

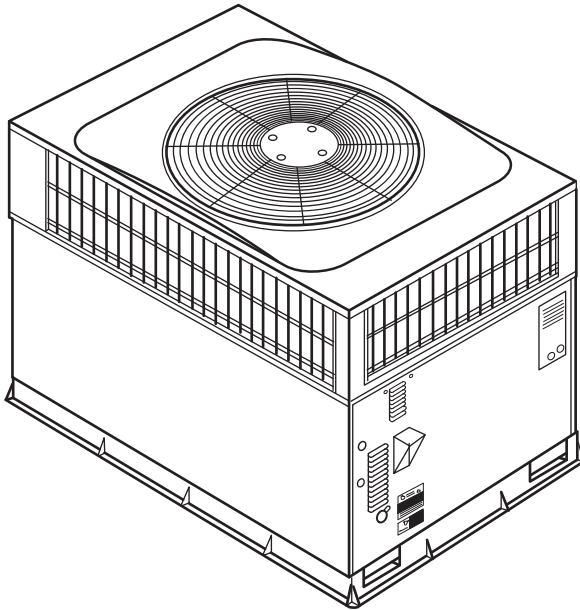
48ES

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



Turn to the Experts.™

Product Data



A08438

Fig. 1 - Unit 48ES

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

- Up to 13.5 SEER
- Up to 81% AFUE
- Factory-Installed TXV
- Multi-Speed Blower-Standard
- Direct Spark Ignition
- Low Sound Levels

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 is an HFC refrigerant which does not contain chlorine that can harm the ozone layer. Puron refrigerant is in service in millions of systems, proving highly reliable, environmentally sound performance.

Easy Installation

Factory-assembled package is a compact, fully self-contained, combination gas heating/electric cooling unit that is prewired, 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 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. 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.

Efficient operation High-efficiency design offers SEER (Seasonal Energy Efficiency Ratios) of up to 13.5 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.

48ESN 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 where a Low NOx rule exists. Low NOx option is available on single phase models only.

Durable, dependable components Compressors are designed for high efficiency. Each compressor is hermetically sealed against contamination to help promote longer life and dependable operation. Each compressor also has vibration isolation to provide quieter operation. All 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 aluminized 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 multi-speed blower motor is standard on all 48ES models.

Direct-drive PSC condenser-fan motors are designed to help reduce energy consumption and provide for cooling operation down to 40°F (4.4°C) outdoor temperature. Motomaster® II low ambient kit is available as a field-installed accessory.

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.

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

High and Low Pressure Switches provide added reliability for the compressor.

Indoor and Outdoor coils are computer-designed for optimum heat transfer and 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 75dBA.

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 jobsite. A nesting feature ensures a positive basepan to roof curb seal when the unit is roof mounted. A convenient 3/4-in. (19.05 mm) wide perimeter flange makes frame mounting on a rooftop easy.

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.

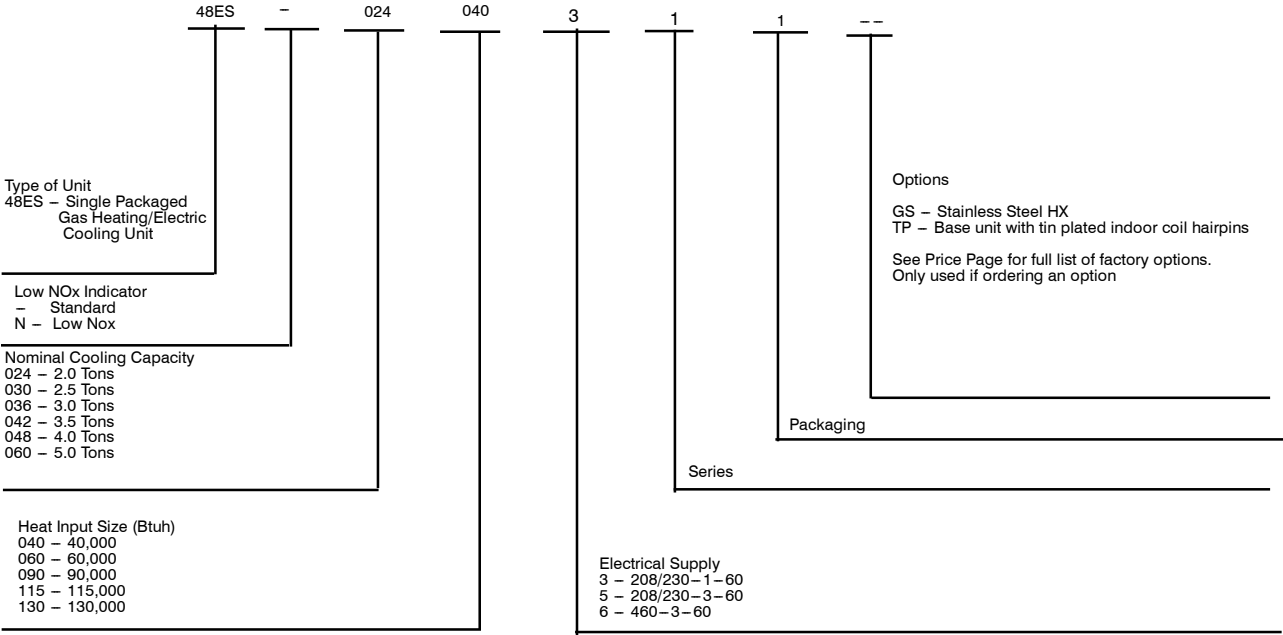
Integrated Gas Control (IGC) board provides safe and efficient control of heating and simplifies trouble-shooting through its built-in diagnostic function.

Cabinets are constructed of heavyduty, phosphated, zinc-coated prepainted steel capable of withstanding 500 hours in salt spray. Interior surfaces of the evaporator/heat exchanger compartment are insulated with cleanable semi-rigid insulation board, 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 62.2.) The sloped drain pan minimizes standing water in the drain. An external drain is provided.

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MODEL NUMBER NOMENCLATURE



48ES



ARI* CAPACITIES

Cooling Capacities and Efficiencies

UNIT 48ES	NOMINAL TONS	STANDARD CFM	NET COOLING CAPACITIES (Btuh)	EER**	SEER†
024	2	800	23,000	11.0	13.2
030	2-1/2	1000	28,600	11.2	13.5
036	3	1200	34,400	11.0	13.0
042	3-1/2	1400	40,500	11.2	13.2
048	4	1600	46,500	11.2	13.2
060	5	1750	57,000	11.0	13.4

LEGEND

dB—Sound Levels (decibels)

db—Dry Bulb

SEER—Seasonal Energy Efficiency Ratio

wb—Wet Bulb

COP—Coefficient of Performance

* Air Conditioning & Refrigeration Institute.

**At "A" conditions—80°F (26.7°C) indoor db/67°F (19.4°C) indoor wb & 95°F (35°C) outdoor db.

† Rated in accordance with U.S. Government DOE Department of Energy)

test procedures and/or ARI Standards 210/240.

Notes:

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

Ratings are based on:

Cooling Standard: 80°F (26.7°C) db, 67°Fwb (19.4°C) indoor entering—air temperature and 95°F db (35°C) outdoor entering—air temperature.

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

48ES

Gas Heating Capacities and Efficiencies

UNIT 48ES	HEATING INPUT (Btuh)	OUTPUT CAPACITY (Btuh)	TEMPERATURE RISE RANGE °F (°C)	AFUE (%)
024040 030040	40,000	32,000	30-60 (16.7-33.3)	80.0
024060 030060 036060 042060	60,000	48,000 48,000 48,000 47,000	25-55 (13.9-30.6)	80.0 80.0 80.0 78.5
036090 042090 048090 060090	90,000	72,000 73,000 73,000 73,000	35-65 (19.4-36.1)	79.3 80.4 80.4 80.4
048115 060115	115,000	93,000	30-60 (16.7-33.3)	80.3
048130 060130	130,000	103,000	35-65 (19.4-36.1)	78.9

LEGEND

AFUE—Annual Fuel Utilization Efficiency

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

A-Weighted Sound Power Level (dBA)

UNIT 48ES	STANDARD RATING dBA	TYPICAL OCTAVE BAND SPECTRUM (dBA without tone adjustment)						
		125	250	500	1000	2000	4000	8000
024---311	76	66.0	66.0	70.5	71.5	67.5	62.5	58.5
030---311/511	75	66.0	63.5	68.0	68.5	67.5	61.5	55.0
036---311/511/611	75	64.0	63.5	68.0	70.5	64.5	61.0	61.0
042---311/511/611	77	67.0	67.0	69.5	70.5	68.0	65.5	61.0
048---311/511/611	78	71.5	66.5	73.0	71.5	68.0	64.0	57.0
060---311/511/611	78	74.5	66.5	70.0	70.0	66.5	64.0	57.0

* Tested in accordance with ARI Standard 270 (not listed in ARI).

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
SHIPPING WEIGHT** lb.	329	329	334	334	344	344	435	435
SHIPPING WEIGHT** (kg)	149	149	152	152	156	156	197	197
COMPRESSORS	Scroll							
Quantity	1							
REFRIGERANT (R-410A)								
Quantity lb.	4.8	4.8	6.2	6.2	6.4	6.4	6.1	6.1
Quantity (kg)	2.2	2.2	2.8	2.8	2.9	2.9	2.7	2.7
REFRIGERANT METERING DEVICE	TXV							
OUTDOOR COIL								
Rows...Fins/in.	1...21	1...21	1...21	1...21	1...21	1...21	1...21	1...21
Face Area (sq ft)	10.2	10.2	11.9	11.9	15.4	15.4	13.6	13.6
OUTDOOR FAN								
Nominal CFM	2800	2800	3000	3000	3200	3200	3600	3600
Diameter in.	24	24	24	24	24	24	26	26
Diameter (mm)	609.6	609.6	609.6	609.6	609.6	609.6	660.4	660.4
Motor Hp (Rpm)	1/5 (810)	1/5 (810)	1/5 (810)	1/5 (810)	1/5 (810)	1/5 (810)	1/5 (810)	1/5 (810)
INDOOR COIL								
Rows...Fins/in.	2...17	2...17	3...17	3...17	3...17	3...17	3...17	3...17
Face Area (sq ft)	3.7	3.7	3.7	3.7	3.7	3.7	4.7	4.7
INDOOR BLOWER								
Nominal Cooling Airflow (Cfm)	800	800	1000	1000	1200	1200	1400	1400
Size in.	10x10	10x10	10x10	10x10	11x10	11x10	11x10	11x10
Size (mm.)	254x254	254x254	254x254	254x254	279.4x254	279.4x254	279.4x254	279.4x254
Motor HP (RPM)	1/2 (1050)	1/2 (1050)	1/2 (1050)	1/2 (1050)	3/4 (1000)	3/4 (1000)	3/4 (1075)	3/4 (1075)
FURNACE SECTION*								
Burner Orifice No. (Qty...Drill Size)								
Natural Gas	2...44	2...38	2...44	2...38	2...38	3...38	2...38	3...38
Propane Gas	2...55	2...53	2...55	2...53	2...53	3...53	2...53	3...53
HIGH-PRESSURE SWITCH (psig) Cut-out Reset (Auto)	650 +/- 15 420 +/- 25							
LOSS-OF-CHARGE / LOW-PRESSURE SWITCH (Liquid Line) (psig) cut-out Reset (auto)	20 +/- 5 45 +/- 10							
RETURN-AIR FILTERS†‡								
Throwaway Size in. (mm)	20x20x1 508x508x25	20x24x1 508x610x25			24x30x1 610x762x25			

48ES

PHYSICAL DATA (CONT)

UNIT SIZE	048090	048115	048130	060090	060115	060130
NOMINAL CAPACITY (ton)	4	4	4	5	5	5
SHIPPING WEIGHT** lb	443	443	443	465	465	465
SHIPPING WEIGHT** kg	201	201	201	211	211	211
COMPRESSORS	Scroll					
Quantity	1					
REFRIGERANT (R-410A)						
Quantity lb	6.4	6.4	6.4	10.0	10.0	10.0
Quantity (kg.)	2.9	2.9	2.9	4.5	4.5	4.5
REFRIGERANT METERING DEVICE	TXV					
OUTDOOR COIL						
Rows...Fins/in.	1...21	1...21	1...21	2...21	2...21	2...21
Face Area (sq ft)	15.5	15.5	15.5	15.5	15.5	15.5
OUTDOOR FAN						
Nominal Cfm	4000	4000	4000	3200	3200	3200
Diameter in.	26	26	26	26	26	26
Diameter (mm)	660.4	660.4	660.4	660.4	660.4	660.4
Motor Hp (Rpm)	1/5 (810)	1/5 (810)	1/5 (810)	1/5 (810)	1/5 (810)	1/5 (810)
INDOOR COIL						
Rows...Fins/in.	3...17	3...17	3...17	3...17	3...17	3...17
Face Area (sq ft)	4.7	4.7	4.7	5.7	5.7	5.7
INDOOR BLOWER						
Nominal Cooling Airflow (Cfm)	1600	1600	1600	1750	1750	1750
Size in.	11x10	11x10	11x10	11x10	11x10	11x10
Size (mm)	279.4x254	279.4x254	279.4x254	279.4x254	279.4x254	279.4x254
Motor HP (RPM)	1.0 (1075)	1.0 (1075)	1.0 (1075)	1.0 (1040)	1.0 (1040)	1.0 (1040)
FURNACE SECTION*						
Burner Orifice No. (Qty...Drill Size)						
Natural Gas	3...38	3...33	3...31	3...38	3...33	3...31
Propane Gas	3...53	3...51	3...49	3...53	3...51	3...49
HIGH-PRESSURE SWITCH (psig) Cut-out Reset (Auto)	650 +/- 15 420 +/- 25					
LOSS-OF-CHARGE / LOW-PRESSURE SWITCH (Liquid Line) (psig) cut-out Reset (auto)	20 +/- 5 45 +/- 10					
RETURN-AIR FILTERS Throwaway†‡ in. (mm)	24x36x1 610x914x25					

*Based on altitude of 0 to 2000 ft (0–610 m).

† 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. Air filter pressure drop for non–standard filters must not exceed 0.08 IN. W.C.

‡ If using accessory filter rack refer to the filter rack installation instructions for correct filter sizes and quantity.

** For 460 volt units, add 14 lbs (6.35 kg) to the shipping weight.

OPTIONS AND ACCESSORIES

Field-installed accessories

Economizer with Solid-State Controls and Barometric Relief Dampers
Manual Air Damper (25% open)
Filter Rack
Flat Roof Curbs (8-in. [203.2 mm] and 14-in. [355.6 mm])
Square-to-Round Duct Transition Kit
Thermostats
Crankcase Heater
Compressor Hard Start Kit (for use on single-phase units only)
Natural-to-propane Gas Conversion Kit
High Altitude Propane Conversion Kit
Propane-to-natural Gas Conversion Kit
Rigging Kit
Low Ambient Kit (Motormaster® II Control)
Solid-State Time Guard® II Device

Economizer with solid-state controls and barometric relief dampers includes filter racks and provide outdoor air during cooling and reduce compressor operation.

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. (203.2 mm) and 14 in. (355.6 mm) sizes are available for roof mounted applications.

Louver grille provides hail and vandalism protection. A wire grille is standard on all models.

Square-to-round duct transition kit enables 024-048 size units to be fitted to 14 in. (355.6 mm) round ductwork.

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

Corporate Thermostats provide control for the system heating and cooling functions. Thermostat models are available in both programmable and non-programmable versions.

