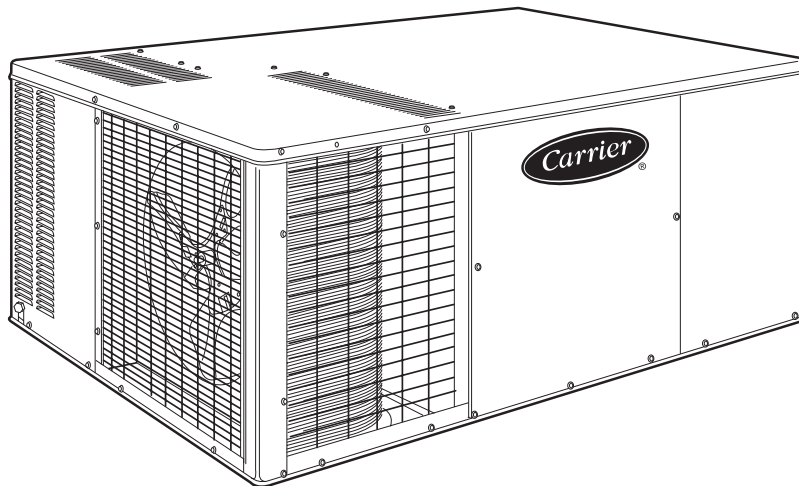




Product Data

48SS Single-Package Gas Heating/Electric Cooling Units

1½ to 5 Nominal Tons



Single-Package Rooftop Products
with Energy-Saving Features

- direct spark ignition
- low sound levels
- 81% AFUE on most units
- 10 SEER

Features/Benefits

One-piece heating and cooling units with low installation costs, dependable performance, and easy maintenance

Easy installation

Factory-assembled package is a compact, fully self-contained, combination gas heating/electric cooling unit that is prewired, prepiped, and precharged for minimum installation expense.

These 48SS 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 a ground-level pad.

Convertible duct configuration

Unit is designed for easy use in either downflow or horizontal applications.

Efficient operation

High-efficiency design with SEERs (Seasonal Energy Efficiency Ratios) of 10.0 and AFUE (Annual Fuel Utilization Efficiency) ratings as high as 81.0%. All units have a minimum CSE (California Seasonal Efficiency) rating of 76.5%.



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.

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, needs cleaning. All gas furnace components are accessible in one compartment.

The 48SS units meet California Air Quality Management NO_x requirement of 40 nanograms/joule or less when NO_x kit no. CRLOWNOX001A00 is installed.

Durable, dependable components

Top quality, top reliability components are designed and tested for a minimum of 15 years of operation under the harshest conditions. Every 48SS unit is thoroughly run-tested at the factory in each operating mode, and is evacuated prior to final charging.

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 quiet operation. All compressors have internal high-pressure and overcurrent protection. Rotary compressors are standard on unit size 018. Reciprocating compressors are standard on unit sizes 024-042. Scroll compressors are standard on unit sizes 048 and 060.

Dimpled heat exchangers optimize heat transfer for improved efficiency. The tubular design permits hot gases to stay in close contact with the cell walls to maximize heat transfer and efficiency.

The induced draft combustion system eliminates the unsightly appearance of flue stacks, and diminishes the effects of wind on heating operation. The induced draft also prevents contaminants from entering the supply air if a leak in the heat exchanger occurs.

Direct-drive multispeed, PSC (permanent split capacitor) blower motor is standard on all models.

Direct-drive, PSC condenser-fan motor is designed to help reduce energy consumption and provide for cooling operation down to 40 F outdoor temperature.

Refrigerant system is designed to provide dependability. Liquid refrigerant strainers 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.

Color-coded wires permit easy tracing and diagnostics.

Evaporator and condenser coils are computer-designed for optimum heat transfer and cooling efficiency. Condenser coil is fabricated of copper tube and aluminum fins and is located inside the unit for protection against damage for long life and reliable operation. The condenser coil is internally mounted and protected by a composite grille. Copper fin coils are also available from the factory by special order. These coils are recommended in applications where aluminum fins are likely to be damaged due to corrosion and are ideal for sea-coast applications.

Low sound ratings ensure a quiet indoor and outdoor environment with sound ratings as low as 7.4 bels.

Easy to service cabinets provide easy accessibility to serviceable components during maintenance and installation. Rounded corners are an important safety feature, and a high quality finish ensures an attractive appearance.

Optional base rails provide holes for rigging and forklifts as well as an elevated mounting frame that provides structural support for horizontal installations. Ideal for light commercial applications.

Downflow option unit is converted for downflow at the factory to allow vertical ductwork connections. Unit is equipped with base rail.

Low and high voltage electrical entries allow low and high voltage to be brought in through either the front duct panel or rear flue panel.

Integrated gas unit controller (IGC) contains all the ignition components and is easily accessible for service. The IGC provides built-in diagnostic capabilities. A light-emitting diode (LED) simplifies troubleshooting by providing visual fault notification and system status information. The IGC board provides exclusive anti-cycle protection for gas heat operation. The IGC also contains burner control logic for dependable heating operation. The 48SS units maximize heating efficiency through the IGC's control of evaporator fan ON/OFF delays. The IGC helps make 48SS units reliable for years.

Weatherized cabinets are constructed of heavy-duty, phosphated, zinc-coated prepainted steel capable of withstanding 500 hours (Federal Test Method Standard No. 141, Method 6061) in salt spray. Interior surfaces of the evaporator/heat exchanger compartment are insulated with cleanable, foil-faced insulation for improved indoor-air quality. Unit conforms to American Society of Heating, Refrigeration and Air Conditioning Engineers [ASHRAE] No. 62, with use of a sloped condensate pan. An external drain trap is required.

The standard control system is readily adaptable to all conventional and programmable thermostats. In addition, units are suitable for integration into monitor control systems if required.

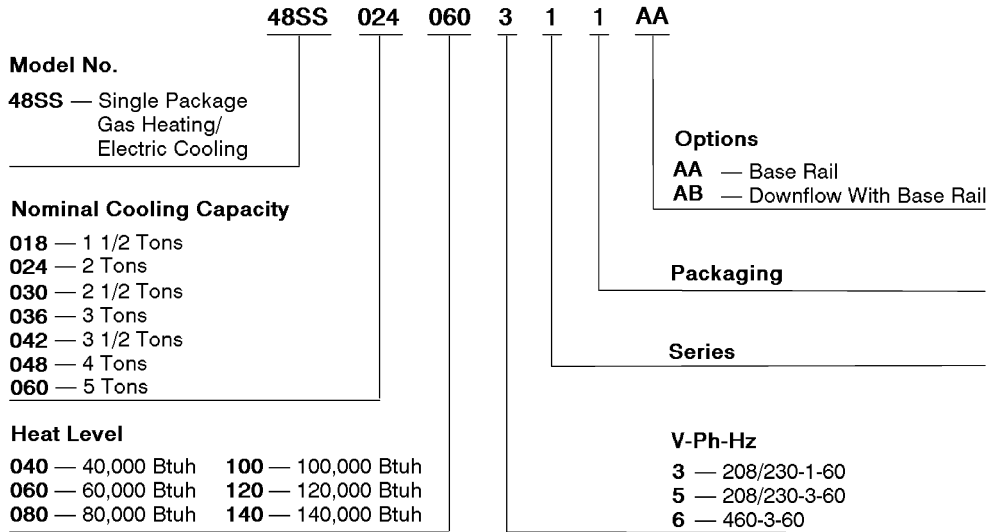
Standardized components for the complete 48SS line of products are found in all safety devices, condenser-fan motors, evaporator-fan motors, and control boards, while the gas sections use common inducer motors, limit switches, and rollout switches. This allows for greater inventory control, familiarity of parts, and fewer stocked parts.

