLING)
40,000 to 130,000 Btu/h
Nominal Heating Input

MODEL NUMBER: 48CE

PART I - GENERAL

SYSTEM DESCRIPTION

Outdoor rooftop or ground mounted gas heating/electric cooling unit utilizing a scroll compressor for cooling duty. Unit shall discharge supply air vertically or horizontally as shown on contract drawings. Outdoor fan/coil section shall have a draw-thru design with vertical discharge for minimum sound levels.

QUALITY ASSURANCE

- A. Unit shall be rated in accordance with ARI Standards 210/240, and 270.
- B. Unit shall be designed in accordance with UL Standard 1995 and ANSI Z21.47-2003.
- C. Unit shall be manufactured in a facility registered to ISO 9001 manufacturing quality standard.
- D. Unit shall be UL listed and c-UL certified as a total package for safety requirements.
- E. Roof curb shall be designed to conform to NRCA Standards.
- F. Insulation and adhesives shall meet NFPA 90A requirements for flame spread and smoke generation.
- G. Cabinet insulation shall meet ASHRAE Standard 62P.

DELIVERY, STORAGE, AND HANDLING

Unit shall be stored and handled per manufacturer's recommendations.

PART 2- PRODUCTS

EQUIPMENT

A. General:

Factory-assembled, single-piece, heating and cooling unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, refrigerant charge (R-410A), and special features required prior to field start-up.

B. Unit Cabinet:

- 1. Unit cabinet shall be constructed of phosphated, zinc-coated, prepainted steel capable of withstanding 500 hrs of salt spray.
- 2. Normal service shall be through a single removable cabinet panel.
- 3. The unit shall be constructed on a rust proof unit base that has an externally trapped, integrated sloped drain pan.
- 4. Indoor fan compartment top surface shall be insulated with a minimum 1/2-in. thick, flexible fiberglass insulation, coated on the air side and retained by adhesive and mechanical means. The indoor wall sections will be insulated with a foil-faced insulation capable of being wiped clean. Aluminum foil-faced fiberglass insulation shall be used in the entire indoor air cavity section.
- 5. Unit shall have a field-supplied condensate trap.

C. Fans:

- 1. The indoor fan shall be direct-drive, variable-speed motor and control, as shown on equipment drawings.

- 2. Fan wheel shall be made from steel, be double-inlet type. It shall have forward-curved blades with a corrosion-resistant finish and shall be dynamically balanced.

- 3. Outdoor fan shall be of the direct-driven propeller type with aluminum blades, riveted to corrosion-resistant steel spiders. It shall be dynamically balanced, and discharge air vertically.

D. Compressor:

- 1. Fully hermetic compressors with factory-installed vibration isolation.
- 2. Scroll compressors shall be standard on all units.

E. Coils:

- 1. Indoor and outdoor coils shall have aluminum plate fins mechanically bonded to seamless copper tubes with all joints brazed.
- 2. Tube sheet openings shall be bellied to prevent tube wear.

F. Heating Section:

- 1. Induced-draft combustion type with energy saving direct spark ignition system and redundant main gas valve.
- 2. Pressure switch ensures adequate airflow for combustion from induced draft motor.
- 3. The heat exchangers shall be constructed of 409 stainless steel for corrosion resistance.
- 4. Burners shall be of the in-shot type constructed of aluminum coated steel.
- 5. All gas piping and electric power shall enter the unit cabinet at a single location.

G. Refrigerant Metering Device:

Refrigerant metering device shall be of the TXV (thermostatic expansion valve) type.

H. Filters:

Filter section shall consist of field-installed, throw-away, 1-in. thick fiberglass filters of commercially available sizes.

I. Controls and Safeties:

- 1. Unit controls shall be complete with self-contained low voltage control circuit.
- 2. Units shall incorporate an internal compressor protector that provides reset capability.
- 3. Unit shall provide high and low/loss-of-charge pressure safety protection.

J. Operating Characteristics:

- 1. Unit shall be capable of starting and running at 125°F ambient outdoor temperature, exceeding maximum load criteria of ARI Standard 210.
- 2. Compressor with standard controls shall be capable of operation down to 55°F ambient outdoor temperature.
- 3. Units shall be provided with fan time delay to prevent cold air delivery before the heat exchanger warms up.

K. Electrical Requirements:

All unit power wiring shall enter unit cabinet at a single location.

L. Motors:

- 1. Compressor motors shall be of the refrigerant-cooled type with line-break thermal and current overload protection.
- 2. All fan motors shall have permanently lubricated bearings and inherent automatic-reset thermal overload protection.
- 3. Outdoor fan motor shall be totally enclosed.

GUIDE SPECIFICATIONS (CONT)

M. Grille

1. Louvered Grille:

Louvered grille shall be factory-installed to provide hail guard and vandalism protection.

N. Special Features:

1. Coil Options:

Shall include factory-installed optional tin-plated indoor copper/copper and vinyl-coated refrigerant coils.

2. Flat Roof Curb:

Curbs shall have seal strip and a wood nailer for flashing and shall be installed per manufacturer's instructions.

3. Manual Outdoor Air Damper:

Package shall consist of damper, bird screen, and rain hood which can be preset to admit outdoor air for year-round ventilation.

4. Infinity™ User Interface:

To provide for one-stage heating and cooling in addition to manual or automatic changeover and indoor fan control.

5. Natural-to-Propane Conversion Kit:

Shall be complete with all required hardware to convert to liquid propane (LP) operation at 3.5 in. wg manifold pressure.

6. Low-Ambient Package:

Shall consist of a solid-state control and outdoor coil temperature sensor for controlling outdoor fan motor operation, which shall allow unit to operate down to 0°F outdoor ambient temperature in cooling.

7. Filter Rack Kit:

Shall provide filter mounting for downflow and horizontal applications.

8. Square-To-Round Duct Transitions:

Shall have the ability to convert the supply and return openings from rectangular to round (024-048 sizes only).

9. Compressor Protection (Time Guard® II Kit):

Solid-state control shall protect compressor by preventing "short cycling."

10. Crankcase Heater:

Shall provide anti-floodback protection for low-load cooling applications.

11. High Altitude Kit:

Shall consist of natural gas orifices to compensate for gas heat operation at 2001 to 6000 ft above sea level.

12. Low NOx (Natural Gas only) Option:

Shall provide NOx reduction to values below 40 nanograms/joule to meet California emission requirements.

13. Compressor Hard Start Kit:

Shall be available to give a boost to the compressor motor at each start-up.