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

Natural-to-propane gas conversion kit allows for conversion from natural gas to propane gas for standard altitude (0 to 2000 ft [0 to 610 m] above sea level).

Rigging kit includes lifting brackets which are inserted into the unit base rigging holds to lift unit for rooftop applications.

Low-ambient kit (Motormaster II control) allows the use of mechanical cooling down to outdoor temperatures as low as 0°F (-17°C) when properly installed.

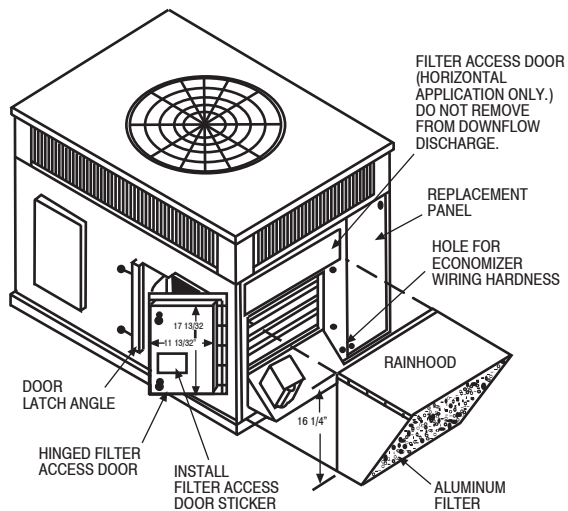
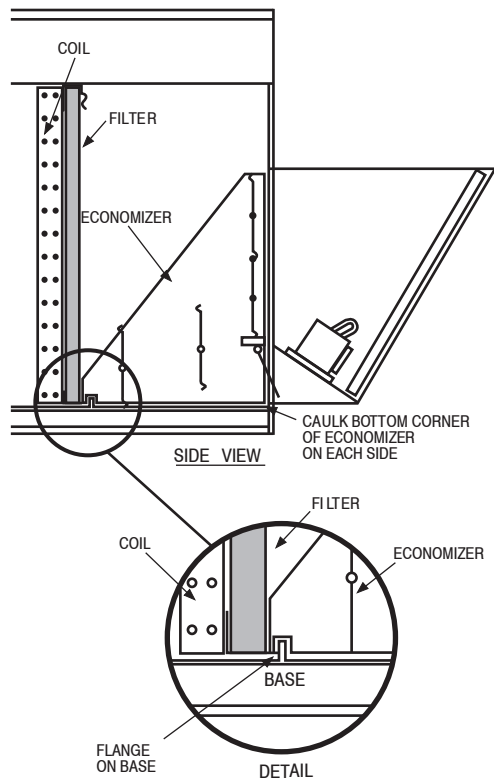
Solid-state Time Guard II device provides short-cycling protection for the compressor. Not required with corporate electronic thermostats.

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

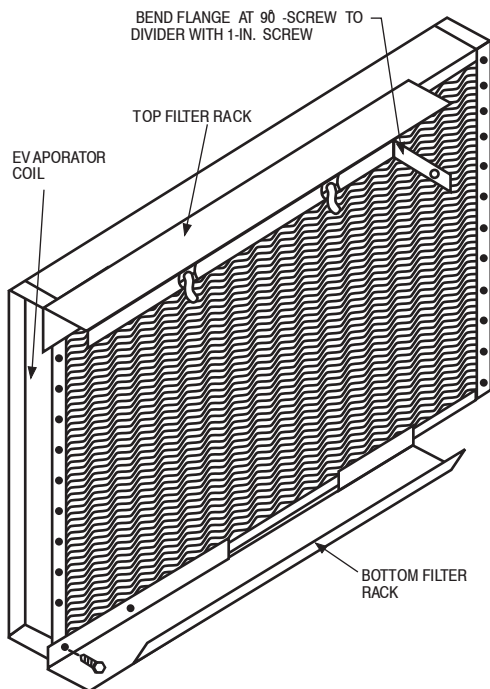
High altitude propane conversion kit is for use at 2001 to 6000 ft (610 to 1829 m) above sea level. Kit consists of propane gas orifices that compensate for gas heat operation at high altitude.

Propane-to-natural conversion kit is for use at standard altitudes (0 to 2000 ft [0 to 610 m] above sea level). Kit contains natural gas orifices and gas valve spring to convert the unit back to natural gas.

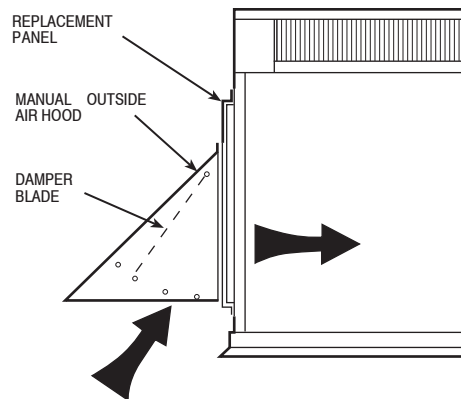
ECONOMIZER



FILTER RACK



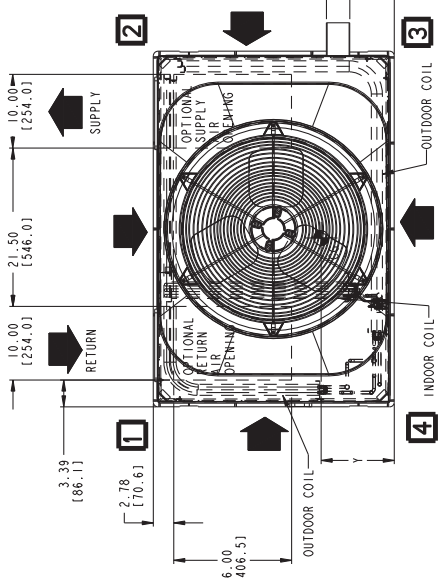
MANUAL OUTSIDE AIR DAMPER



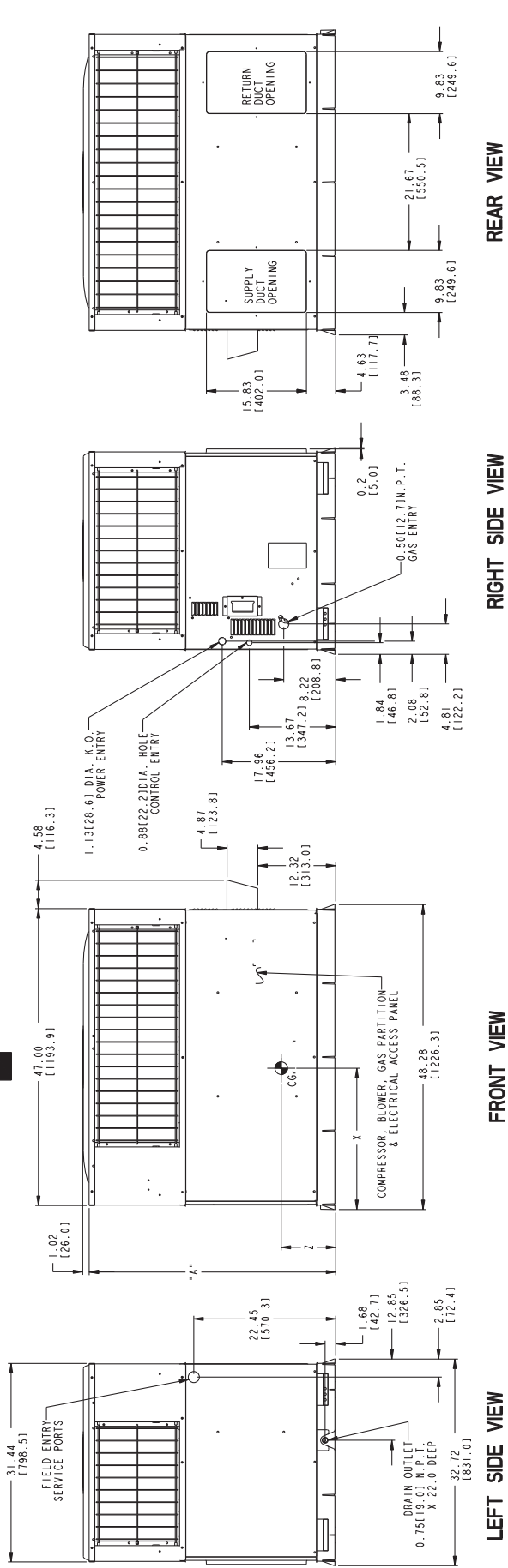
UNIT DIMENSIONS - 48ES024-036

UNIT	ELECTRICAL CHARACTERISTICS			UNIT HT.			CENTER OF GRAVITY IN/MM		
	LB	KG	"A"	LB	KG	"A"	X	Y	Z
48ES024040/060	281	128	37.0 [940.3]	20.0 [508.0]	17.0 [431.8]	17.0 [431.8]	17.0 [431.8]	17.0 [431.8]	17.0 [431.8]
48ES03040/060	286	130	39.0 [991.0]	20.0 [508.0]	19.3 [490.0]	19.3 [490.0]	19.3 [490.0]	19.3 [490.0]	19.3 [490.0]
48ES036060/090	296	134	43.0 [1092.7]	21.0 [533.0]	21.0 [533.0]	21.0 [533.0]	21.0 [533.0]	21.0 [533.0]	21.0 [533.0]

CORNER WEIGHTS LB/KG			
"1"	"2"	"3"	"4"
024 33.7/15.3	70.3/31.9	78.7/35.7	98.4/44.7
030 34.3/15.6	71.5/32.5	80.1/36.4	100.1/45.4
036 35.5/16.1	74.0/33.6	82.9/37.6	103.6/47.0



TOP VIEW



LEFT SIDE VIEW

FRONT VIEW

RIGHT SIDE VIEW

REAR VIEW

REQUIRED CLEARANCES TO COMBUSTIBLE MATL.

INCHES [MM]
TOP OF UNIT.....14.00 [355.6]
DUCT SIDE OF UNIT.....2.00 [50.8]
SIDE OPPOSITE DUCTS.....14.00 [355.6]
BOTTOM OF UNIT.....0.50 [12.7]
FLUE PANEL.....36.00 [914.4]

NEC REQUIRED CLEARANCES.

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

REQUIRED CLEARANCE FOR OPERATION AND SERVICING

INCHES [MM]
EVAP. COIL ACCESS SIDE.....36.00 [914.0]
POWER ENTRY SIDE.....42.00 [1066.8]
(EXCEPT FOR NEC REQUIREMENTS)
UNIT TOP.....48.00 [1219.2]
SIDE OPPOSITE DUCTS.....36.00 [914.0]
DUCT PANEL.....12.00 [304.8]

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

DIMENSIONS IN [] ARE IN MM

48ES500203	REV
2.0	

48ES

UNIT DIMENSIONS - 48ES042-060

UNIT	ELECTRICAL CHARACTERISTICS	UNIT WT.		UNIT HEIGHT		CENTER OF GRAVITY IN/MM					
		LB	KG	"A"	"A"	X	Y	Z			
48ES042060/090	208/230-1, 208/230-3, 460-3 60HZ	383	174	37.0	939.8	21.0	533.0	21.0	533.4	17.1	434.0
48ES048090/115/130	208/230-1, 208/230-3, 460-3 60HZ	391	178	39.0	990.6	21.0	533.0	20.0	508.0	17.4	442.0
48ES060090/115/130	208/230-1, 208/230-3, 460-3 60HZ	413	188	39.0	990.6	21.0	533.0	20.0	508.0	17.6	447.0

REQUIRED CLEARANCES TO COMBUSTIBLE MATL.

CORNER WEIGHTS LB/KG			
"1"	"2"	"3"	"4"
0.42	46.0/20.9	95.8/43.5	107.2/48.7
0.48	46.9/21.3	97.8/44.4	109.5/49.7
0.60	49.6/22.5	103.3/46.9	115.6/52.5

INCHES [MM]
 TOP OF UNIT..... 14.00 [355.6]
 DUCT SIDE OF UNIT..... 2.00 [50.8]
 SIDE OPPOSITE DUCTS..... 14.00 [355.6]
 BOTTOM OF UNIT..... 0.50 [12.7]
 FLUE PANEL..... 36.00 [914.4]

NEC. REQUIRED CLEARANCES.

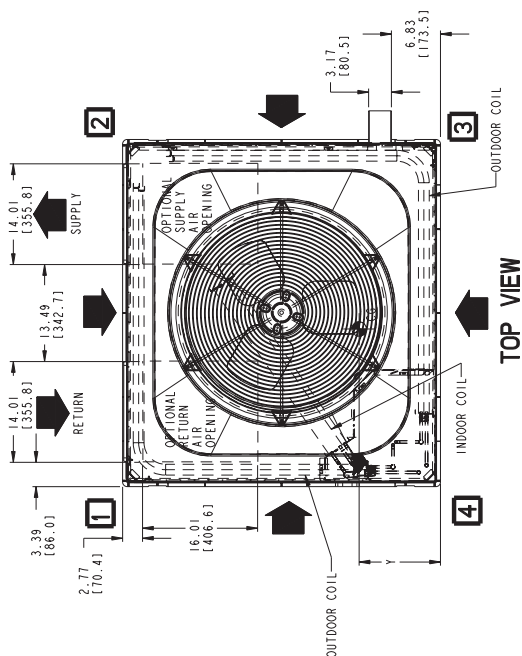
INCHES [MM]
 BETWEEN UNITS: POWER ENTRY SIDE..... 42.00 [1066.8]
 UNIT AND UNGROUNDED SURFACES, POWER ENTRY SIDE..... 36.00 [914.0]
 UNIT AND BLOCK OR CONCRETE WALLS AND OTHER GROUNDED SURFACES, POWER ENTRY SIDE..... 42.00 [1066.8]

REQUIRED CLEARANCE FOR OPERATION AND SERVICING

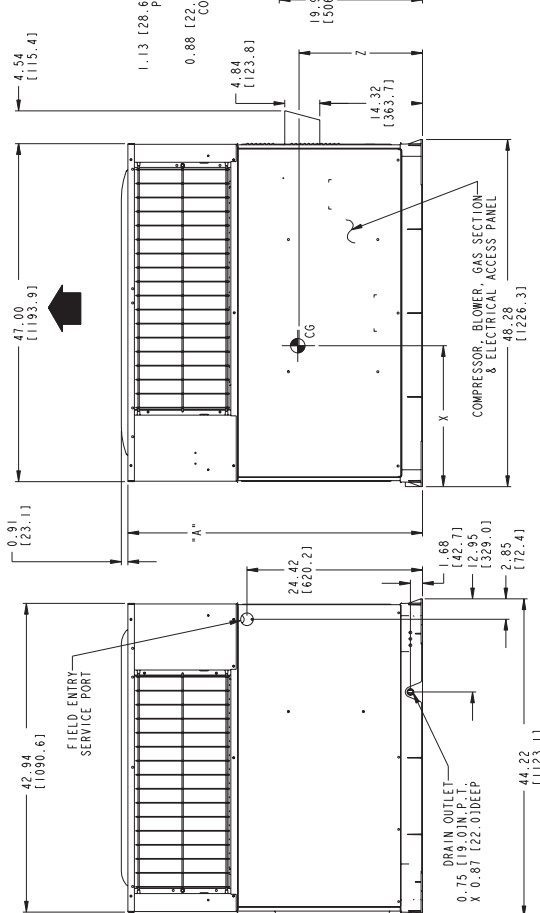
INCHES [MM]
 EVAP. COIL ACCESS SIDE..... 36.00 [914.0]
 POWER ENTRY SIDE..... 42.00 [1066.8]
 (EXCEPT FOR NEC REQUIREMENTS)
 UNIT AND GROUNDED SURFACES, POWER ENTRY SIDE..... 48.00 [1219.2]
 SIDE OPPOSITE DUCTS..... 36.00 [914.0]
 DUCT PANEL..... 12.00 [304.8]