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Model number nomenclature



COOLING CAPACITIES AND EFFICIENCIES

UNIT 48SS	NOMINAL TONS	STANDARD CFM	NET COOLING† CAPACITIES	SEER†	SOUND RATINGS** (Bels)
018040	1½	600	17,000	10.0	7.4
024040 024060	2	800	24,000	10.0	7.6
030040 030060 030080	2½	1000	29,200	10.0	8.0
036060 036080 036100 036120	3	1200	36,000	10.0	8.0
042060 042080 042100 042120	3½	1400	42,500	10.0	8.2
048080 048100 048120 048140	4	1600	47,000	10.0	8.2
060080 060100 060120 060140	5	1995	59,500	10.0	8.2

LEGEND

Bels — Sound Levels (1 bel = 10 decibels)
db — Dry Bulb
SEER — Seasonal Energy Efficiency Ratio
wb — Wet Bulb

*Air Conditioning & Refrigeration Institute.

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

**Rated in accordance with ARI Standard 270.

NOTES:

1. Capacity 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.



OUTDOOR SOUND: ONE-THIRD OCTAVE BAND DATA — DECIBELS

FREQUENCY (Hz)	UNIT 48SS						
	018	024	030	036	042	048	060
63	49.8	38.1	45.7	47.8	45.5	56.0	54.3
125	56.5	55.0	58.1	59.3	61.2	65.6	65.1
250	60.3	65.3	68.7	67.4	70.4	71.5	71.5
500	59.8	67.2	64.7	68.8	69.9	71.4	72.7
1000	64.1	68.9	73.0	73.1	76.5	74.2	73.9
2000	64.1	65.5	70.2	69.5	71.3	73.3	73.4
4000	65.2	63.8	68.8	68.2	73.7	69.6	71.7
8000	56.0	60.3	66.6	65.8	65.5	67.1	66.3

Bels — Sound Levels (1 bel = 10 decibels)



HEATING CAPACITIES AND EFFICIENCIES

UNIT 48SS	HEATING INPUT (Btuh)	OUTPUT CAPACITY (Btuh)	TEMPERATURE RISE RANGE (°F)	AFUE (%)	CSE (%)
018040	40,000	32,800	20-50	81	76.5
024040			20-50	81	76.5
030040			20-50	81	76.5
024060	60,000	48,600	25-55	81	77.5
030060			25-55	81	77.5
036060			25-55	81	77.5
042060			25-55	81	77.5
030080	80,000	64,800	40-70	81	77.5
036080			40-70	81	77.5
042080			40-70	81	77.5
048080			40-70	81	77.5
060080			40-70	81	77.5
036100	100,000	81,000	50-80	81	78.0
042100			50-80	81	78.0
048100			50-80	81	78.0
060100			50-80	81	78.0
036120	120,000	97,200	60-90	80	77.5
042120			60-90	80	77.5
048120			60-90	80	77.5
060120			60-90	80	77.5
048140	140,000	113,000	50-80	80	77.5
060140			50-80	80	77.5

LEGEND

AFUE — Annual Fuel Utilization Efficiency

CSE — California Seasonal Efficiency

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



Physical data



UNIT SIZE 48SS	018040	024040	024060	030040	030060	030080	036060	036080	036100	036120
NOMINAL CAPACITY (ton)	1½	2	2	2½	2½	2½	3	3	3	3
OPERATING WEIGHT (lb)										
Without Base Rail	272	303	315	320	324	324	336	336	348	348
With Optional Base Rail	296	327	339	344	356	356	360	360	372	372
COMPRESSORS Quantity	Rotary 1	Reciprocating 1								
REFRIGERANT (R-22) Charge (lb)	2.60	2.75	2.75	3.40	3.40	3.40	4.30	4.30	4.30	4.30
REFRIGERANT METERING DEVICE Orifice ID (in.)	.030	.030	.030	.030	.030	.030	.032	.032	.032	.032
CONDENSER COIL Rows...Fins/in. Face Area (sq ft)	1...17 5.95	1...17 5.95	1...17 5.95	2...17 5.95	2...17 5.95	2...17 5.95	2...17 5.95	2...17 5.95	2...17 5.95	2...17 5.95
CONDENSER FAN Nominal Cfm Diameter (in.) Motor Hp (Rpm)	1700 18 ½ (850)	1700 18 ½ (850)	1700 18 ½ (850)	1900 18 ½ (850)	1900 18 ½ (850)	1900 18 ½ (850)	1900 18 ¼ (1050)	1900 18 ¼ (1050)	1900 18 ¼ (1050)	1900 18 ¼ (1050)
EVAPORATOR COIL Rows...Fins/in. Face Area (sq ft)	3...15 1.83	3...15 2.29	3...15 2.29	3...15 2.29	3...15 2.29	3...15 2.29	3...15 3.06	3...15 3.06	3...15 3.06	3...15 3.06
EVAPORATOR FAN Nominal Airflow (Cfm) Size (in.)	600 10 x 10	800 10 x 10	800 10 x 10	1000 10 x 10	1000 10 x 10	1000 10 x 10	1200 10 x 10	1200 10 x 10	1200 10 x 10	1200 10 x 10
FURNACE SECTION* Burner Orifice No. (Qty...drill size) Natural Gas	1...32	1...32	2...40	1...32	2...40	2...32	2...40	2...32	2...30	3...32
Burner Orifice No. (Qty...drill size) Propane Gas	1...41	1...41	2...47	1...41	2...47	2...42	2...47	2...42	2...40	3...42
RETURN-AIR FILTERS (in.)† Throwaway	20 x 20	20 x 20	20 x 20	20 x 24	20 x 24	20 x 24	20 x 24	20 x 24	20 x 24	20 x 24

UNIT SIZE 48SS	042060	042080	042100	042120	048080	048100	048120	048140	060080	060100	060120	060140
NOMINAL CAPACITY (ton)	3½	3½	3½	3½	4	4	4	4	5	5	5	5
OPERATING WEIGHT (lb)												
Without Base Rail	375	375	387	387	414	426	426	426	453	465	465	465
With Optional Base Rail	399	399	411	411	438	450	450	450	477	489	489	489
COMPRESSORS Quantity	Reciprocating 1				Hermetic Scroll 1							
REFRIGERANT (R-22) Charge (lb)	5.20	5.20	5.20	5.20	6.50	6.50	6.50	6.50	7.00	7.00	7.00	7.00
REFRIGERANT METERING DEVICE Orifice ID (in.)	.034	.034	.034	.034	.030	.030	.030	.030	.030	.030	.030	.030
CONDENSER COIL Rows...Fins/in. Face Area (sq ft)	2...17 7.04	2...17 7.04	2...17 7.04	2...17 7.04	2...17 8.67	2...17 8.67	2...17 8.67	2...17 8.67	2...17 8.67	2...17 8.67	2...17 8.67	2...17 8.67
CONDENSER FAN Nominal Cfm Diameter (in.) Motor Hp (Rpm)	1900 18 ¼ (1050)	1900 18 ¼ (1050)	1900 18 ¼ (1050)	1900 18 ¼ (1050)	2400 20 ½ (1050)	2400 20 ½ (1050)	2400 20 ½ (1050)	2400 20 ½ (1050)	2400 20 ½ (1050)	2400 20 ½ (1050)	2400 20 ½ (1050)	2400 20 ½ (1050)
EVAPORATOR COIL Rows...Fins/in. Face Area (sq ft)	3...15 3.33	3...15 3.33	3...15 3.33	3...15 3.33	3...15 4.44	3...15 4.44	3...15 4.44	3...15 4.44	4...15 4.44	4...15 4.44	4...15 4.44	4...15 4.44
EVAPORATOR FAN Nominal Airflow (Cfm) Size (in.)	1400 10 x 10	1400 10 x 10	1400 10 x 10	1400 10 x 10	1600 10 x 10	1600 10 x 10	1600 10 x 10	1600 10 x 10	1995 10 x 10	1995 10 x 10	1995 10 x 10	1995 10 x 10
FURNACE SECTION* Burner Orifice No. (Qty...drill size) Natural Gas	2...40	2...32	2...30	3...32	2...32	2...30	3...32	3...31	2...32	2...30	3...32	3...31
Burner Orifice No. (Qty...drill size) Propane Gas	2...47	2...42	2...40	3...42	2...42	2...40	3...42	3...40	2...42	2...40	3...42	3...40
RETURN-AIR FILTERS (in.)† Throwaway	24 x 24	24 x 24	24 x 24	24 x 24	24 x 30	24 x 30	24 x 30	816**	24 x 30	24 x 30	24 x 30	960**

*Based on altitude of 0-2000 feet.