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

DIMENSIONS IN () ARE IN MM

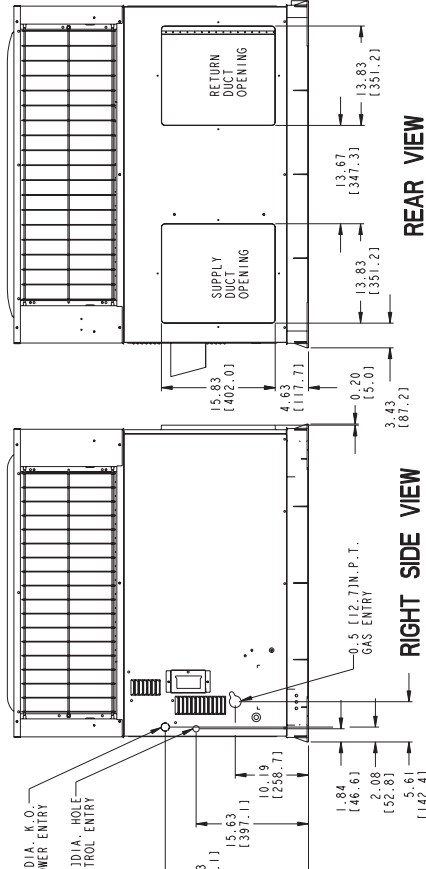


TOP VIEW



FRONT VIEW

LEFT SIDE VIEW

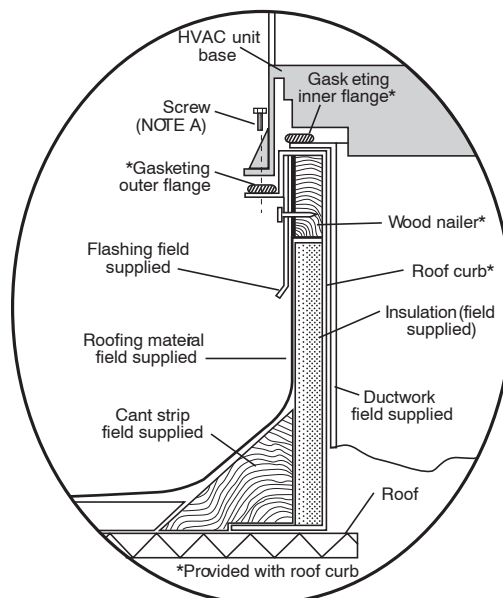


REAR VIEW

RIGHT SIDE VIEW

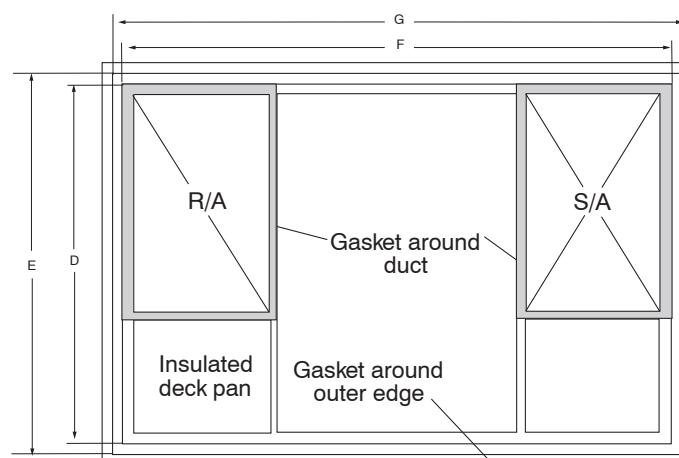
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48ES



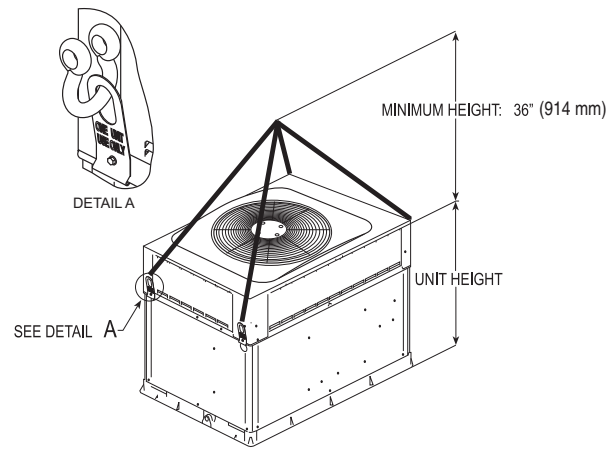
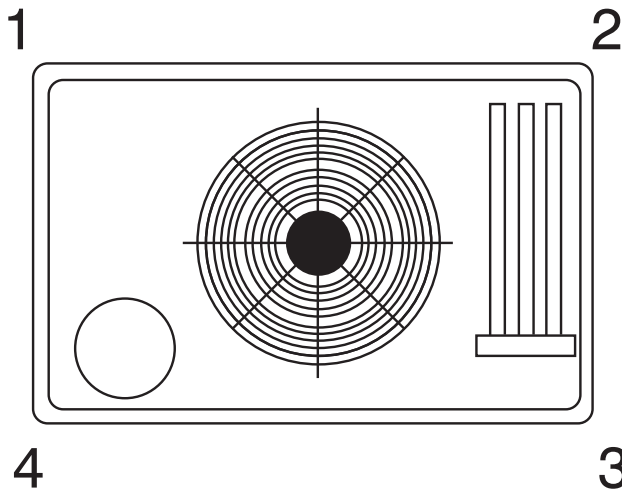
Roof Curb for Large Cabinet

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



UNIT SIZE	CATALOG NUMBER	A IN. (MM)	B IN. (MM)	C IN. (MM)	D IN. (MM)	E IN. (MM)	F IN. (MM)	G IN. (MM)
48ES024-036	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)
48ES042-060	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)

1. Roof curb must be set up for unit being installed.
2. Seal strip must be applied, as required, to unit being installed.
3. Roof curb is made of 16-gauge steel.
4. Attach ductwork to curb (flanges of duct rest on curb).
5. Insulated panels: 1-in. (25.4 mm) thick fiberglass 1 lb. density.
6. 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.



A08487

A08015

SMALL CABINET							LARGE CABINET						
Unit *	024		030		036		Unit *	042		048		060	
	lb	kg	lb	kg	lb	kg		lb	kg	lb	kg	lb	kg
Rigging Weight	292	133	297	135	307	139	Rigging Weight	398	181	406	184	428	194

* For 460 volt units add 14 lb (6.35 kg) to the rigging weight.
NOTE: See dimensional drawing for corner weights.

SELECTION PROCEDURE (WITH EXAMPLE)

1. Determine cooling and heating requirements at design conditions:

Given:

Required Cooling Capacity (TC) 34,000 Btuh
Sensible Heat Capacity (SHC) 25,000 Btuh
Required Heating Capacity 60,000 Btuh
Condenser Entering Air Temperature 95°F (35°C)
Indoor-Air Temperature 80°F (26°C)edb 67°F (19°C) ewb
Evaporator Air Quantity 1200 CFM
External Static Pressure 0.300 in. W.C.
Electrical Characteristics 230-1-60

2. Select unit based on required cooling capacity.

Enter Net Cooling Capacities table at condenser entering temperature of 95°F (35°C). Unit 036 at 1200 cfm and 67°F (19°C) ewb (entering wet bulb) will provide a total capacity of 34,400 Btuh and a SHC of 25,900 Btuh. Calculate SHC correction, if required, using Note 4 under Cooling Capacities tables.

3. Select heating capacity of unit to provide design condition requirement.

In the Heating Capacities and Efficiencies table, note that the unit 036090 will provide 72,000 Btuh with an input of 90,000 Btuh.

4. Determine fan speed and power requirements at design conditions.

Before entering the air delivery tables, calculate the total static pressure required. From the given example, the Wet Coil Pressure Drop Table, and the Filter Pressure Drop Table:

External Static Pressure	0.300 in. W.C.
Filter	0.130 in. W.C.
Wet Coil Pressure Drop	<u>0.100 in. W.C</u>
Total Static Pressure	0.530 in. W.C

Enter the table for Dry Coil Air Delivery—Horizontal and Downflow Discharge. At .530 in. W.C. ESP, the closest speed to 1200 CFM is Med-High (orange wire), which delivers 1316 CFM at .6 in ESP.

5. Select unit that corresponds to power source available.

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

PERFORMANCE DATA

48ES024

EVAPORATOR AIR		CONDENSER ENTERING AIR TEMPERATURES °F (°C)																	
CFM/BF	EWB °F (°C)	75 (23.9)			85 (29.4)			95 (35)			105 (40.6)			115 (46.1)			125 (51.7)		
		Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW
		Total	Sens		Total	Sens		Total	Sens		Total	Sens		Total	Sens		Total	Sens	
700/0.07	57 (13.8)	22.74	22.74	1.66	21.26	21.26	1.85	19.77	19.77	2.06	18.28	18.28	2.29	16.77	16.77	2.54	15.24	15.24	2.80
	62 (16.6)	23.94	20.55	1.66	22.18	19.57	1.86	20.42	18.59	2.07	18.67	17.59	2.30	16.93	16.57	2.54	15.24	15.24	2.80
	63* (17.2)	24.48	17.00	1.67	22.68	16.12	1.86	20.88	15.23	2.07	19.08	14.35	2.30	17.27	13.46	2.54	15.45	12.56	2.81
	67 (19.4)	26.34	17.55	1.67	24.42	16.65	1.86	22.49	15.76	2.07	20.57	14.86	2.30	18.64	13.97	2.55	16.70	13.07	2.82
	72 (22.2)	28.95	14.51	1.67	26.85	13.70	1.87	24.76	12.88	2.08	22.66	12.07	2.31	20.56	11.25	2.56	18.45	10.43	2.83
800/0.09	57 (13.8)	23.78	23.78	1.68	22.21	22.21	1.87	20.64	20.64	2.08	19.06	19.06	2.31	17.46	17.46	2.56	15.85	15.85	2.82
	62 (16.6)	24.57	22.03	1.68	22.75	20.99	1.87	20.94	19.93	2.08	19.15	18.83	2.31	17.46	17.46	2.56	15.85	15.85	2.82
	63* (17.2)	25.10	18.06	1.68	23.23	17.14	1.88	21.36	16.21	2.09	19.49	15.29	2.32	17.62	14.37	2.56	15.74	13.44	2.82
	67 (19.4)	27.00	18.66	1.69	25.00	17.73	1.88	23.00	16.80	2.09	21.01	15.87	2.32	19.01	14.94	2.57	17.00	14.00	2.83
	72 (22.2)	29.65	15.23	1.69	27.48	14.39	1.89	25.30	13.54	2.10	23.13	12.71	2.33	20.96	11.86	2.58	18.77	11.01	2.84
900/0.1	57 (13.8)	24.67	24.67	1.70	23.02	23.02	1.89	21.37	21.37	2.10	19.71	19.71	2.33	18.05	18.05	2.58	16.36	16.36	2.84
	62 (16.6)	25.09	23.40	1.70	23.23	22.27	1.89	21.39	21.39	2.10	19.71	19.71	2.33	18.04	18.04	2.58	16.35	16.35	2.84
	63* (17.2)	25.60	19.06	1.70	23.66	18.11	1.89	21.74	17.15	2.10	19.81	16.20	2.33	17.89	15.24	2.58	15.96	14.27	2.84
	67 (19.4)	27.52	19.73	1.70	25.45	16.76	1.90	23.40	17.80	2.11	21.34	16.83	2.34	19.29	15.67	2.59	17.23	14.89	2.85
	72 (22.2)	30.21	15.91	1.71	27.97	15.04	1.90	25.72	14.18	2.11	23.50	13.31	2.35	21.26	12.45	2.60	19.02	11.58	2.86

See Legend and Notes on Page 19.

PERFORMANCE DATA
48ES030

EVAPORATOR AIR		CONDENSER ENTERING AIR TEMPERATURES °F (°C)																							
		75 (23.9)				85 (29.4)				95 (35)				105 (40.6)				115 (46.1)				125 (51.7)			
		Capacity MBtuh		Total Sys KW	Total Sys KW	Capacity MBtuh		Total Sys KW	Total Sys KW	Capacity MBtuh		Total Sys KW	Total Sys KW	Capacity MBtuh		Total Sys KW	Total Sys KW	Capacity MBtuh		Total Sys KW	Total Sys KW	Capacity MBtuh		Total Sys KW	Total Sys KW
Total	Sens	Total	Sens	Total		Sens	Total	Sens		Total	Sens	Total		Sens	Total	Sens		Total	Sens	Total		Sens	Total	Sens	
CFM/BF	°F (°C)	29.20	29.20	2.09	27.20	27.20	2.30	25.19	25.19	2.52	23.18	23.18	2.77	21.16	21.16	3.04	19.13	19.13	3.32						
		30.09	26.44	2.09	27.78	25.28	2.30	25.48	24.10	2.52	23.22	23.12	2.77	21.16	21.16	3.04	19.12	19.12	3.32						
	83*	30.75	21.65	2.09	28.36	20.61	2.30	25.99	19.56	2.52	23.63	18.51	2.77	21.26	17.45	3.04	18.90	16.38	3.32						
	67	33.12	22.39	2.08	30.58	21.34	2.29	28.05	20.29	2.52	25.52	19.23	2.77	23.00	18.16	3.04	20.48	17.08	3.32						
	19.4																								
875/0.03	72	36.50	18.28	2.08	33.73	17.33	2.29	30.97	16.37	2.52	28.22	15.41	2.77	25.48	14.44	3.04	22.73	13.46	3.32						
	22.2																								
	57	30.51	30.51	2.12	28.39	28.39	2.33	26.27	26.27	2.56	24.14	24.14	2.80	22.01	22.01	3.07	19.87	19.87	3.35						
	13.8																								
	62	30.85	28.45	2.12	28.49	28.24	2.33	26.26	26.26	2.56	24.14	24.14	2.80	22.01	22.01	3.07	19.86	19.86	3.35						
1000/0.03	63*	31.44	23.11	2.12	28.97	22.02	2.33	26.51	20.93	2.56	24.07	19.84	2.81	21.63	18.73	3.07	19.21	17.60	3.35						
	17.2																								
	67	33.86	23.94	2.12	31.22	22.85	2.33	28.60	21.75	2.55	25.99	20.65	2.80	23.40	19.53	3.07	20.80	18.40	3.35						
	19.4																								
	72	37.30	19.27	2.11	34.43	18.29	2.32	31.58	17.30	2.55	28.74	16.31	2.80	25.91	15.31	3.07	23.07	14.29	3.35						
	22.2																								
	57	31.61	31.61	2.15	29.39	29.39	2.36	27.17	27.17	2.59	24.95	24.95	2.84	22.72	22.72	3.10	20.48	20.48	3.39						
	13.8																								
	62	31.61	31.61	2.15	29.39	29.39	2.36	27.17	27.17	2.59	24.95	24.95	2.84	22.72	22.72	3.10	20.48	20.48	3.39						
	16.6																								
1125/0.04	63*	31.97	24.51	2.15	29.43	23.38	2.36	26.91	22.25	2.59	24.41	21.10	2.84	21.92	19.95	3.10	19.45	18.75	3.39						
	17.2																								
	67	34.42	25.44	2.15	31.71	24.30	2.36	29.02	23.16	2.59	26.35	22.01	2.84	23.69	20.84	3.10	21.05	19.65	3.39						
	19.4																								
	72	37.91	20.22	2.14	34.96	19.20	2.35	32.03	18.19	2.58	29.12	17.17	2.83	26.22	16.14	3.10	23.32	15.10	3.39						
22.2																									

See Legend and Notes on Page 19.