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

**Sq inch. Filter is mounted external to unit.

Options and accessories



Factory-installed options

Unit with base rail provides holes for rigging and forklifts as well as an elevated mounting frame that gives additional structural support for horizontal installations. Ideal for light commercial applications.

Downflow option unit is shipped from factory configured for vertical ductwork connection. Unit is equipped with base rail.

Field-installed accessories

Factory-assembled roof curbs are designed for use on downflow discharge applications. Heavy gage, galvanized steel construction provides one-piece support. The curb complies with the standards of the NRCA (National Roofing Contractors Association). A wood nailing strip is provided for attaching the roofing to the curb.

25% Open manual outdoor-air damper provides for minimum outdoor air and is manually adjustable.

Thermostat and subbase provide heating and cooling unit control. The subbase provides system and fan switching at the thermostat location.

Carrier electronic programmable thermostats provide 2-stage heating and 2-stage cooling control with remote communication ability.

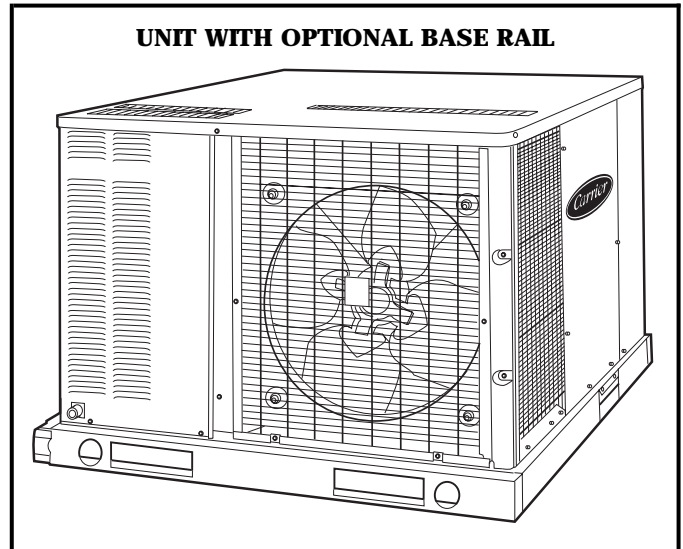
Low-ambient kit (Motormaster® II device) allows the use of mechanical cooling down to outdoor ambient temperatures as low as 0° F.

LP conversion kit allows for conversion from natural gas to liquid propane. Conversion kit involves changing the gas orifices and adding ceramic baffles to accommodate liquid propane.

Solid-state Time Guard® II device protects compressor by preventing short cycling.

Crankcase heater warms crankcase oil to reduce refrigerant migration and ensure proper compressor lubrication. (Recommended on 208/230-v single-phase units in sizes 024-042 only).

UNIT WITH OPTIONAL BASE RAIL



High- and low-pressure switches provide additional safety features and protect the unit from running at unsuitable pressures.

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

Lifting bracket kit provides attachment points for rigging straps. The kit is not required when unit is equipped with an optional base rail or downflow application.

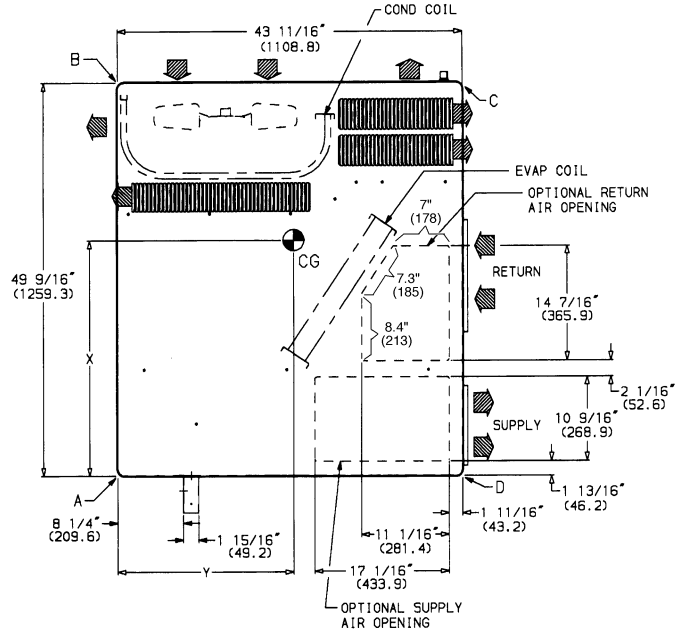
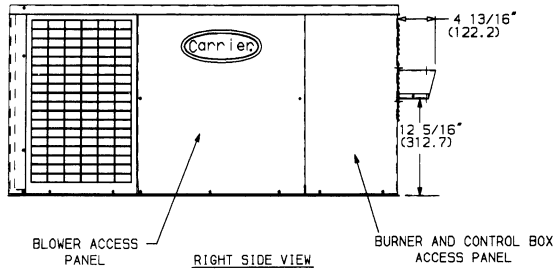
High altitude kit is for use at 2001 to 5000 feet above sea level. Kit consists of natural gas orifices that compensate for gas heat operation at high altitude.

Low NO_x kit provides compliance with low NO_x emissions requirements for units being installed in California Air Quality Management Districts, which require NO_x emissions of 40 nanograms/joule or less.

Base unit dimensions



48SS018-042 WITHOUT OPTIONAL BASE RAIL



REQ'D CLEARANCES FOR SERVICING. in. (mm)

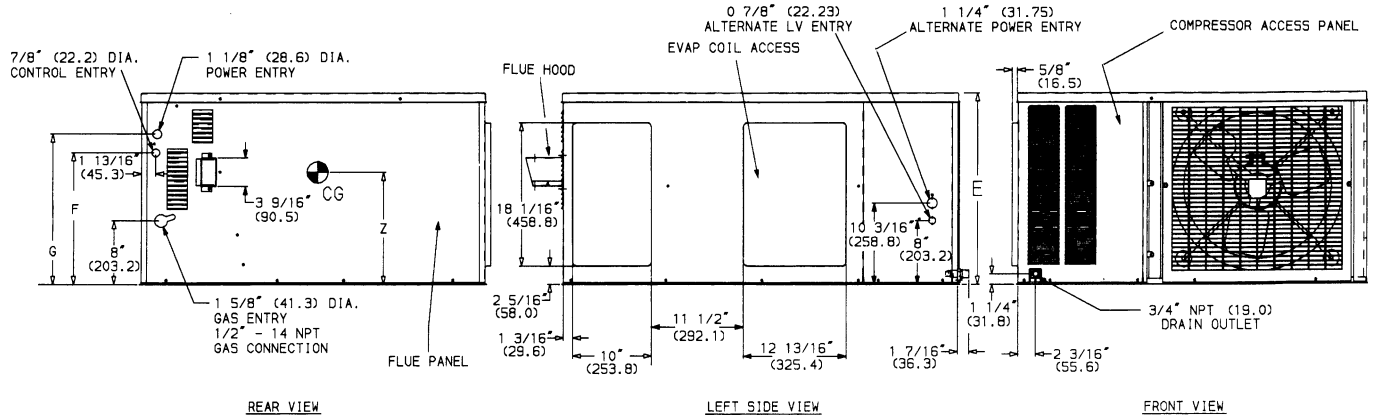
Duct panel	0
Unit top	36 (914)
Side opposite ducts	36 (914)
Compressor access	36 (914)
(Except for NEC requirements)	