PERFORMANCE DATA (CONT)

48ES036

EVAPORATOR AIR		CONDENSER ENTERING AIR TEMPERATURES °F (°C)																	
		75 (23.9)			85 (29.4)			95 (35)			105 (40.6)			115 (46.1)			125 (51.7)		
		Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW
CFM/BF	EWB °F (°C)	Total	Sens		Total	Sens		Total	Sens		Total	Sens		Total	Sens		Total	Sens	
1050/0.04	57 (13.6)	35.66	35.66	2.38	32.84	32.84	2.71	30.06	30.06	3.07	27.32	27.32	3.47	24.62	24.62	3.91	21.93	21.93	4.39
	62 (16.6)	37.08	32.25	2.39	33.82	30.46	2.71	30.65	28.68	3.07	27.56	26.88	3.47	24.62	24.62	3.91	21.93	21.93	4.39
	63* (17.2)	37.87	26.52	2.39	34.55	24.93	2.71	31.28	23.37	3.08	28.09	21.82	3.48	24.95	20.29	3.91	21.88	18.77	4.39
	67 (19.4)	40.79	27.41	2.39	37.23	25.80	2.72	33.74	24.21	3.08	30.32	22.64	3.48	26.96	21.09	3.92	23.65	19.54	4.39
	72 (22.2)	44.91	22.49	2.39	41.02	21.04	2.72	37.19	19.62	3.09	33.45	18.21	3.49	29.78	16.82	3.93	26.16	15.44	4.40
	57 (13.6)	37.24	37.24	2.43	34.27	34.27	2.76	31.33	31.33	3.12	28.44	28.44	3.52	25.58	25.58	3.96	22.76	22.76	4.44
1200/0.04	62 (16.6)	37.97	34.65	2.43	34.64	32.72	2.76	31.35	31.35	3.12	28.43	28.43	3.52	25.58	25.58	3.96	22.75	22.75	4.44
	63* (17.2)	38.73	28.25	2.43	35.29	26.59	2.76	31.91	24.95	3.12	28.60	23.33	3.52	25.37	21.73	3.96	22.21	20.12	4.44
	67 (19.4)	41.71	29.24	2.44	38.02	27.56	2.76	34.40	25.90	3.13	30.86	24.26	3.53	27.40	22.63	3.97	24.00	21.00	4.44
	72 (22.2)	45.90	23.65	2.44	41.86	22.16	2.77	37.91	20.68	3.13	34.05	19.23	3.54	30.26	17.79	3.98	26.53	16.36	4.45
	57 (13.8)	38.59	38.59	2.48	35.47	35.47	2.81	32.40	32.40	3.17	29.37	29.37	3.57	26.39	26.39	4.01	23.43	23.43	4.49
	62 (16.6)	38.77	36.79	2.48	35.46	35.46	2.81	32.39	32.39	3.17	29.37	29.37	3.57	26.38	26.38	4.01	23.43	23.43	4.49
1350/0.05	63* (17.2)	39.40	29.91	2.48	35.85	28.18	2.81	32.38	26.47	3.17	28.99	24.78	3.57	25.69	23.09	4.01	22.46	21.40	4.49
	67 (19.4)	42.41	31.01	2.48	38.61	29.26	2.81	34.89	27.52	3.18	31.27	25.81	3.58	27.72	24.10	4.02	24.26	22.39	4.49
	72 (22.2)	46.65	24.77	2.49	42.51	23.22	2.82	38.45	21.70	3.18	34.49	20.20	3.58	30.61	18.72	4.03	26.80	17.24	4.50

See Legend and Notes on Page 19.

PERFORMANCE DATA

48ES042

EVAPORATOR AIR		CONDENSER ENTERING AIR TEMPERATURES °F (°C)																	
		75 (23.9)			85 (29.4)			95 (35)			105 (40.6)			115 (46.1)			125 (51.7)		
		Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW
CFM/BF	EWB	Total	Sens		Total	Sens		Total	Sens		Total	Sens		Total	Sens		Total	Sens	
1225/0.03	⁵⁷ (13.8)	40.45	40.45	3.00	37.98	37.98	3.37	35.49	35.49	3.78	32.98	32.98	4.20	30.44	30.44	4.65	27.84	27.84	5.10
	⁶² (16.6)	42.06	37.63	2.94	39.15	35.73	3.33	36.25	33.83	3.74	33.37	31.92	4.18	30.48	30.39	4.64	27.88	27.88	5.10
	^{63*} (17.2)	42.93	30.96	2.91	39.95	29.27	3.31	36.96	27.59	3.72	33.97	25.92	4.17	30.95	24.26	4.63	27.90	22.59	5.10
	⁶⁷ (19.4)	46.12	31.94	2.80	42.92	30.23	3.19	39.72	28.52	3.61	36.53	26.83	4.05	33.31	25.15	4.52	30.04	23.46	4.99
	⁷² (22.2)	50.58	26.16	2.65	47.09	24.61	3.04	43.59	23.08	3.46	40.11	21.56	3.90	36.60	20.05	4.37	33.04	18.53	4.84
	⁵⁷ (13.8)	42.24	42.24	2.98	39.61	39.61	3.35	36.97	36.97	3.76	34.32	34.32	4.18	31.63	31.63	4.63	28.88	28.88	5.08
1400/0.04	⁶² (16.6)	43.11	40.44	2.95	38.38	33.34	3.34	37.15	36.28	3.75	34.31	34.31	4.18	31.62	31.62	4.63	28.88	28.88	5.08
	^{63*} (17.2)	43.91	32.97	2.92	40.81	31.21	3.32	37.71	29.45	3.73	34.61	27.70	4.18	31.49	25.96	4.64	28.35	24.21	5.12
	⁶⁷ (19.4)	47.15	34.07	2.81	43.82	32.28	3.20	40.50	30.50	3.62	37.19	28.73	4.06	33.86	26.97	4.53	30.50	25.20	5.00
	⁷² (22.2)	51.67	27.51	2.65	48.05	25.91	3.05	44.42	24.32	3.46	40.81	22.75	3.91	37.19	21.19	4.38	33.51	19.62	4.85
	⁵⁷ (13.8)	43.75	43.75	2.97	40.99	40.99	3.34	38.22	38.22	3.75	35.43	35.43	4.17	32.62	32.62	4.62	29.74	29.74	5.07
	⁶² (16.6)	44.02	42.95	2.96	41.01	41.01	3.34	38.21	38.21	3.75	35.43	35.43	4.17	32.61	32.61	4.62	29.74	29.74	5.07
1575/0.05	^{63*} (17.2)	44.67	34.90	2.94	41.47	33.06	3.33	38.28	31.23	3.75	35.10	29.41	4.20	31.91	27.58	4.66	28.70	25.74	5.14
	⁶⁷ (19.4)	47.93	36.13	2.82	44.51	34.26	3.21	41.09	32.40	3.63	37.69	30.56	4.08	34.28	28.71	4.54	30.85	26.85	5.02
	⁷² (22.2)	52.51	28.80	2.67	48.78	27.15	3.06	45.05	25.51	3.48	41.34	23.89	3.93	37.63	22.28	4.39	33.86	20.67	4.87

See Legend and Notes on Page 19.

PERFORMANCE DATA (CONT)

48ES048

EVAPORATOR AIR		CONDENSER ENTERING AIR TEMPERATURES °F (°C)																							
		75 (23.9)				85 (29.4)				95 (35)				105 (40.6)				115 (46.1)				125 (51.7)			
		Capacity MBtuh		Total Sys KW	Capacity MBtuh	Total Sys KW	Capacity MBtuh	Total Sys KW	Capacity MBtuh	Total Sys KW	Capacity MBtuh	Total Sys KW	Capacity MBtuh	Total Sys KW	Capacity MBtuh	Total Sys KW	Capacity MBtuh	Total Sys KW	Capacity MBtuh	Total Sys KW					
		Total	Sens																		Total	Sens	Total	Sens	Total
CFMBF	EWB °F (°C)	57 (13.8)	46.51	46.51	3.29	43.60	43.60	3.68	3.68	40.66	40.66	4.11	37.70	37.70	4.56	4.56	34.70	34.70	5.05	5.05	31.64	31.64	5.55	5.55	
		62 (16.6)	48.43	41.91	3.29	45.02	40.09	3.68	3.68	41.60	38.24	4.10	38.19	36.35	4.56	4.56	34.81	34.56	5.05	5.05	31.64	31.64	5.55	5.55	
		63* (17.2)	49.45	34.51	3.29	45.95	32.87	3.68	3.68	42.43	31.22	4.10	38.89	29.56	4.56	4.56	35.34	27.89	5.05	5.05	31.75	26.19	5.55	5.55	
		67 (19.4)	53.14	35.61	3.29	49.39	33.95	3.68	3.68	45.62	32.29	4.10	41.85	30.61	4.55	4.55	38.05	28.93	5.04	5.04	34.20	27.21	5.55	5.55	
		72 (22.2)	58.33	29.19	3.28	54.23	27.68	3.67	3.67	50.11	26.15	4.09	46.00	24.62	4.55	4.55	41.85	23.08	5.03	5.03	37.64	21.51	5.54	5.54	
1400/0.04	57 (13.8)	48.55	48.55	3.35	45.46	45.46	3.74	3.74	42.35	42.35	4.16	39.21	39.21	4.61	4.61	36.04	36.04	5.10	5.10	32.81	32.81	5.60	5.60		
	62 (16.6)	49.62	44.99	3.35	46.10	43.02	3.74	3.74	42.60	40.97	4.16	39.21	39.21	4.61	4.61	36.04	36.04	5.10	5.10	32.80	32.80	5.60	5.60		
	63* (17.2)	50.57	36.73	3.35	46.92	35.02	3.74	3.74	43.27	33.30	4.16	39.61	31.57	4.61	4.61	35.94	29.83	5.10	5.10	32.24	28.05	5.60	5.60		
	67 (19.4)	54.31	37.96	3.34	50.41	36.23	3.73	3.73	46.50	34.50	4.15	42.59	32.76	4.61	4.61	38.66	30.99	5.09	5.09	34.70	29.20	5.60	5.60		
	72 (22.2)	59.58	30.68	3.34	55.32	29.12	3.73	3.73	51.05	27.54	4.15	46.80	25.97	4.60	4.60	42.51	24.38	5.08	5.08	38.17	22.76	5.59	5.59		
1600/0.05	57 (13.8)	50.26	50.26	3.40	47.02	47.02	3.79	3.79	43.76	43.76	4.21	40.47	40.47	4.66	4.66	37.15	37.15	5.15	5.15	33.76	33.76	5.65	5.65		
	62 (16.6)	50.64	47.75	3.40	47.06	47.06	3.79	3.79	43.75	43.75	4.21	40.46	40.46	4.66	4.66	37.14	37.14	5.15	5.15	33.76	33.76	5.65	5.65		
	63* (17.2)	51.44	38.88	3.40	47.67	37.10	3.79	3.79	43.92	35.31	4.21	40.16	33.51	4.67	4.67	36.40	31.68	5.15	5.15	32.62	29.81	5.66	5.66		
	67 (19.4)	55.22	40.25	3.40	51.19	38.45	3.79	3.79	47.17	36.64	4.21	43.16	34.83	4.66	4.66	39.13	32.98	5.14	5.14	35.08	31.10	5.65	5.65		
	72 (22.2)	60.54	32.12	3.40	56.16	30.51	3.78	3.78	51.77	28.89	4.20	47.40	27.27	4.65	4.65	43.00	25.64	5.13	5.13	38.55	23.98	5.64	5.64		

PERFORMANCE DATA

48ES060

EVAPORATOR AIR		CONDENSER ENTERING AIR TEMPERATURES °F (°C)														
		75 (23.9)			85 (29.4)			95 (35)			105 (40.6)			115 (46.1)		
		Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW
		Total	Sens		Total	Sens		Total	Sens		Total	Sens		Total	Sens	
CFM/BF	EWB °F (°C)	57 (13.8)	57.89	57.89	4.22	54.53	54.53	51.13	51.13	5.08	47.68	47.68	5.56	44.15	44.15	6.06
		62 (16.6)	59.66	51.98	4.24	55.71	49.84	47.68	47.68	5.09	47.84	45.44	5.56	44.15	44.15	6.06
		63* (17.2)	60.79	42.58	4.25	56.72	40.64	38.69	38.69	5.10	48.53	36.74	5.57	44.37	34.78	6.06
		67 (19.4)	65.28	43.94	4.28	60.89	41.97	40.00	40.00	5.14	52.08	38.03	5.61	47.59	36.03	6.10
		72 (22.2)	71.52	35.78	4.34	66.71	33.95	32.13	32.13	5.19	57.02	30.30	5.66	52.07	28.45	6.15
1750/0.02	57 (13.8)	60.39	60.39	4.33	56.80	56.80	4.74	53.18	53.18	5.18	49.50	49.50	5.66	45.74	45.74	6.16
	62 (16.6)	61.11	55.94	4.33	57.07	53.59	4.74	53.18	53.18	5.18	49.50	49.50	5.66	45.74	45.74	6.16
	63* (17.2)	62.07	45.41	4.34	57.83	43.39	4.75	53.59	41.36	5.19	49.33	39.33	5.66	45.03	37.28	6.15
	67 (19.4)	66.60	46.95	4.38	62.04	44.89	4.79	57.48	42.84	5.23	52.89	40.78	5.69	48.25	38.70	6.19
	72 (22.2)	72.91	37.66	4.43	67.90	35.78	4.85	62.90	33.90	5.28	57.85	32.01	5.75	52.74	30.11	6.24
2000/0.02	57 (13.8)	62.47	62.47	4.43	58.69	58.69	4.84	54.87	54.87	5.28	51.00	51.00	5.75	47.03	47.03	6.25
	62 (16.6)	62.48	62.48	4.43	58.68	58.68	4.84	54.86	54.86	5.28	50.99	50.99	5.75	47.03	47.03	6.25
	63* (17.2)	63.04	48.14	4.43	58.67	46.04	4.84	54.31	43.93	5.28	49.93	41.81	5.74	45.52	39.67	6.23
	67 (19.4)	67.60	49.85	4.47	62.90	47.72	4.88	58.21	45.59	5.32	53.50	43.44	5.78	48.74	41.27	6.27
	72 (22.2)	73.95	39.47	4.53	68.79	37.54	4.94	63.63	35.61	5.37	58.45	33.68	5.84	53.20	31.73	6.32
2250/0.03	57 (13.8)	62.47	62.47	4.43	58.69	58.69	4.84	54.87	54.87	5.28	51.00	51.00	5.75	47.03	47.03	6.25
	62 (16.6)	62.48	62.48	4.43	58.68	58.68	4.84	54.86	54.86	5.28	50.99	50.99	5.75	47.03	47.03	6.25
	63* (17.2)	63.04	48.14	4.43	58.67	46.04	4.84	54.31	43.93	5.28	49.93	41.81	5.74	45.52	39.67	6.23
	67 (19.4)	67.60	49.85	4.47	62.90	47.72	4.88	58.21	45.59	5.32	53.50	43.44	5.78	48.74	41.27	6.27
	72 (22.2)	73.95	39.47	4.53	68.79	37.54	4.94	63.63	35.61	5.37	58.45	33.68	5.84	53.20	31.73	6.32

See Legend and Notes on Page 19.

PERFORMANCE DATA (CONT)

* At 75°F (24°C) entering dry bulb—Tennessee Valley Authority (TVA) rating conditions; all others at 80°F (27°C) dry bulb.

LEGEND

BF— Bypass Factor

edb— Entering Dry—Bulb

Ewb— Entering Wet—Bulb

kW — Total Unit Power Input

SHC— Sensible Heat Capacity (1000 Btuh)

TC — Total Capacity (1000 Btuh) (net)

rh—Relative Humidity

COOLING 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:

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

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

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

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

4. The SHC is based on 80°F (26.6°C) edb temperature of air entering evaporator coil. Below 80°F (26.6°C) edb, subtract (corr factor x cfm) from SHC.

Above 80°F (26.6°C) edb, add (corr factor x cfm) to SHC.

Correction Factor = $1.10 \times (1 + \text{BF}) \times (\text{edb} + 80)$.

5. Integrated capacity is maximum (instantaneous) capacity less the effect of frost on the outdoor coil and the heat required to defrost it.

PERFORMANCE DATA (CONT)

Dry Coil Air Delivery* - Horizontal and Downflow Discharge - Unit 48ES024-060

48ES

Unit	Heating Rise Range	Motor Speed	Wire Color		External Static Pressure (in. W.C.)								
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
48ES(-,N)024040	30 – 60°F (17 – 33°C)	Low	Blue	CFM	754	650	538	429	--	--	--	--	--
				Heating Rise (°F)	40	46	56	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	22	26	31	NA	NA	NA	NA	NA	NA
		Med–Low	Pink	CFM	851	777	675	591	475	--	--	--	--
				Heating Rise (°F)	36	39	45	51	NA	NA	NA	NA	NA
				Heating Rise (°C)	20	22	25	28	NA	NA	NA	NA	NA
		Medium ²	Red	CFM	941	851	774	684	576	479	--	--	--
				Heating Rise (°F)	32	36	39	44	52	NA	NA	NA	NA
				Heating Rise (°C)	18	20	22	25	29	NA	NA	NA	NA
		Med–High ¹	Orange	CFM	1009	917	840	759	667	577	447	--	--
				Heating Rise (°F)	30	33	36	40	45	52	NA	NA	NA
				Heating Rise (°C)	17	18	20	22	25	29	NA	NA	NA
		High	Black	CFM	1241	1167	1111	1036	969	881	818	731	640
				Heating Rise (°F)	NA	NA	NA	NA	31	34	37	41	47
				Heating Rise (°C)	NA	NA	NA	NA	17	19	21	23	26
48ES(-,N)024060	25 – 55°F (14 – 31°C)	Low	Blue	CFM	754	650	538	429	--	--	--	--	--
				Heating Rise (°F)	NA	NA	NA	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Med–Low	Pink	CFM	851	777	675	591	475	--	--	--	--
				Heating Rise (°F)	52	NA	NA	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	29	NA	NA	NA	NA	NA	NA	NA	NA
		Medium ²	Red	CFM	941	851	774	684	576	479	--	--	--
				Heating Rise (°F)	47	52	NA	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	26	29	NA	NA	NA	NA	NA	NA	NA
		Med–High	Orange	CFM	1009	917	840	759	667	577	447	--	--
				Heating Rise (°F)	44	48	53	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	24	27	29	NA	NA	NA	NA	NA	NA
		High ¹	Black	CFM	1241	1167	1111	1036	969	881	818	731	640
				Heating Rise (°F)	36	38	40	43	46	50	54	NA	NA
				Heating Rise (°C)	20	21	22	24	25	28	30	NA	NA
48ES(-,N)030040	30 – 60°F (17 – 33°C)	Low	Blue	CFM	741	638	547	415	--	--	--	--	--
				Heating Rise (°F)	41	47	55	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	23	26	31	NA	NA	NA	NA	NA	NA
		Med–Low ¹	Pink	CFM	973	887	823	733	665	538	451	--	--
				Heating Rise (°F)	31	34	37	41	45	56	NA	NA	NA
				Heating Rise (°C)	17	19	20	23	25	31	NA	NA	NA
		Medium	Red	CFM	1088	1023	954	881	800	723	658	563	461
				Heating Rise (°F)	NA	30	32	34	38	42	46	54	NA
				Heating Rise (°C)	NA	16	18	19	21	23	26	30	NA
		Med–High ²	Orange	CFM	1140	1064	996	915	840	758	687	564	480
				Heating Rise (°F)	NA	NA	30	33	36	40	44	54	NA
				Heating Rise (°C)	NA	NA	17	18	20	22	24	30	NA
		High	Black	CFM	1202	1140	1082	1015	961	881	810	732	631
				Heating Rise (°F)	NA	NA	NA	30	31	34	37	41	48
				Heating Rise (°C)	NA	NA	NA	17	17	19	21	23	27

PERFORMANCE DATA (CONT)

Dry Coil Air Delivery* - Horizontal and Downflow Discharge - Unit 48ES024-060 (Cont)

Unit	Heating Rise Range	Motor Speed	Wire Color		External Static Pressure (in. W.C.)								
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
48ES(-,N)030060	25 – 55°F (14 – 31°C)	Low	Blue	CFM	741	638	547	415	--	--	--	--	--
				Heating Rise (°F)	NA	NA	NA	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Med–Low	Pink	CFM	973	887	823	733	665	538	451	--	--
				Heating Rise (°F)	46	50	54	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	25	28	30	NA	NA	NA	NA	NA	NA
		Medium	Red	CFM	1088	1023	954	881	800	723	658	563	461
				Heating Rise (°F)	41	43	47	50	NA	NA	NA	NA	NA
				Heating Rise (°C)	23	24	26	28	NA	NA	NA	NA	NA
		Med–High ²	Orange	CFM	1140	1064	996	915	840	758	687	564	480
				Heating Rise (°F)	39	42	45	49	53	NA	NA	NA	NA
				Heating Rise (°C)	22	23	25	27	29	NA	NA	NA	NA
		High ¹	Black	CFM	1202	1140	1082	1015	961	881	810	732	631
				Heating Rise (°F)	37	39	41	44	46	50	55	NA	NA
				Heating Rise (°C)	21	22	23	24	26	28	30	NA	NA
48ES(-,N)036060	25 – 55°F (14 – 31°C)	Low ¹	Blue	CFM	1234	1168	1093	1021	961	894	825	759	687
				Heating Rise (°F)	36	38	41	44	46	50	54	NA	NA
				Heating Rise (°C)	20	21	23	24	26	28	30	NA	NA
		Med–Low	Pink	CFM	1290	1223	1154	1090	1027	977	894	828	762
				Heating Rise (°F)	34	36	39	41	43	45	50	54	NA
				Heating Rise (°C)	19	20	21	23	24	25	28	30	NA
		Medium ²	Red	CFM	1354	1290	1226	1158	1102	1046	981	918	843
				Heating Rise (°F)	33	34	36	38	40	42	45	48	53
				Heating Rise (°C)	18	19	20	21	22	24	25	27	29
		Med–High	Orange	CFM	1606	1546	1489	1430	1371	1316	1258	1208	1140
				Heating Rise (°F)	28	29	30	31	32	34	35	37	39
				Heating Rise (°C)	15	16	17	17	18	19	20	20	22
		High	Black	CFM	1630	1580	1517	1463	1407	1339	1277	1210	1131
				Heating Rise (°F)	27	28	29	30	32	33	35	37	39
				Heating Rise (°C)	15	16	16	17	18	18	19	20	22
48ES(-,N)036090	35 – 65°F (19 – 36°C)	Low	Blue	CFM	1234	1168	1093	1021	961	894	825	759	687
				Heating Rise (°F)	55	58	62	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	31	32	35	NA	NA	NA	NA	NA	NA
		Med–Low	Pink	CFM	1290	1223	1154	1090	1027	977	894	828	762
				Heating Rise (°F)	53	56	59	62	NA	NA	NA	NA	NA
				Heating Rise (°C)	29	31	33	35	NA	NA	NA	NA	NA
		Medium ²	Red	CFM	1354	1290	1226	1158	1102	1046	981	918	843
				Heating Rise (°F)	50	53	55	59	62	65	NA	NA	NA
				Heating Rise (°C)	28	29	31	33	34	36	NA	NA	NA
		Med–High	Orange	CFM	1606	1546	1489	1430	1371	1316	1258	1208	1140
				Heating Rise (°F)	42	44	46	48	50	52	54	56	60
				Heating Rise (°C)	24	24	25	26	28	29	30	31	33
		High ¹	Black	CFM	1630	1580	1517	1463	1407	1339	1277	1210	1131
				Heating Rise (°F)	42	43	45	46	48	51	53	56	60
				Heating Rise (°C)	23	24	25	26	27	28	30	31	33

48ES

PERFORMANCE DATA (CONT)

Dry Coil Air Delivery* - Horizontal and Downflow Discharge - Unit 48ES024-060 (Cont)

48ES

Unit	Heating Rise Range	Motor Speed	Wire Color		External Static Pressure (in. W.C.)									
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	
48ES(–,N)042060	25 – 55°F (14 – 31°C)	Low ¹	Blue	CFM	1295	1234	1182	1126	1075	1016	955	898	857	
				Heating Rise (°F)	34	36	38	39	41	44	47	49	52	
				Heating Rise (°C)	19	20	21	22	23	24	26	27	29	
		Med–Low	Pink	CFM	1345	1282	1235	1194	1140	1095	1027	974	921	
				Heating Rise (°F)	33	35	36	37	39	41	43	46	48	
				Heating Rise (°C)	18	19	20	21	22	23	24	25	27	
		Medium	Red	CFM	1505	1452	1413	1358	1323	1282	1234	1169	1130	
				Heating Rise (°F)	30	31	31	33	34	35	36	38	39	
				Heating Rise (°C)	16	17	17	18	19	19	20	21	22	
		Med–High ²	Orange	CFM	1545	1492	1449	1411	1362	1313	1278	1231	1188	
				Heating Rise (°F)	29	30	31	31	33	34	35	36	37	
				Heating Rise (°C)	16	17	17	17	18	19	19	20	21	
		High	Black	CFM	1705	1643	1607	1568	1518	1483	1448	1404	1360	
				Heating Rise (°F)	26	27	28	28	29	30	31	32	33	
				Heating Rise (°C)	14	15	15	16	16	17	17	18	18	
48ES(–,N)042090	35 – 65°F (19 – 36°C)	Low	Blue	CFM	1295	1234	1182	1126	1075	1016	955	898	857	
				Heating Rise (°F)	53	55	58	60	63	NA	NA	NA	NA	
				Heating Rise (°C)	29	31	32	34	35	NA	NA	NA	NA	
		Med–Low	Pink	CFM	1345	1282	1235	1194	1140	1095	1027	974	921	
				Heating Rise (°F)	51	53	55	57	60	62	NA	NA	NA	
				Heating Rise (°C)	28	29	31	32	33	35	NA	NA	NA	
		Medium ¹	Red	CFM	1505	1452	1413	1358	1323	1282	1234	1169	1130	
				Heating Rise (°F)	45	47	48	50	51	53	55	58	60	
				Heating Rise (°C)	25	26	27	28	29	29	31	32	33	
		Med–High ²	Orange	CFM	1545	1492	1449	1411	1362	1313	1278	1231	1188	
				Heating Rise (°F)	44	46	47	48	50	52	53	55	57	
				Heating Rise (°C)	24	25	26	27	28	29	30	31	32	
		High	Black	CFM	1705	1643	1607	1568	1518	1483	1448	1404	1360	
				Heating Rise (°F)	40	41	42	43	45	46	47	48	50	
				Heating Rise (°C)	22	23	24	24	25	25	26	27	28	
48ES(–,N)048090	35 – 65°F (19 – 36°C)	Low ¹	Blue	CFM	1402	1351	1311	1263	1224	1172	1136	1080	1041	
				Heating Rise (°F)	49	50	52	54	56	58	60	63	65	
				Heating Rise (°C)	27	28	29	30	31	32	33	35	36	
		Med–Low	Pink	CFM	1457	1404	1367	1318	1284	1233	1197	1144	1104	
				Heating Rise (°F)	47	48	50	52	53	55	57	59	62	
				Heating Rise (°C)	26	27	28	29	29	31	32	33	34	
		Medium ²	Red	CFM	1736	1695	1642	1601	1553	1512	1465	1427	1381	
				Heating Rise (°F)	39	40	41	42	44	45	46	48	49	
				Heating Rise (°C)	22	22	23	24	24	25	26	26	27	
		Med–High	Orange	CFM	2149	2111	2062	2026	1980	1945	1905	1864	1793	
				Heating Rise (°F)	NA	NA	NA	NA	NA	35	36	36	38	
				Heating Rise (°C)	NA	NA	NA	NA	NA	19	20	20	21	
		High	Black	CFM	2344	2306	2259	2203	2141	2070	1991	1902	1803	
				Heating Rise (°F)	NA	NA	NA	NA	NA	NA	NA	36	38	
				Heating Rise (°C)	NA	NA	NA	NA	NA	NA	NA	20	21	

PERFORMANCE DATA (CONT)

Dry Coil Air Delivery* - Horizontal and Downflow Discharge - Unit 48ES024-060 (Cont)