REQ'D CLEARANCES TO COMBUSTIBLE MAT'L. in. (mm)

Maximum extension of overhangs	.48 (1219)
Unit top	14 (356)
Duct side of unit	2 (51)
Side opposite ducts	14 (356)
Bottom of unit	0
Flue panel	36 (914)

NEC REQ'D CLEARANCES. in. (mm)

Between units, control box side	.42 (1067)
Unit and ungrounded surfaces, control box side	.36 (914)
Unit and block or concrete walls and other grounded surfaces, control box side	.42 (1067)



UNIT	ELECTRICAL CHARACTERISTICS	UNIT WEIGHT		CORNER WEIGHT (lb/kg)				UNIT HEIGHT (in./mm)
		lb	kg	A	B	C	D	E
48SS180040	208/230-1-60	272	123	81/37	62/28	76/35	53/24	24.1/613
48SS024040	208/230-1-60	303	138	97/44	43/20	123/56	40/18	24.1/613
48SS024060	208/230-1-60	315	143	100/45	46/21	126/57	43/20	24.1/613
48SS030040	208/230-1-60, 208/230-3-60	320	145	100/45	47/21	126/57	47/21	24.1/613
48SS030060/080	208/230-1-60, 208/230-3-60	324	147	94/43	63/29	115/52	52/24	24.1/613
48SS036060/080	208/230-1-60, 208/230-3-60, 460-3-60	336	153	86/39	76/35	111/50	63/29	24.1/613
48SS036100/120	208/230-1-60, 208/230-3-60, 460-3-60	348	158	89/40	79/36	114/52	66/30	24.1/613
48SS042060/080	208/230-1-60, 208/230-3-60, 460-3-60	375	170	95/43	86/39	119/54	75/34	28.1/714
48SS042100/120	208/230-1-60, 208/230-3-60, 460-3-60	387	176	98/45	89/40	122/55	78/35	28.1/714

UNIT	F in./mm	G in./mm	CENTER OF GRAVITY in./mm		
			X	Y	Z
48SS018040	16 5/16/420.7	18 1/8/481.0	25.07/637	20.59/523	10.85/276
48SS024040			27.07/688	23.35/593	
48SS024060			26.98/685	23.27/591	
48SS030040			26.71/678	23.46/596	
48SS030060/080			27.15/689	22.36/568	
48SS036060/080			27.50/698	22.48/571	
48SS036100/120	20 9/16/522.3	22 1/8/582.6	27.40/696	22.44/570	12.7/321
48SS042060/080			27.01/686	22.44/570	
48SS042100/120			26.94/684	22.44/570	

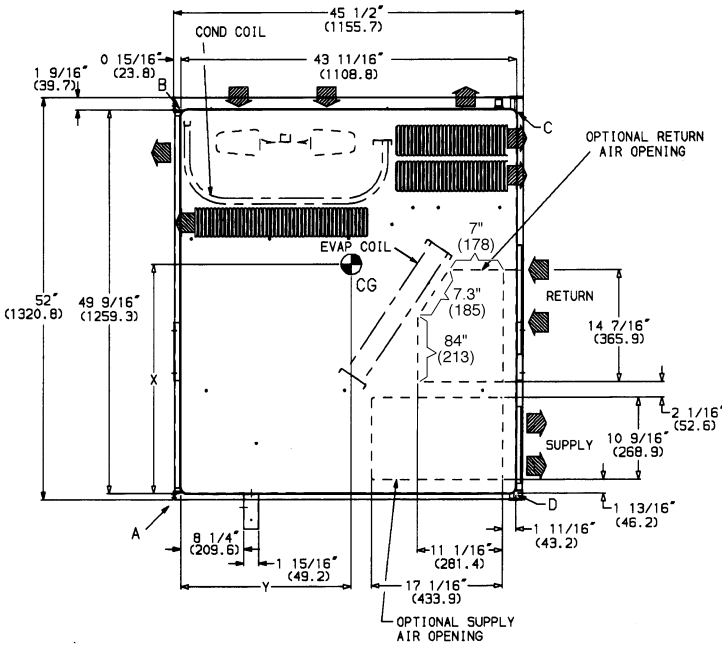
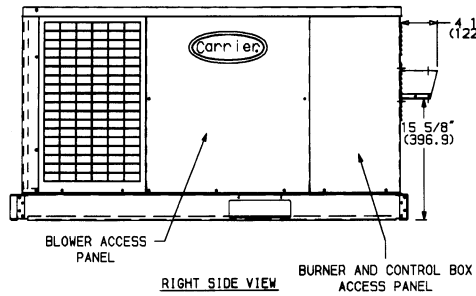
LEGEND

CG	— Center of Gravity	MAT'L	— Material
COND	— Condenser	NEC	— National Electrical Code
LV	— Low Voltage	REQ'D	— Required

NOTES:

- Clearances must be maintained to prevent recirculation of air from outdoor-fan discharge.
- Adequate clearance around air openings into combustion chamber must be provided.

48SS018-042 WITH OPTIONAL BASE RAIL



REQ'D CLEARANCES FOR SERVICING. in. (mm)

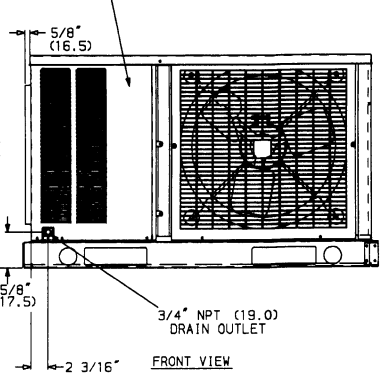
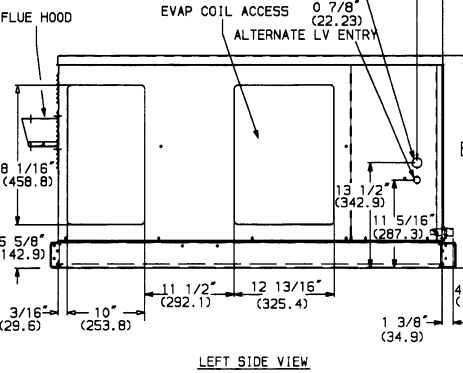
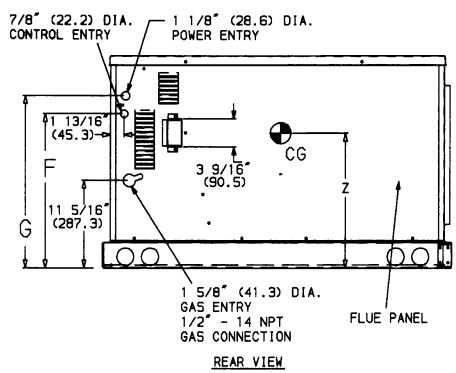
Duct panel	0
Unit top	36 (914)
Side opposite ducts	36 (914)
Compressor access (Except for NEC requirements)	36 (914)

REQ'D CLEARANCES TO COMBUSTIBLE MAT'L. in. (mm)

Maximum extension of overhangs	.48 (1219)
Unit top	14 (356)
Duct side of unit	.2 (51)
Side opposite ducts	14 (356)
Bottom of unit	0
Flue panel	36 (914)

NEC REQ'D CLEARANCES. in. (mm)

Between units, control box side	.42 (1067)
Unit and ungrounded surfaces, control box side	.36 (914)
Unit and block or concrete walls and other grounded surfaces, control box side	.42 (1067)