Unit	Heating Rise Range	Motor Speed	Wire Color		External Static Pressure (in. W.C.)								
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
48ES(-,N)048115	30 – 60°F (17 – 33°C)	Low	Blue	CFM	1402	1351	1311	1263	1224	1172	1136	1080	1041
				Heating Rise (°F)	NA	NA	NA	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Med–Low	Pink	CFM	1457	1404	1367	1318	1284	1233	1197	1144	1104
				Heating Rise (°F)	60	NA	NA	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	33	NA	NA	NA	NA	NA	NA	NA	NA
		Medium ²	Red	CFM	1736	1695	1642	1601	1553	1512	1465	1427	1381
				Heating Rise (°F)	50	51	53	54	56	57	59	NA	NA
				Heating Rise (°C)	28	28	29	30	31	32	33	NA	NA
		Med–High ¹	Orange	CFM	2149	2111	2062	2026	1980	1945	1905	1864	1793
				Heating Rise (°F)	40	41	42	43	44	45	46	47	48
				Heating Rise (°C)	22	23	23	24	24	25	25	26	27
		High	Black	CFM	2344	2306	2259	2203	2141	2070	1991	1902	1803
				Heating Rise (°F)	37	38	38	39	41	42	44	46	48
				Heating Rise (°C)	21	21	21	22	23	23	24	25	27
48ES(-,N)048130	35 – 65°F (19 – 36°C)	Low	Blue	CFM	1402	1351	1311	1263	1224	1172	1136	1080	1041
				Heating Rise (°F)	NA	NA	NA	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Med–Low	Pink	CFM	1457	1404	1367	1318	1284	1233	1197	1144	1104
				Heating Rise (°F)	NA	NA	NA	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Medium ²	Red	CFM	1736	1695	1642	1601	1553	1512	1465	1427	1381
				Heating Rise (°F)	55	57	59	60	62	64	NA	NA	NA
				Heating Rise (°C)	31	32	33	33	34	35	NA	NA	NA
		Med–High ¹	Orange	CFM	2149	2111	2062	2026	1980	1945	1905	1864	1793
				Heating Rise (°F)	45	46	47	48	49	50	51	52	54
				Heating Rise (°C)	25	25	26	26	27	28	28	29	30
		High	Black	CFM	2344	2306	2259	2203	2141	2070	1991	1902	1803
				Heating Rise (°F)	41	42	43	44	45	47	48	51	53
				Heating Rise (°C)	23	23	24	24	25	26	27	28	30
48ES(-,N)060090	35 – 65°F (19 – 36°C)	Low ¹	Blue	CFM	1445	1389	1341	1281	1236	1189	1139	1072	1027
				Heating Rise (°F)	47	49	51	53	55	57	60	63	NA
				Heating Rise (°C)	26	27	28	29	31	32	33	35	NA
		Med–Low	Pink	CFM	1678	1635	1602	1558	1513	1474	1438	1404	1349
				Heating Rise (°F)	41	42	42	44	45	46	47	48	50
				Heating Rise (°C)	23	23	24	24	25	26	26	27	28
		Medium ²	Red	CFM	1962	1915	1880	1843	1794	1753	1711	1675	1628
				Heating Rise (°F)	35	36	36	37	38	39	40	41	42
				Heating Rise (°C)	19	20	20	20	21	22	22	23	23
		Med–High	Orange	CFM	2131	2088	2065	2013	1982	1941	1888	1860	1785
				Heating Rise (°F)	NA	NA	NA	NA	NA	35	36	37	38
				Heating Rise (°C)	NA	NA	NA	NA	NA	19	20	20	21
		High	Black	CFM	2461	2409	2339	2286	2192	2140	2062	1968	1874
				Heating Rise (°F)	NA	NA	NA	NA	NA	NA	NA	35	36
				Heating Rise (°C)	NA	NA	NA	NA	NA	NA	NA	19	20

48ES

PERFORMANCE DATA (CONT)

Dry Coil Air Delivery* - Horizontal and Downflow Discharge - Unit 48ES024-060 (Cont)

Unit	Heating Rise Range	Motor Speed	Wire Color		External Static Pressure (in. W.C.)									
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	
48ES(–,N)060115	30 – 60°F (17 – 33°C)	Low	Blue	CFM	1445	1389	1341	1281	1236	1189	1139	1072	1027	
				Heating Rise (°F)	60	NA	NA	NA	NA	NA	NA	NA	NA	
				Heating Rise (°C)	33	NA	NA	NA	NA	NA	NA	NA	NA	
		Med–Low	Pink	CFM	1678	1635	1602	1558	1513	1474	1438	1404	1349	
				Heating Rise (°F)	52	53	54	56	57	59	60	NA	NA	
				Heating Rise (°C)	29	30	30	31	32	33	34	NA	NA	
		Medium ²	Red	CFM	1962	1915	1880	1843	1794	1753	1711	1675	1628	
				Heating Rise (°F)	44	45	46	47	48	50	51	52	53	
				Heating Rise (°C)	25	25	26	26	27	28	28	29	30	
		Med–High ¹	Orange	CFM	2131	2088	2065	2013	1982	1941	1888	1860	1785	
				Heating Rise (°F)	41	42	42	43	44	45	46	47	49	
				Heating Rise (°C)	23	23	23	24	24	25	26	26	27	
		High	Black	CFM	2461	2409	2339	2286	2192	2140	2062	1968	1874	
				Heating Rise (°F)	35	36	37	38	40	41	42	44	46	
				Heating Rise (°C)	20	20	21	21	22	23	23	25	26	
48ES(–,N)060130	35 – 65°F (19 – 36°C)	Low	Blue	CFM	1445	1389	1341	1281	1236	1189	1139	1072	1027	
				Heating Rise (°F)	NA	NA	NA	NA	NA	NA	NA	NA	NA	
				Heating Rise (°C)	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		Med–Low	Pink	CFM	1678	1635	1602	1558	1513	1474	1438	1404	1349	
				Heating Rise (°F)	57	59	60	62	64	65	NA	NA	NA	
				Heating Rise (°C)	32	33	33	34	35	36	NA	NA	NA	
		Medium ²	Red	CFM	1962	1915	1880	1843	1794	1753	1711	1675	1628	
				Heating Rise (°F)	49	50	51	52	54	55	56	57	59	
				Heating Rise (°C)	27	28	28	29	30	31	31	32	33	
		Med–High ¹	Orange	CFM	2131	2088	2065	2013	1982	1941	1888	1860	1785	
				Heating Rise (°F)	45	46	47	48	49	50	51	52	54	
				Heating Rise (°C)	25	26	26	27	27	28	28	29	30	
		High	Black	CFM	2461	2409	2339	2286	2192	2140	2062	1968	1874	
				Heating Rise (°F)	39	40	41	42	44	45	47	49	51	
				Heating Rise (°C)	22	22	23	23	24	25	26	27	29	

* Air delivery values are without air filter and are for dry coil (See Table 10 – 48ES Wet Coil Pressure Drop table).

¹ Factory–shipped heating speed

² Factory–shipped cooling speed

NA – Not allowed for heating speed

Note: Deduct field–supplied air filter pressure drop and wet coil pressure drop to obtain external static pressure available for ducting.

Filter Pressure Drop Table (IN. W.C.)

FILTER SIZE in. (mm)	CFM																		
	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
20X20X1 (508X508X25)	0.05	0.07	0.08	0.1	0.12	0.13	0.14	0.15	—	—	—	—	—	—	—	—	—	—	—
20X24X1 (508X610X25)	—	—	—	—	0.09	0.10	0.11	0.13	0.14	0.15	0.16	—	—	—	—	—	—	—	—
24X30X1 (610X762X25)	—	—	—	0.04	0.05	0.06	0.07	0.07	0.08	0.09	0.1	—	—	—	—	—	—	—	—
24X36X1 (610X914X25)	—	—	—	—	—	—	0.06	0.07	0.07	0.08	0.09	0.09	0.10	0.11	0.12	0.13	0.14	0.14	0.14

PERFORMANCE DATA (CONT)

48ES Wet Coil Pressure Drop

UNIT SIZE	STANDARD CFM (S.C.F.M)														
	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
024	0.030	0.037	0.044	0.053	0.063	—	—	—	—	—	—	—	—	—	—
030	—	0.037	0.044	0.053	0.063	0.072	0.081	0.105	—	—	—	—	—	—	—
036	—	—	—	0.055	0.060	0.090	0.100	0.110	0.140	—	—	—	—	—	—
042	—	—	—	—	0.045	0.050	0.060	0.065	0.075	0.080	0.090	0.094	0.110	—	—
048	—	—	—	—	—	—	0.041	0.063	0.085	0.100	0.104	0.110	0.120	0.130	—
060	—	—	—	—	—	—	—	—	—	0.060	0.065	0.072	0.077	0.085	0.100

Wet Coil Air Delivery - Downflow - High Speed with 1-in. Filter and Economizer

UNIT SIZE	EXTERNAL STATIC PRESSURE (in. W.C.)									
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
36	1333	1289	1256	1214	1152	1118	1076	1035	997	950
42	1612	1569	1527	1481	1451	1393	1351	1317	1278	1242
48	2166	2085	2002	1919	1798	1709	1582	1467	1270	988
60	2298	2239	2180	2110	2044	1951	1862	1777	1697	1591

Economizer 1-in. (25 mm) Filter Pressure Drop (IN. W.C.)

UNIT 48ES	PRESSURE DROP
024–036	0.20
042–060	0.25

48ES

GAS ADJUSTMENT

Natural Gas Orifice Sizes and Manifold Pressure

NAMEPLATE INPUT (Btu/hr)		ALTITUDE OF INSTALLATION (FT. ABOVE SEA LEVEL) U.S.A.*				
		0–2000 (0–610 m)	2001–3000*† (610–914 m)	3001–4000† (915–1219 m)	4001–5000† (1220–1524 m)	5001–6000† (1524–1829 m)
40,000	Orifice No. (Qty)	44 (2)	45 (2)	48 (2)	48 (2)	48 (2)
	Manifold Press. (in. W.C)	3.3	3.2	3.8	3.6	3.2
60,000	Orifice No. (Qty)	38 (2)	41 (2)	41 (2)	42 (2)	42 (2)
	Manifold Press. (in. W.C)	3.8	3.8	3.5	3.5	3.2
90,000	Orifice No. (Qty)	38 (3)	41 (3)	41 (3)	42 (3)	42 (3)
	Manifold Press. (in. W.C)	3.8	3.8	3.5	3.5	3.2
115,000	Orifice No. (Qty)	33 (3)	36 (3)	36 (3)	36 (3)	38 (3)
	Manifold Press. (in. W.C)	3.8	3.8	3.7	3.4	3.7
130,000	Orifice No. (Qty)	31 (3)	31 (3)	33 (3)	33 (3)	34 (3)
	Manifold Press. (in. W.C)	3.8	3.2	3.8	3.4	3.3

* For Canadian Installations from 2000 – 4500 ft (610 – 1372 m), use U.S.A. column 2001 – 3000 ft (610 – 914 m).

† Orifices available through your distributor

Note: Orifice sizes and manifold pressure settings are based on natural gas with a heating value of 1050 Btu/ft³ and a specific gravity of .65.

Propane Gas Orifice Sizes and Manifold Pressure

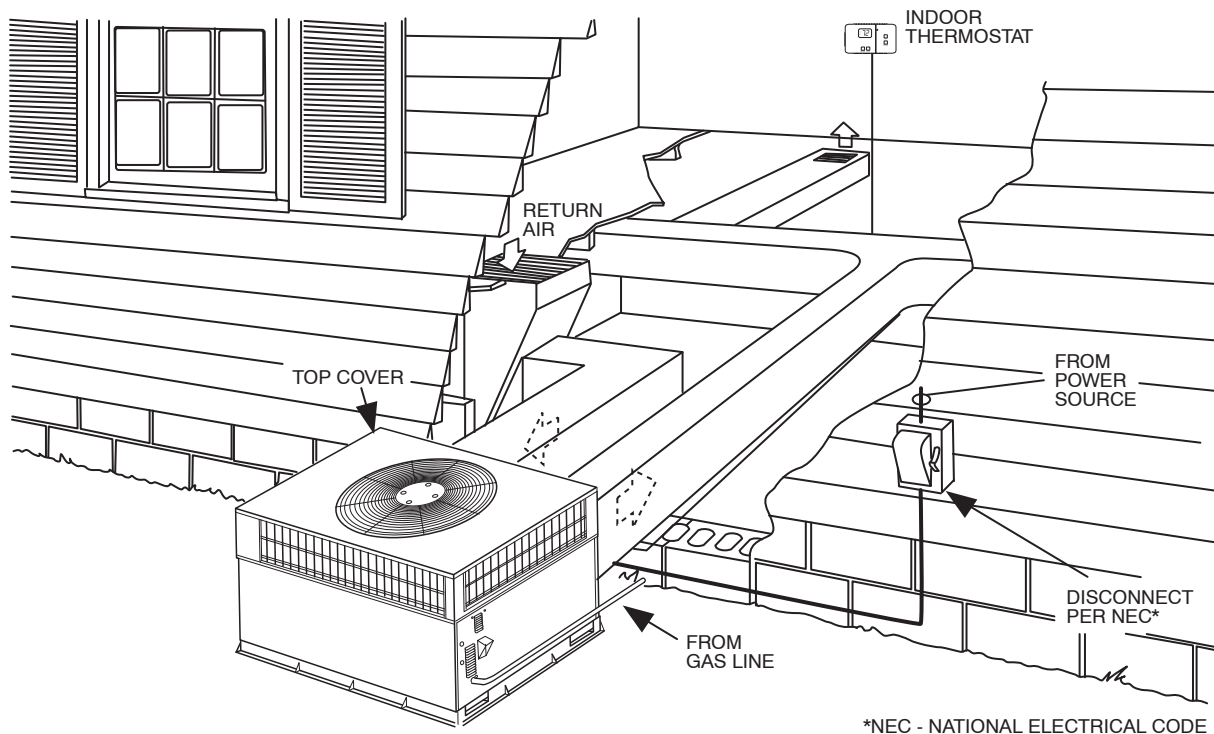
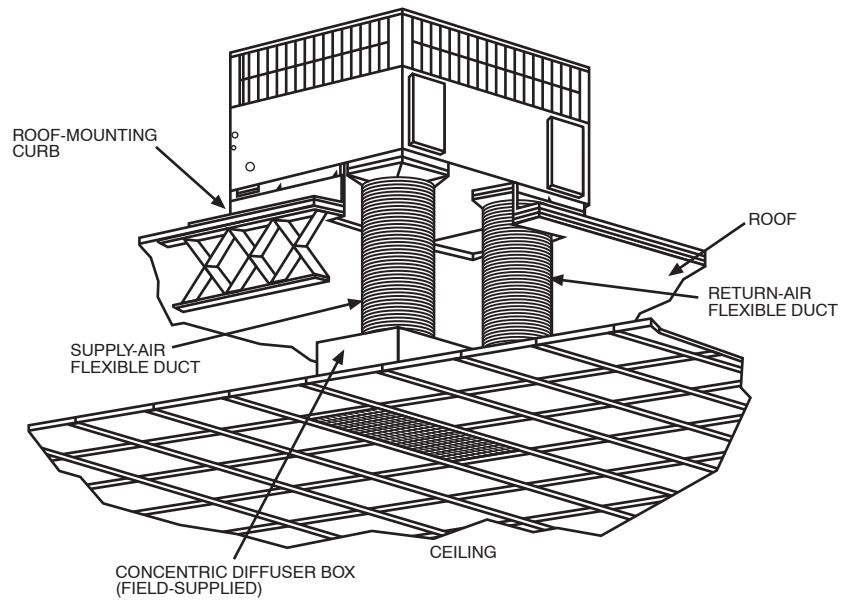
NAMEPLATE INPUT (Btu/hr)		ALTITUDE OF INSTALLATION (FT. ABOVE SEA LEVEL) U.S.A.*				
		0–2000 (0–610 m)	2001–3000*† (610–914 m)	3001–4000† (915–1219 m)	4001–5000† (1220–1524 m)	5001–6000† (1524–1829 m)
40,000	Orifice No. (Qty)	55 (2)	56 (2)	56 (2)	56 (2)	56 (2)
	Manifold Press. (in. W.C)	10.0	11.0	11.0	11.0	10.7
60,000	Orifice No. (Qty)	53 (2)	54 (2)	54 (2)	54 (2)	54 (2)
	Manifold Press. (in. W.C)	10.0	11.0	11.0	11.0	11.0
90,000	Orifice No. (Qty)	53 (3)	54 (3)	54 (3)	54 (3)	54 (3)
	Manifold Press. (in. W.C)	10.0	11.0	11.0	11.0	11.0
115,000	Orifice No. (Qty)	51 (3)	52 (3)	52 (3)	53 (3)	53 (3)
	Manifold Press. (in. W.C)	10.0	11.0	10.6	11.0	11.0
130,000	Orifice No. (Qty)	49 (3)	50 (3)	51 (3)	52 (3)	52 (3)
	Manifold Press. (in. W.C)	10.0	11.0	11.0	11.0	11.0

*For Canadian Installations from 2000 – 4500 ft (610 – 1372 m), use U.S.A. column 2001 – 3000 ft (610 – 914 m).

† Use Kit No. CPLPCONV013A00 (0 – 2000ft. [0 – 610 m] above sea level). Use Kit No. CPLPCONV014A00 (2001 – 6000 ft [611 – 1829 m] above sea level)

TYPICAL PIPING AND WIRING

VERTICAL DISCHARGE



APPLICATION DATA

Condensate trap — A 2-in. (51 mm) 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 down-flow openings. Removal of the inserts is similar to removing an electrical knock-out. Use the duct cover to seal the horizontal discharge openings in the unit. Units installed in horizontal discharge orientation do not require duct covers.

Airflow — Units are draw-thru in the cooling mode and blow-thru in the heating mode.

Maximum cooling airflow — To minimize the possibility of condensate blow-off from the evaporator, airflow through the units should not exceed 450 cfm per ton.

Minimum cooling airflow — Minimum cooling airflow is 350 cfm per ton.

Minimum ambient cooling operation temperature — All standard units have a minimum ambient operating temperature of 40°F (4°C). With accessory low ambient temperature kit, units can operate at temperatures down to 0°F (-17°C).

Minimum temperature — Air entering the heat exchanger in heating mode must be a minimum of 50°F (10°C) continuous and/or 45°F (7°C) intermittent.

ELECTRICAL DATA

UNIT	NOMINAL V-PH-HZ	VOLTAGE RANGE		COMPRESSOR		OFM	IFM	IDM	POWER SUPPLY	
		MIN	MAX	RLA	LRA	FLA	FLA	FLA	MCA	MOCP**
48ES(-,N)024040	208/230-1-60	187	253	12.8	58.3	1.2	4.1	0.7	21.3	30.
48ES(-,N)024060				12.8	58.3	1.2	4.1	1.7	21.3	30.
48ES(-,N)030040				12.8	64.0	1.2	4.1	0.7	21.3	30.
48ES(-,N)030060				12.8	64.0	1.2	4.1	1.7	21.3	30.
48ES(-,N)036060				16.7	79.0	1.2	6.0	1.7	28.0	40.
48ES(-,N)036090				16.7	79.0	1.2	6.0	0.5	28.0	40.
48ES(-,N)042060				17.9	112.0	1.2	6.0	1.7	29.6	40.
48ES(-,N)042090				17.9	112.0	1.2	6.0	0.7	29.6	40.
48ES(-,N)048090				21.8	117.0	1.2	7.6	0.7	36.0	50.
48ES(-,N)048115				21.8	117.0	1.2	7.6	1.7	36.0	50.
48ES(-,N)048130				21.8	117.0	1.2	7.6	0.5	36.0	50.
48ES(-,N)060090				26.4	134.0	1.2	7.6	0.7	41.8	60.
48ES(-,N)060115				26.4	134.0	1.2	7.6	1.7	41.8	60.
48ES(-,N)060130				26.4	134.0	1.2	7.6	0.5	41.8	60.
48ES(-,N)030040	208/230-3-60	187	253	8.4	58.0	1.2	4.1	0.7	15.8	20.
48ES(-,N)030060				8.4	58.0	1.2	4.1	1.7	15.8	20.
48ES(-,N)036060				10.4	88.0	1.2	6.0	1.7	20.3	30.
48ES(-,N)036090				10.4	88.0	1.2	6.0	0.5	20.3	30.
48ES(-,N)042060				13.5	88.0	1.2	6.0	1.7	24.1	35.
48ES(-,N)042090				13.5	88.0	1.2	6.0	0.7	24.1	35.
48ES(-,N)048090				13.7	83.1	1.2	7.6	0.7	25.9	35.
48ES(-,N)048115				13.7	83.1	1.2	7.6	1.7	25.9	35.
48ES(-,N)048130				13.7	83.1	1.2	7.6	0.5	25.9	35.
48ES(-,N)060090				16.0	110.0	1.2	7.6	0.7	28.8	40.
48ES(-,N)060115				16.0	110.0	1.2	7.6	1.7	28.8	40.
48ES(-,N)060130				16.0	110.0	1.2	7.6	0.5	28.8	40.
48ES(-,N)036060	460-3-60	414	506	5.8	38.0	0.5	3.0	0.7	10.7	15.
48ES(-,N)036090				5.8	38.0	0.5	3.0	0.3	10.7	15.
48ES(-,N)042060				6.0	44.0	0.5	3.0	0.7	11.0	15.
48ES(-,N)042090				6.0	44.0	0.5	3.0	0.3	11.0	15.
48ES(-,N)048090				6.2	41.0	0.5	3.8	0.3	12.1	15.
48ES(-,N)048115				6.2	41.0	0.5	3.8	0.7	12.1	15.
48ES(-,N)048130				6.2	41.0	0.5	3.8	0.3	12.1	15.
48ES(-,N)060090				7.8	52.0	0.5	3.8	0.3	14.3	20.
48ES(-,N)060115				7.8	52.0	0.5	3.8	0.7	14.0	20.
48ES(-,N)060130				7.8	52.0	0.5	3.8	0.3	14.0	20.

** FUSE OR CIRCUIT BREAKER

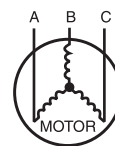
Note: 460 volt units have 230 volt ID motors with FLA values at 230 volts

LEGEND

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



EXAMPLE: Supply voltage is 230-3-60.



AB = 228 v

BC = 231 v

AC = 227 v

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

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

% Voltage imbalance

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

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

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

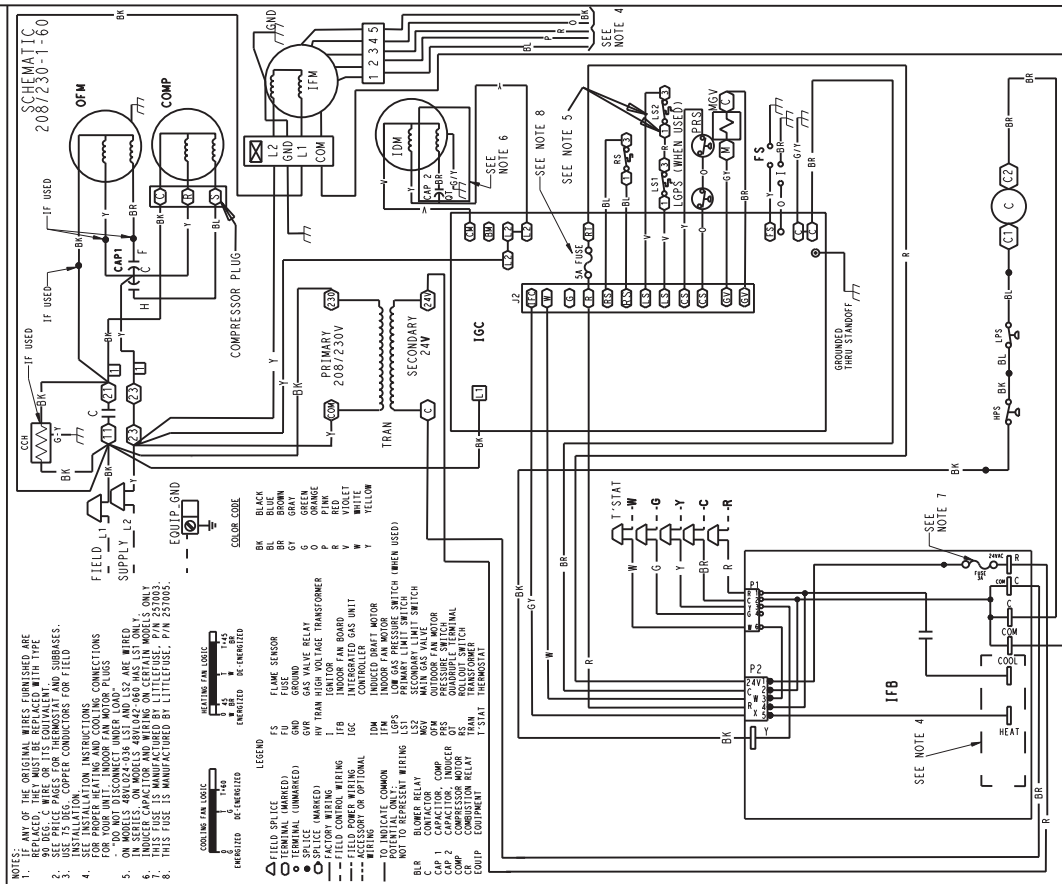
This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

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

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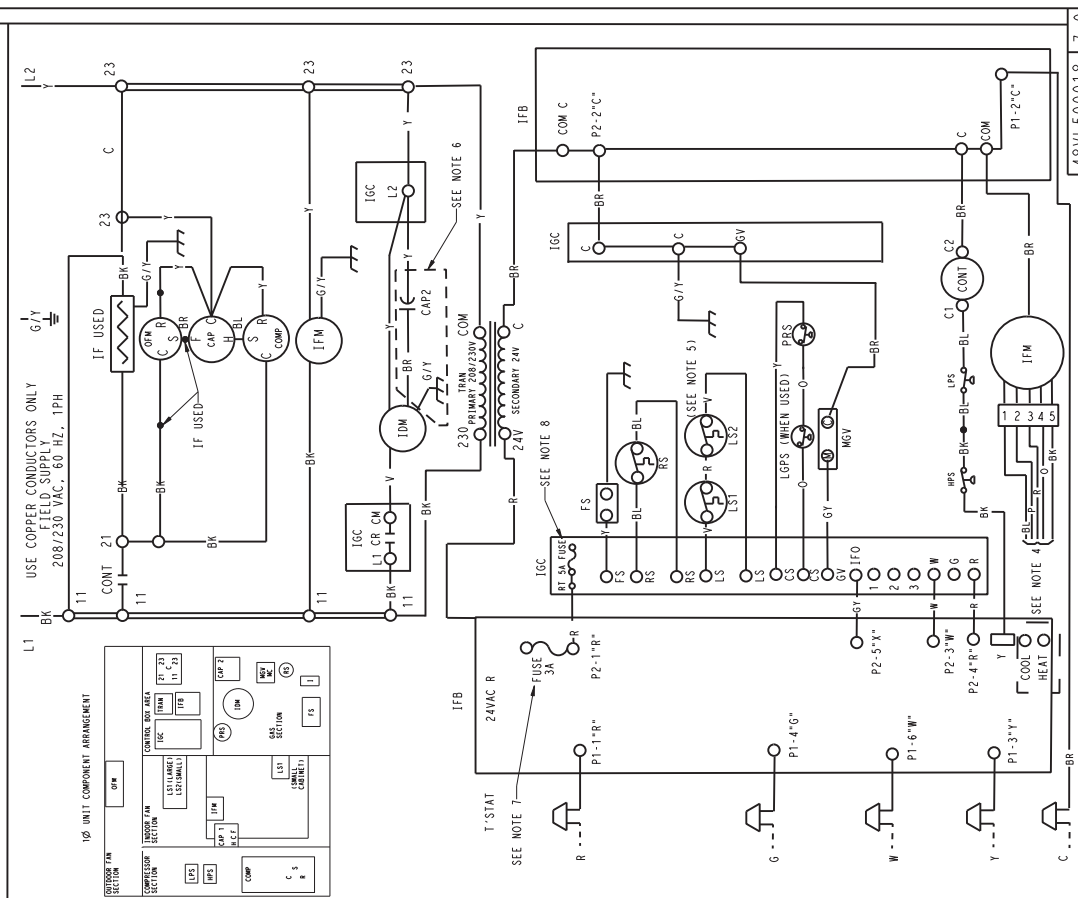
CONNECTION WIRING DIAGRAM

DANGER: ELECTRICAL SHOCK HAZARD DISCONNECT POWER BEFORE SERVICING



LADDER WIRING DIAGRAM

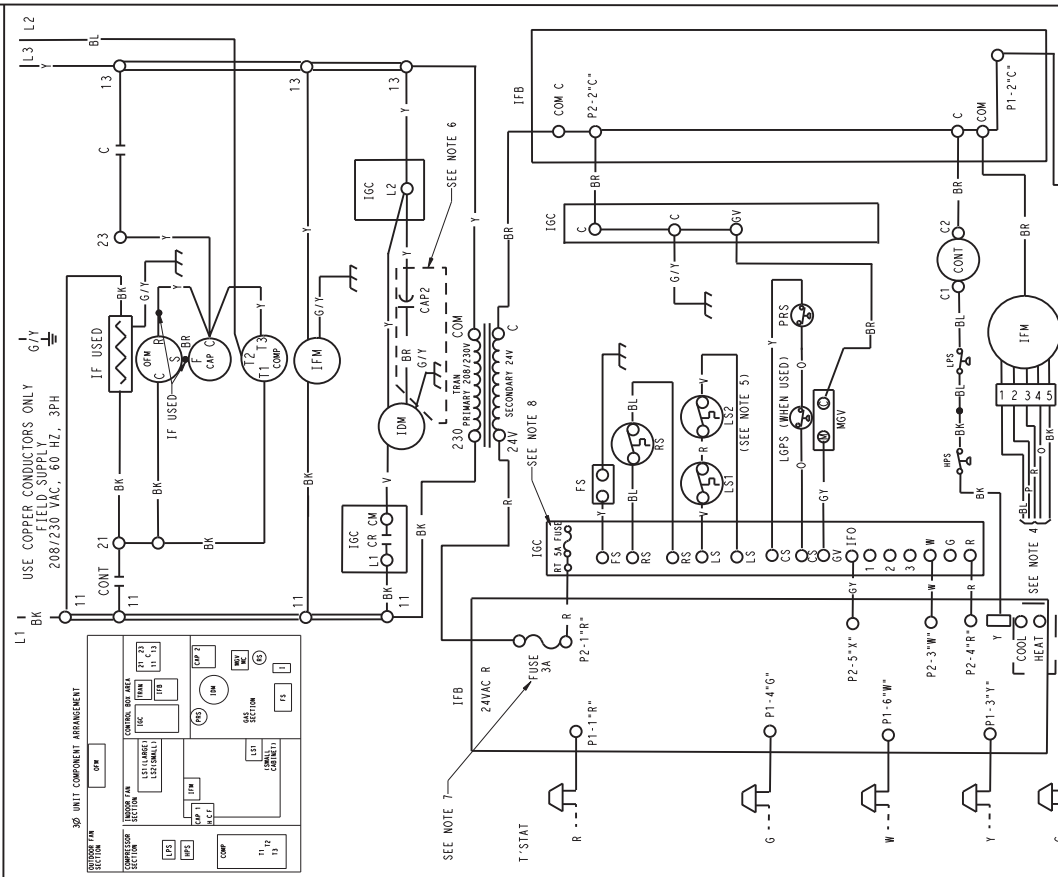
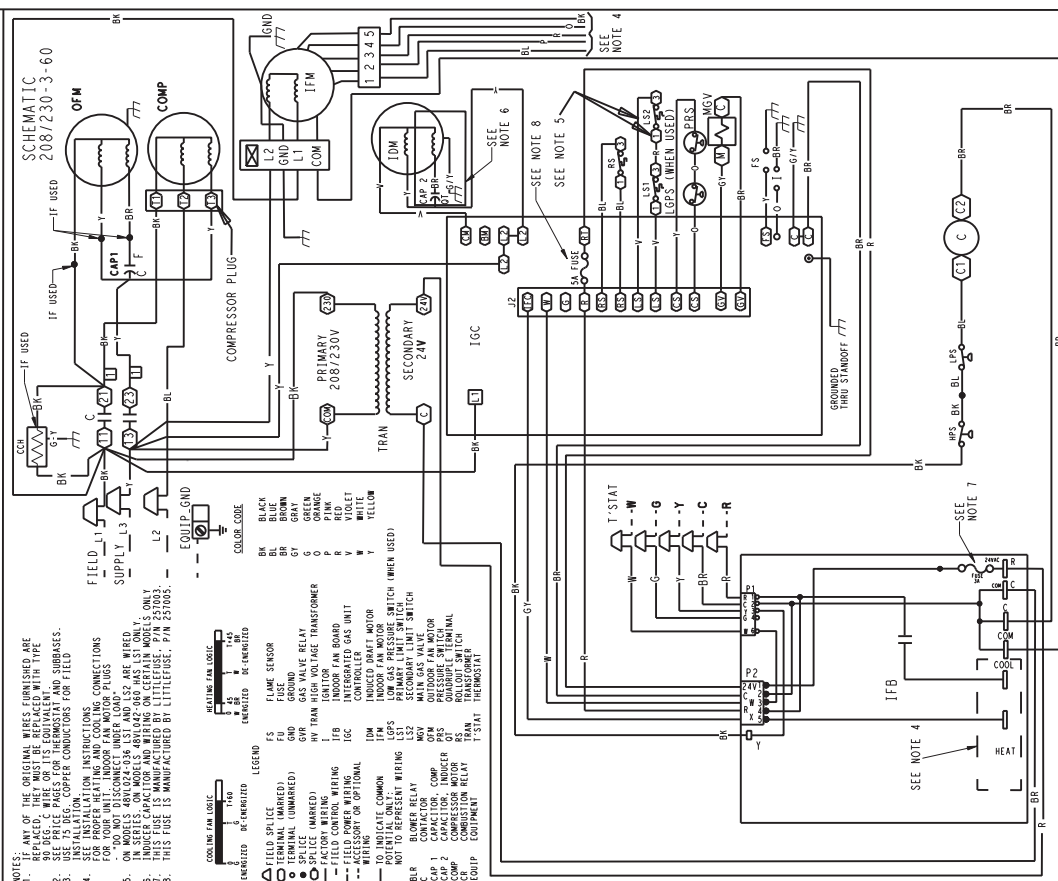
DANGER: ELECTRICAL SHOCK HAZARD DISCONNECT POWER BEFORE SERVICING