UNIT	ELECTRICAL CHARACTERISTICS	UNIT WEIGHT		CORNER WEIGHT (lb/kg)				UNIT HEIGHT (in./mm)
		lb	kg	A	B	C	D	
48SS018040	208/230-1-60	296	135	87/40	68/31	82/37	59/27	27.4/697
48SS024040	208/230-1-60	327	149	103/47	49/22	129/59	46/21	27.4/697
48SS024060	208/230-1-60	339	155	106/48	52/24	132/60	49/22	27.4/697
48SS030040	208/230-1-60, 208/230-3-60	344	157	106/48	53/24	132/60	53/24	27.4/697
48SS030060/080	208/230-1-60, 208/230-3-60	356	162	102/46	71/32	123/56	60/27	27.4/697
48SS036060/080	208/230-1-60, 208/230-3-60, 460-3-60	360	164	92/42	82/37	117/53	69/31	27.4/697
48SS036100/120	208/230-1-60, 208/230-3-60, 460-3-60	372	169	95/43	85/39	120/55	72/33	27.4/697
48SS042060/080	208/230-1-60, 208/230-3-60, 460-3-60	399	181	101/46	92/42	125/57	81/37	31.4/798
48SS042100/120	208/230-1-60, 208/230-3-60, 460-3-60	411	187	104/47	95/43	128/58	84/38	31.4/798

UNIT	F in./mm	G in./mm	CENTER OF GRAVITY in./mm		
			X	Y	Z
48SS018040	19 7/8/504.8	22 1/4/565.4	25.04/636	22.72/577	13.16/334.3
48SS024040			26.90/683.3	20.17/512.3	
48SS024060			26.82/681.2	20.22/513.6	
48SS030040			26.57/674.9	20.1/509.3	
48SS030060/080			26.93/684	21.1/535.4	
48SS036060/080			27.31/693.7	21.0/532.6	
48SS036100/120	23 7/8/606.4	26 1/4/666.8	27.23/691.6	21.0/533.1	14.96/380
48SS042060/080			26.87/682.5	21.0/533.1	
48SS042100/120			26.81/681	21.0/533.7	

LEGEND

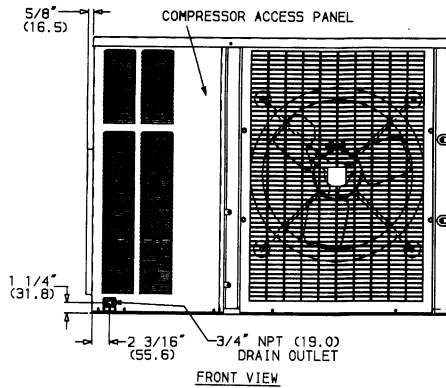
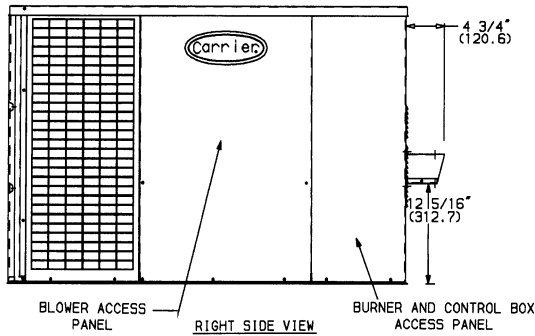
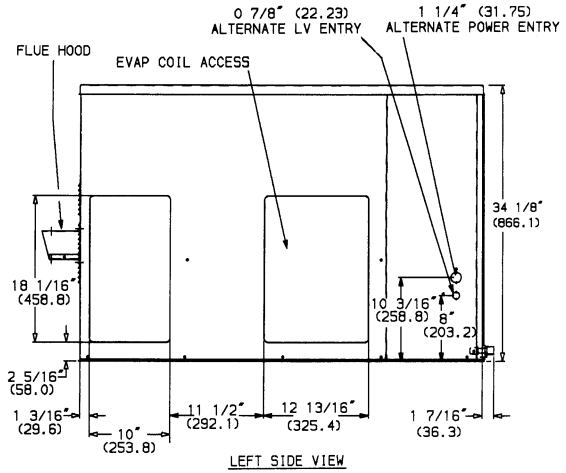
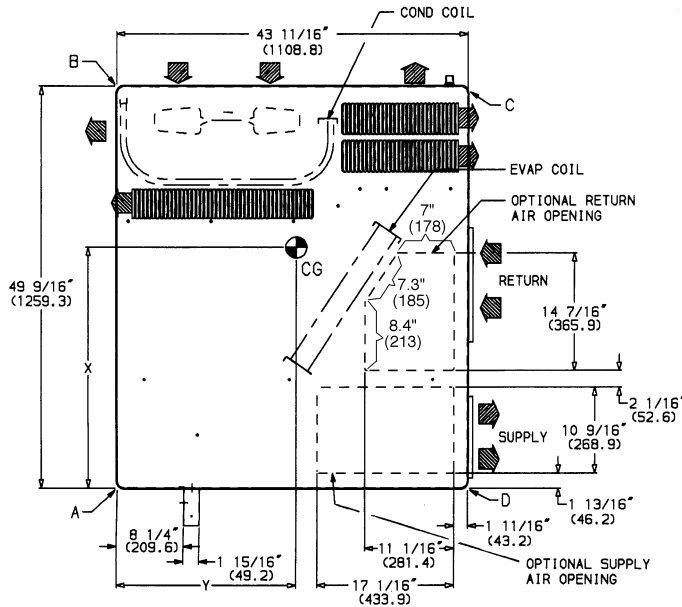
- CG --- Center of Gravity
- COND --- Condenser
- LV --- Low Voltage
- MAT'L --- Material
- NEC --- National Electrical Code
- REQ'D --- Required

- NOTES:**
- Clearances must be maintained to prevent recirculation of air from outdoor-fan discharge.
 - Adequate clearance around air openings into combustion chamber must be provided.

Base unit dimensions (cont)



48SS048,060 WITHOUT OPTIONAL BASE RAIL



REQ'D CLEARANCES FOR SERVICING. in. (mm)

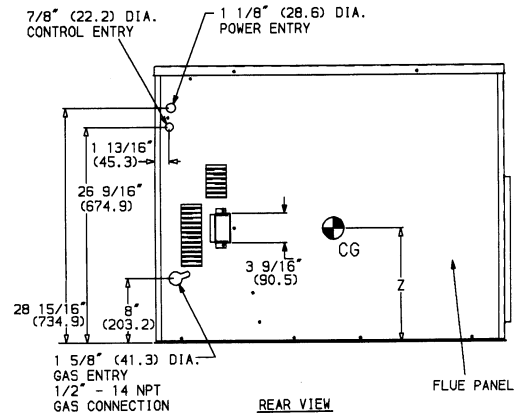
Duct panel	0
Unit top	36 (914)
Side opposite ducts	36 (914)
Compressor access	36 (914)
(Except for NEC requirements)	

REQ'D CLEARANCES TO COMBUSTIBLE MAT'L. in. (mm)

Maximum extension of overhangs	48 (1219)
Unit top	14 (356)
Duct side of unit	2 (51)
Side opposite ducts	14 (356)
Bottom of unit	0
Flue panel	36 (914)

NEC REQ'D CLEARANCES. in. (mm)

Between units, control box side	42 (1067)
Unit and ungrounded surfaces, control box side	36 (914)
Unit and block or concrete walls and other grounded surfaces, control box side	42 (1067)