LADDER WIRING DIAGRAM

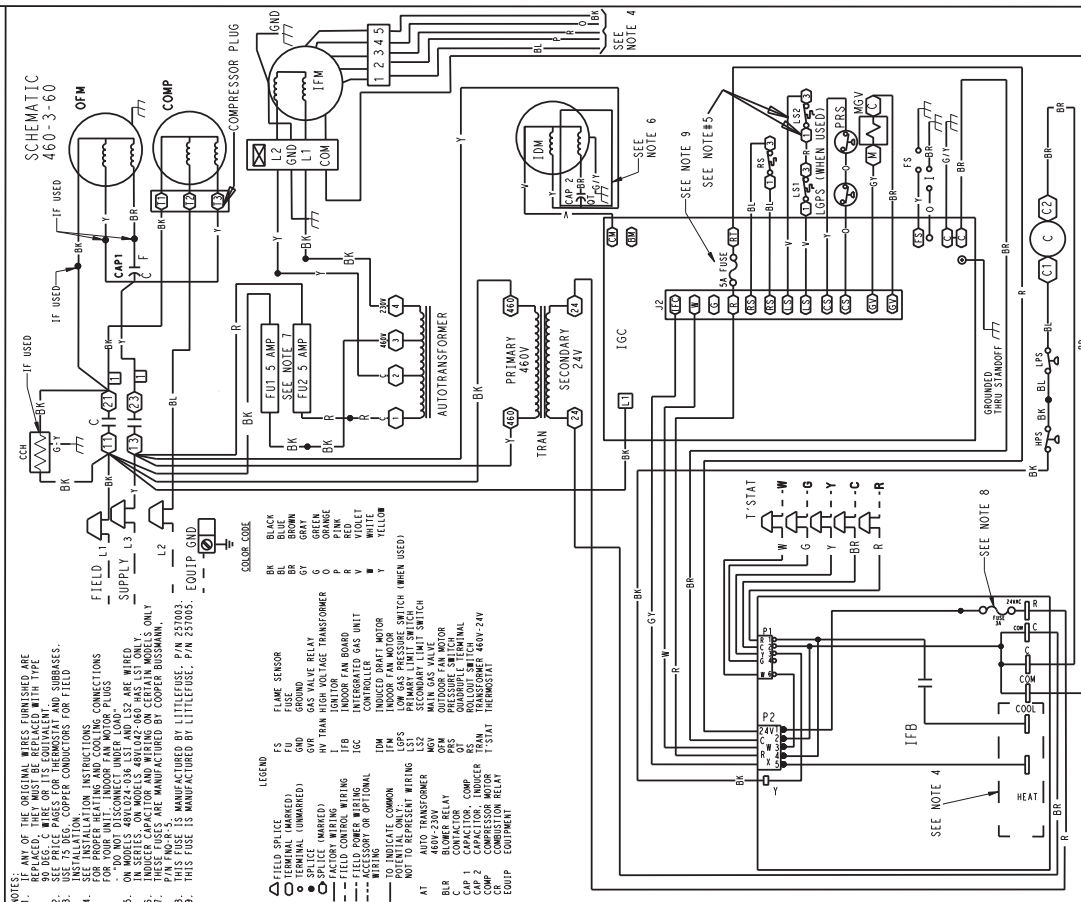
DANGER: ELECTRICAL SHOCK HAZARD DISCONNECT POWER BEFORE SERVICING

DANGER: ELECTRICAL SHOCK HAZARD DISCONNECT POWER BEFORE SERVICING



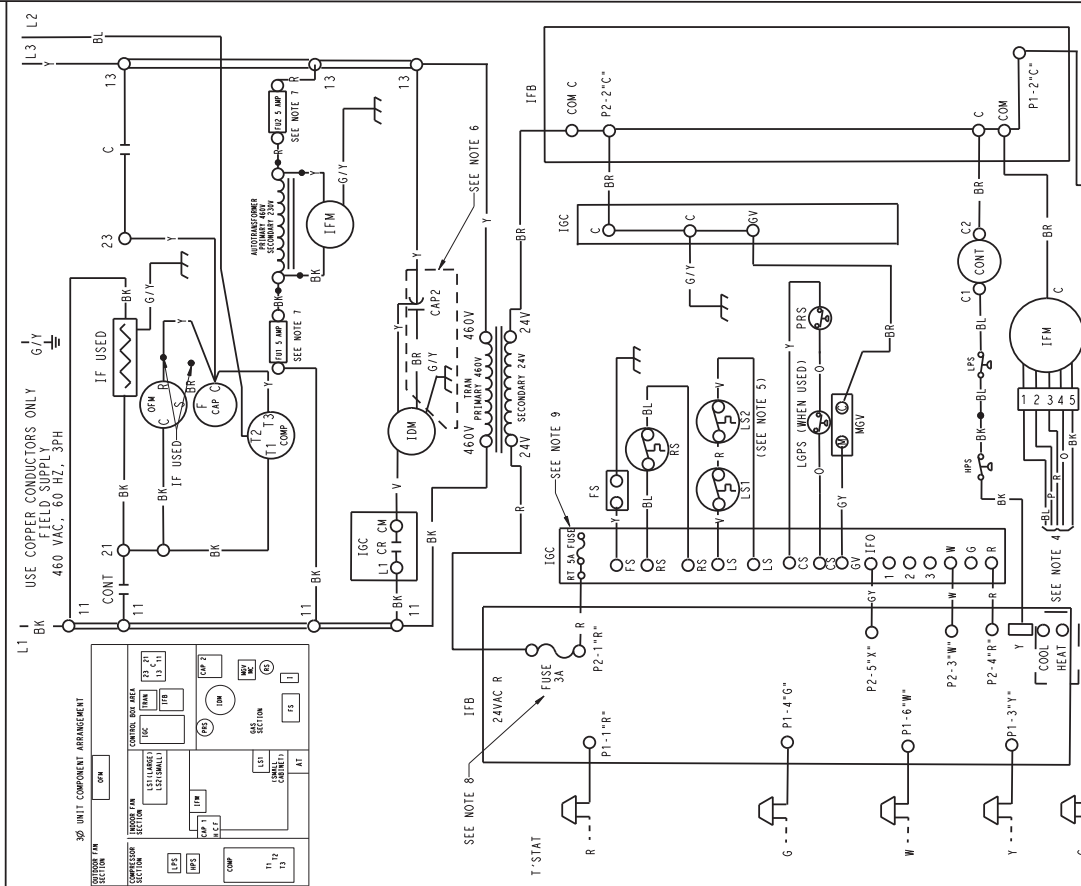
CONNECTION WIRING DIAGRAM

DANGER: ELECTRICAL SHOCK HAZARD DISCONNECT POWER BEFORE SERVICING



LADDER WIRING DIAGRAM

DANGER: ELECTRICAL SHOCK HAZARD DISCONNECT POWER BEFORE SERVICING



CONTROLS

Operating sequence

Heating - On a call for heating, terminal W of the thermostat is energized, starting the induced-draft motor. When the pressure switch senses that the induced-draft motor is moving sufficient combustion air, the burner sequence begins. This function is performed by the integrated gas unit controller (IGC). The indoor (evaporator)-fan motor is energized 45 sec after flame is established. When the thermostat is satisfied and W is de-energized, the burners stop firing and the indoor (evaporator) fan motor shuts off after a 45-sec time-off delay. Please note that the IGC has the capability to automatically reduce the indoor fan motor on delay and increase the indoor fan motor off delay in the event of high duct static and/or partially-clogged filter.

Cooling — When the system thermostat calls for cooling, 24 V is supplied to the “Y” and “G” terminals of the thermostat. This completes the circuit to the contactor coil (C) and indoor (evaporator) fan relay (IFR). The normally open contacts of energized C close and complete the circuit through compressor motor (COMP) to outdoor (condenser) fan motor (OFM). Both motors start instantly. The set of normally open contacts of energized IFR close and complete the circuit through IFM. The IFM starts instantly.

On the loss of the thermostat call for cooling, 24 V is removed from both the “Y” and “G” terminals (provided the fan switch is in the “AUTO” position) de-energizing the compressor contactor and opening the contacts supplying power to compressor/OFM. After a 60-second delay, the IFM shuts off. If the thermostat fan selector switch is in the “ON” position, the IFM will run continuously.

NOTE: On units with a Time Guard® II device: Once the compressor has started and then stopped, it cannot be restarted again until 5 minutes have elapsed.

GUIDE SPECIFICATIONS

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 Btuh,
Nominal Heating Input**

Model Number: 48ES

Part 1 — General

SYSTEM DESCRIPTION

Outdoor rooftop mounted, gas heating/electric cooling unit utilizing a hermetic scroll compressor for cooling duty. Unit shall discharge supply air vertically or horizontally as shown on contract drawings. Condenser 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.
- 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 90.1 requirements for flame spread and smoke generation.
- G. Cabinet insulation shall meet ASHRAE Standard 62.2.

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 enclosure shall be all factory wiring, piping, controls, refrigerant charge with R-410A refrigerant, and special features required prior to field start-up.

B. Unit Cabinet:

- 1. Unit cabinet shall be constructed of phosphated, zinc-coated, pre-painted steel capable of with-standing 500 hours in 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.
- 4. Evaporator fan compartment top surface shall be insulated with a minimum 1/2-in. (12.7 mm) thick, flexible fiberglass insulation, coated on the air side and retained by adhesive and mechanical means. The evaporator wall sections will be insulated with a minimum semi-rigid foil-faced board 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 evaporator fan shall be a multi-speed, direct-drive, as shown on equipment drawings.

- 2. Fan wheel shall be made from steel, be double-inlet type with forward curved blades with corrosion resistant finish. Fan wheel shall be dynamically balanced.
- 3. Condenser fan shall be direct drive propeller type with aluminum blades riveted to corrosion resistant steel spiders, 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:

Evaporator and condenser coils shall have aluminum plate fins mechanically bonded to seamless copper tubes with all joints brazed (Copper/copper and vinyl-coated construction available as option). Tube sheet openings shall be belled 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. Induced-draft motors shall provide adequate airflow for combustion.
- 3. The heat exchangers shall be constructed of aluminized 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 Components:

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

H. Filters:

Filter section shall consist of field-installed, throwaway, 1-in. (25 mm) thick fiberglass filters of commercially available sizes.

I. Controls and Safeties:

- 1. Unit controls shall be complete with a self-contained low voltage control circuit.
- 2. Compressors shall incorporate a solid-state compressor protector that provides reset capability.

J. Operating Characteristics:

- 1. Unit shall be capable of starting and running at 125°F (51°C) ambient outdoor temperature per maximum load criteria of ARI Standard 210.
- 2. Compressor with standard controls shall be capable of operation down to 40°F (4°C) ambient outdoor temperature.
- 3. Units shall be provided with fan time delay to prevent cold air delivery before the heat exchanger warms up.
- 4. Unit shall be provided with 60-second fan time delay after the thermostat is satisfied.

K. Electrical Requirements:

All unit power wiring shall enter the 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. Condenser fan motor shall be totally enclosed.

GUIDE SPECIFICATIONS (CONT)

M. Special Features Available:

1. Louvered Grille:
Wire grille shall be standard on all units. Louvered grille shall be available as a factory-installed option to provide hail guard and vandalism protection.
2. Coil Options:
Shall include factory-installed optional copper/copper and vinyl-coated refrigerant coils.
3. Economizer:
 - a. Economizer controls capable of providing free cooling using outside air.
 - b. Equipped with low leakage dampers not to exceed 3% leakage, at 1.0 IN. W.C. pressure differential.
 - c. Spring return motor shuts off outdoor damper on power failure.
4. Flat Roof Curb:
Curbs shall have seal strip and a wood nailer for flashing and shall be installed per manufacturer's instructions.
5. Manual Outdoor Air Damper:
Package shall consist of damper, birdscreen, and rainhood which can be preset to admit outdoor air for year-round ventilation.
6. Thermostat:
To provide for one-stage heating and cooling in addition manual or automatic changeover and indoor fan control.
7. Natural-to-Propane Conversion Kit:
Shall be complete with all required hardware to convert to propane gas operation at 10.0 IN. W.C. manifold pressure.
8. Propane-to-Natural Conversion Kit
Shall be complete with all hardware to convert to natural gas at standard altitude (0 to 2000 ft [0 to 610 m] above sea level).
9. Low Ambient Package:
Shall consist of a solid-state control and condenser coil temperature sensor for controlling condenser-fan motor operation, which shall allow unit to operate down to 0°F (-17°C) outdoor ambient temperature when properly installed.
10. Filter Rack Kit:
Shall provide filter mounting for downflow applications.
11. Square-To-Round Duct Transitions (024-048):
Shall have the ability to convert the supply and return openings from rectangular to round.
12. Compressor Protection:
Solid-state control shall protect compressor by preventing "short cycling."
13. Crankcase Heater:
Shall provide anti-floodback protection for low-load cooling applications.
14. High Altitude Propane Conversion Kit:
Shall consist of all required hardware to convert to propane gas heat operation at 2001 to 6000 ft (610 to 1829 m) above sea level.
15. Low NOx:
Shall provide NOx reduction to values below 40 nano-grams/joule to meet California emission requirements as shipped from factory.
16. Compressor Hard Start Kit (single phase units only):
Shall provide additional starting torque for single-phase compressors.