UNIT	ELECTRICAL CHARACTERISTICS	UNIT WEIGHT		CORNER WEIGHT (lb/kg)			
		lb	kg	A	B	C	D
48SS048080	208/230-1-60, 208/230-3-60, 460-3-60	414	188	107/49	83/38	158/72	66/30
48SS048100/120/140	208/230-1-60, 208/230-3-60, 460-3-60	426	193	110/50	86/39	159/72	71/32
48SS060080	208/230-1-60, 208/230-3-60, 460-3-60	453	206	117/53	93/42	167/76	76/35
48SS060100/120/140	208/230-1-60, 208/230-3-60, 460-3-60	465	211	120/55	96/44	167/76	82/37

UNIT	CENTER OF GRAVITY (in./mm)		
	X	Y	Z
48SS048080	28.76/731	23.46/596	15.35/390
48SS048100/120/140	28.42/722	23.42/595	15.35/390
48SS060080	28.36/720	23.27/591	15.35/390
48SS060100/120/140	27.95/710	23.23/590	15.35/390

LEGEND

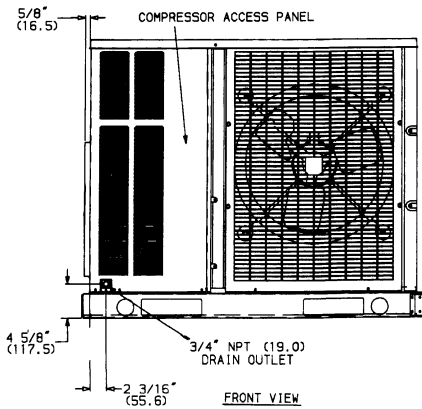
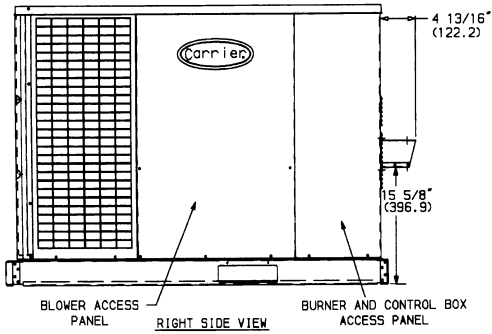
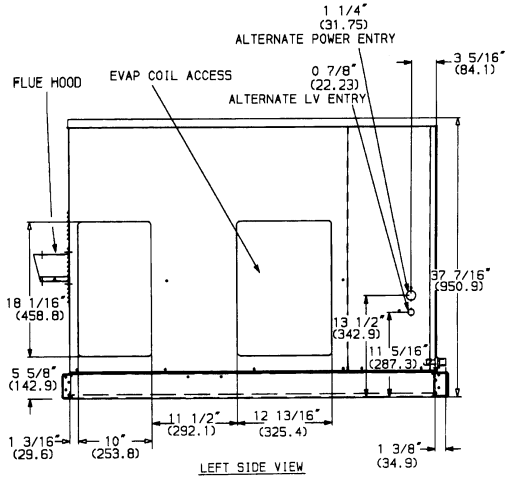
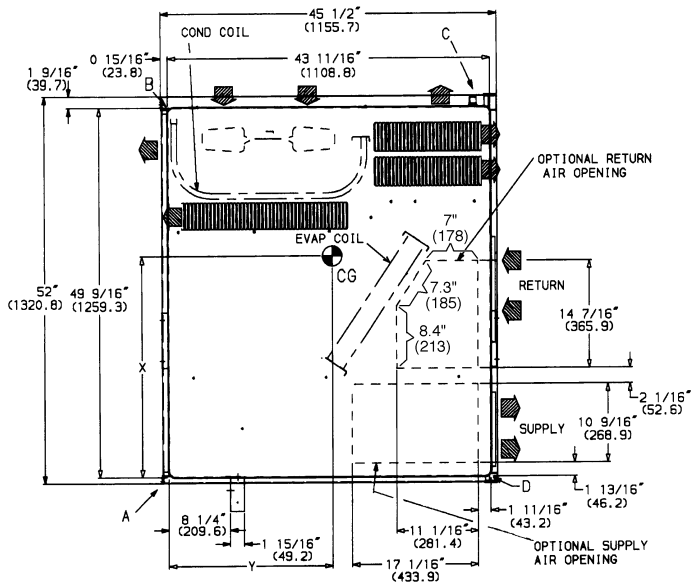
CG	— Center of Gravity	MAT'L	— Material
COND	— Condenser	NEC	— National Electrical Code
LV	— Low Voltage	REQ'D	— Required

NOTES:

- Clearances must be maintained to prevent recirculation of air from outdoor-fan discharge.
- Adequate clearance around air openings into combustion chamber must be provided.



48SS048,060 WITH OPTIONAL BASE RAIL



REQ'D CLEARANCES FOR SERVICING. in. (mm)

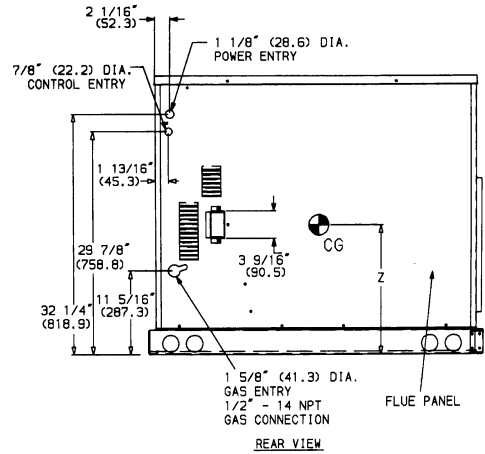
Duct panel	0
Unit top	36 (914)
Side opposite ducts	36 (914)
Compressor access	36 (914)
(Except for NEC requirements)	

REQ'D CLEARANCES TO COMBUSTIBLE MAT'L. in. (mm)

Maximum extension of overhangs	48 (1219)
Unit top	14 (356)
Duct side of unit	2 (51)
Side opposite ducts	14 (356)
Bottom of unit	0
Flue panel	36 (914)

NEC REQ'D CLEARANCES. in. (mm)

Between units, control box side	42 (1067)
Unit and ungrounded surfaces, control box side	36 (914)
Unit and block or concrete walls and other grounded surfaces, control box side	42 (1067)



UNIT	ELECTRICAL CHARACTERISTICS	UNIT WEIGHT		CORNER WEIGHT (lb/kg)			
		lb	kg	A	B	C	D
48SS048080	208/230-1-60, 208/230-3-60, 460-3-60	438	199	113/51	89/40	164/75	72/33
48SS048100/120/140	208/230-1-60, 208/230-3-60, 460-3-60	450	205	116/53	92/42	165/75	77/35
48SS060080	208/230-1-60, 208/230-3-60, 460-3-60	477	217	123/56	99/45	173/79	82/37
48SS060100/120/140	208/230-1-60, 208/230-3-60, 460-3-60	489	222	126/57	102/46	173/79	88/40

UNIT	CENTER OF GRAVITY (in./mm)		
	X	Y	Z
48SS048080	28.54/724.9	20.00/508	17.66/448.6
48SS048100/120/140	28.22/716.8	20.05/509.3	17.66/448.6
48SS060080	28.18/715.6	20.19/512.8	17.66/448.6
48SS060100/120/140	27.79/705.9	20.23/513.8	17.66/448.6

LEGEND

- CG — Center of Gravity
- COND — Condenser
- LV — Low Voltage
- MAT'L — Material
- NEC — National Electrical Code
- REQ'D — Required

NOTES:

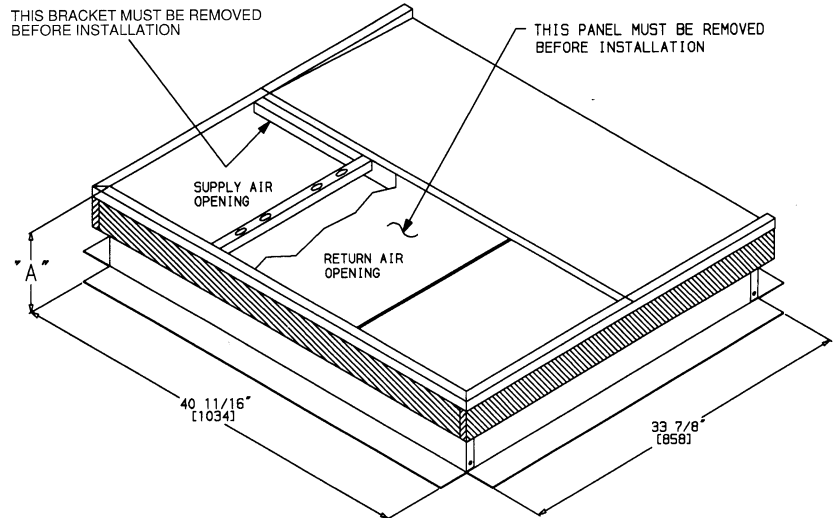
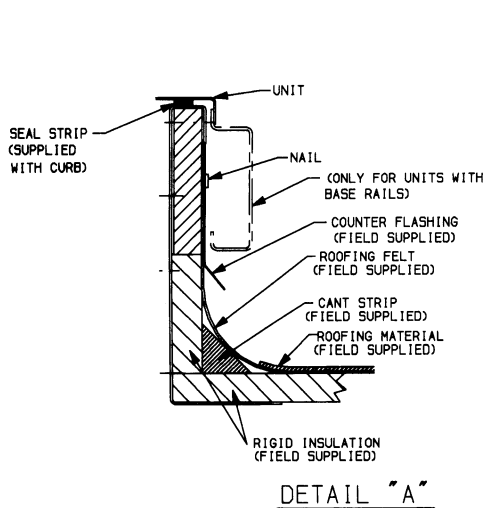
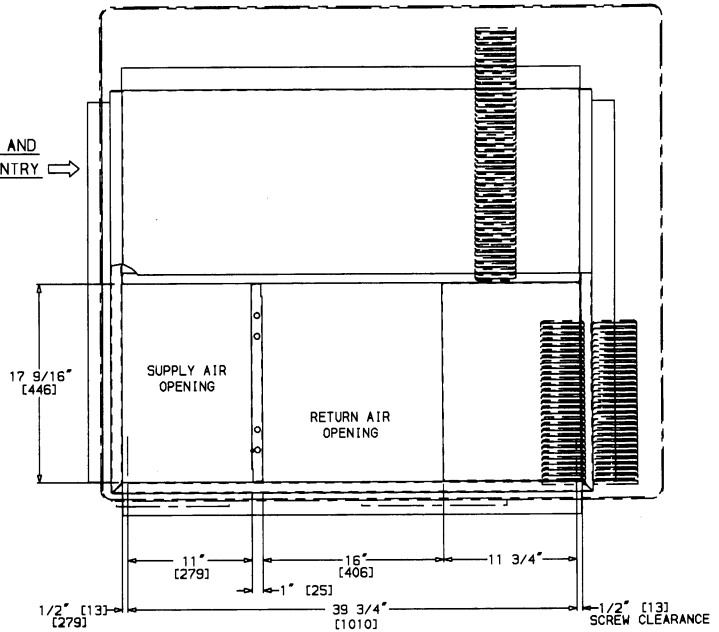
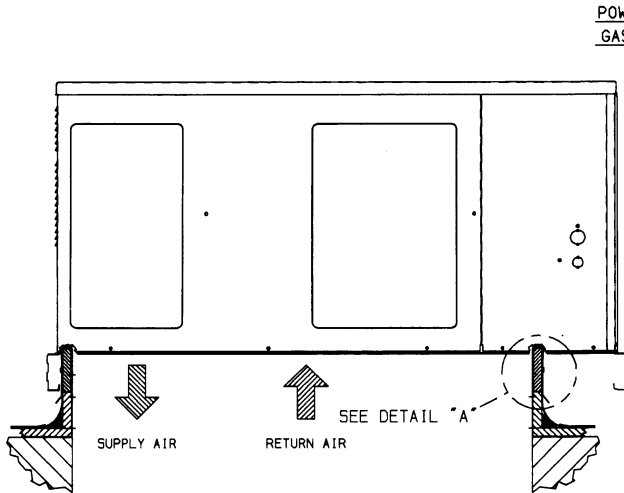
1. Clearances must be maintained to prevent recirculation of air from outdoor-fan discharge.
2. Adequate clearance around air openings into combustion chamber must be provided.

Accessory dimensions



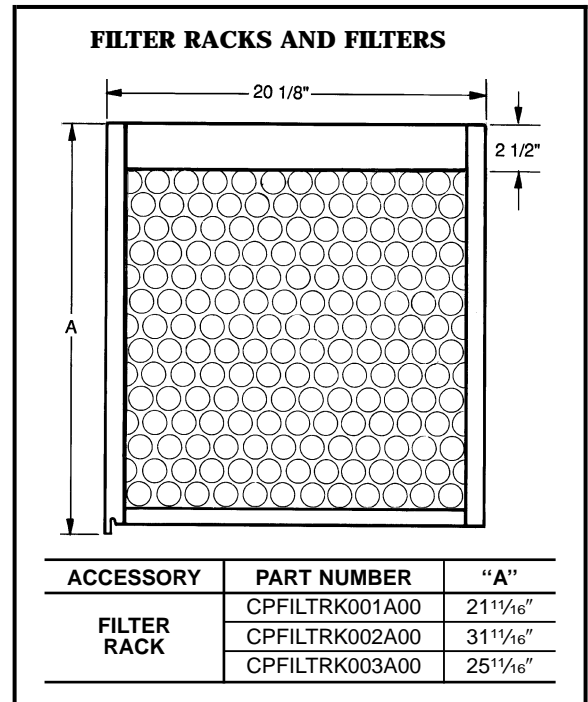
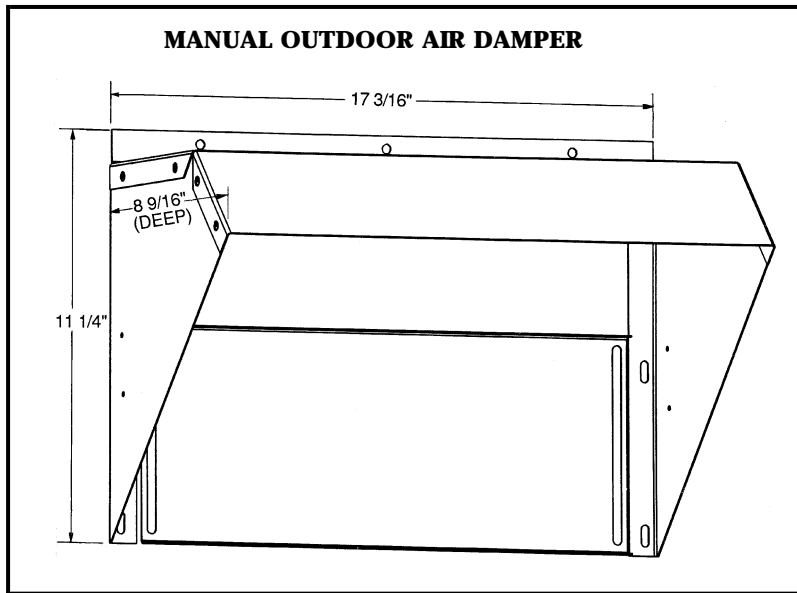
ROOF CURB DIMENSIONS

	PART NUMBER	"A"
48SS	CPRFCURB001A00	8" [203]
	CPRFCURB002A00	11" [279]
	CPRFCURB003A00	14" [356]



NOTES:

1. Roof curb must be set up for unit being installed.
2. Seal strip must be applied as required for unit being installed.
3. Dimensions in [] are in millimeters.
4. Roof curb is made of 16 gage steel.
5. Attach ductwork to curb (flanges of duct rest on curb).
6. Service clearance 4 ft on each side.
7. Direction of airflow.
8. Insulated panels: 1-in. thick fiberglass 1 lb density.



Selection procedure (with example)

I Determine cooling and heating requirements at design conditions:

Given:

Required Cooling Capacity (TC) 34,000 Btuh
 Sensible Heat Capacity (SHC) 24,000 Btuh
 Required Heating Capacity 60,000 Btuh
 Condenser Entering-Air Temperature 95 F
 Indoor-Air Temperature 80 F edb, 67 F ewb
 Evaporator-Air Quantity 1200 cfm
 External Static Pressure 0.2 in. wg
 Electrical Characteristics (V-Ph-Hz) 208-1-60

II Select unit based on required cooling capacity.

Enter Cooling Capacities table at condenser entering temperature of 95 F. Unit 48SS036 at 1200 cfm and 67 F ewb (entering wet bulb) will provide a total capacity of 36,000 Btuh and an SHC of 26,200 Btuh. Calculate SHC correction, if required, using Note 4 under Cooling Capacities tables.

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

In the Heating Capacities and Efficiencies table on page 5, note that unit 48SS036080 will provide 64,800 Btuh with an input of 80,000 Btuh.

IV Determine fan speed and power requirements at design conditions.

Before entering the air delivery tables, calculate the total static pressure required. From the given, the Wet Coil Pressure Drop table, and the Filter Pressure Drop table on page 18, find at 1200 cfm:

External static pressure	0.20 in. wg
Wet coil	0.088 in. wg
Filter	0.13 in. wg
Total static pressure	0.42 in. wg (rounded)

Enter the table for Dry Coil Air Delivery — Horizontal Discharge for 230 and 460 V on page 16. For 208 v operation, deduct 10% from value given. The fan will deliver 1233 cfm at 0.4 external static pressure (1370 x 0.9) at high speed and 852 cfm at 0.5 external static pressure (946 x 0.9) at low speed. The fan speed should be set at high to satisfy job requirements.

V Select unit that corresponds to power source available.

The Electrical Data table on page 24 shows that the unit is designed to operate at 208-1-60.



COOLING CAPACITIES

48SS018										
TEMP (F) AIR ENT COND		EVAP AIR — CFM/BF								
		525/0.10			600/0.12			675/0.13		
		Evap Air — Ewb (F)								
		62	67	72	62	67	72	62	67	72
85	TC	15.8	17.4	19.0	16.0	17.6	19.2	16.1	17.8	19.3
	SHC	13.6	11.2	8.7	14.4	11.8	9.0	15.1	12.4	9.2
	KW	1.76	1.80	1.85	1.81	1.86	1.90	1.86	1.91	1.95
95	TC	15.3	16.9	18.5	15.5	17.0	18.7	15.6	17.1	18.8
	SHC	13.4	11.1	8.6	14.2	11.6	8.9	14.9	12.2	9.1
	KW	1.90	1.95	2.00	1.95	2.00	2.05	2.01	2.05	2.10
105	TC	14.6	16.2	17.9	14.9	16.3	18.0	14.9	16.4	18.0
	SHC	13.2	10.9	8.4	14.0	11.4	8.6	14.6	12.0	8.8
	KW	2.05	2.10	2.15	2.10	2.15	2.20	2.15	2.20	2.25
115	TC	13.8	15.5	17.1	14.1	15.6	17.3	14.3	15.7	17.4
	SHC	12.8	10.6	8.1	13.6	11.2	8.4	14.2	11.7	8.7
	KW	2.20	2.26	2.31	2.25	2.31	2.37	2.31	2.36	2.42

48SS036										
TEMP (F) AIR ENT COND		EVAP AIR — CFM/BF								
		1050/0.07			1200/0.08			1350/0.09		
		Evap Air — Ewb (F)								
		62	67	72	62	67	72	62	67	72
85	TC	33.6	37.6	41.7	34.2	38.3	42.3	34.8	38.7	42.6
	SHC	30.5	25.4	19.9	32.5	27.1	20.7	34.2	28.5	21.4
	KW	3.72	3.86	3.99	3.81	3.95	4.08	3.90	4.03	4.15
95	TC	31.2	35.5	39.3	31.9	36.0	40.2	32.8	36.4	40.4
	SHC	29.4	24.7	19.1	31.4	26.2	20.1	32.8	27.7	20.8
	KW	3.90	4.05	4.18	3.99	4.14	4.29	4.09	4.22	4.36
105	TC	28.8	33.2	37.2	30.0	33.7	37.6	31.1	34.0	37.9
	SHC	28.2	23.8	18.4	30.0	25.4	19.2	31.0	26.8	20.0
	KW	4.08	4.23	4.39	4.17	4.32	4.48	4.29	4.41	4.56
115	TC	26.7	30.9	34.7	28.1	31.3	35.0	29.2	31.6	35.2
	SHC	26.7	22.9	17.5	28.1	24.5	18.3	29.2	25.9	19.0
	KW	4.26	4.41	4.57	4.37	4.50	4.66	4.48	4.58	4.73

48SS024										
TEMP (F) AIR ENT COND		EVAP AIR — CFM/BF								
		700/0.06			800/0.07			900/0.08		
		Evap Air — Ewb (F)								
		62	67	72	62	67	72	62	67	72
85	TC	22.5	25.1	27.8	23.0	25.6	28.3	23.4	26.0	28.7
	SHC	19.8	16.6	13.2	21.2	17.6	13.7	22.3	18.6	14.2
	KW	2.51	2.60	2.69	2.56	2.65	2.75	2.62	2.71	2.80
95	TC	21.1	23.6	26.3	21.5	24.0	26.6	21.9	24.4	27.0
	SHC	19.3	16.1	12.7	20.5	17.1	13.1	21.5	18.1	13.7
	KW	2.63	2.73	2.84	2.69	2.82	2.89	2.75	2.85	2.95
105	TC	19.6	22.0	24.6	20.0	22.4	25.0	20.5	22.6	25.3
	SHC	18.5	15.5	12.1	19.7	16.5	12.7	20.5	17.4	13.2
	KW	2.74	2.86	2.97	2.81	2.92	3.03	2.88	2.97	3.09
115	TC	17.9	20.3	22.9	18.6	20.6	23.2	19.2	20.9	23.5
	SHC	17.6	14.9	11.6	18.5	15.9	12.2	19.2	16.9	12.7
	KW	2.85	2.97	3.10	2.93	3.03	3.16	3.01	3.09	3.21

48SS042										
TEMP (F) AIR ENT COND		EVAP AIR — CFM/BF								
		1225/0.11			1400/0.12			1575/0.14		
		Evap Air — Ewb (F)								
		62	67	72	62	67	72	62	67	72
85	TC	40.3	44.2	47.9	41.1	44.9	48.5	41.8	45.4	49.0
	SHC	36.1	30.0	23.5	38.3	31.7	24.3	40.2	33.2	25.0
	KW	4.28	4.43	4.57	4.38	4.52	4.66	4.48	4.61	4.75
95	TC	38.0	41.8	45.3	38.8	42.5	45.9	39.4	43.0	46.4
	SHC	34.9	29.2	22.5	37.1	30.9	23.4	38.9	32.5	24.2
	KW	4.50	4.67	4.81	4.61	4.77	4.91	4.71	4.87	5.00
105	TC	35.7	39.3	43.0	36.4	39.9	43.3	37.2	40.4	43.7
	SHC	33.8	28.2	21.8	35.8	29.9	22.5	37.2	31.5	23.4
	KW	4.73	4.90	5.08	4.84	5.01	5.17	4.94	5.10	5.26
115	TC	33.3	36.7	40.1	34.1	37.2	40.4	35.0	37.6	40.8
	SHC	32.5	27.2	20.7	34.1	28.8	21.4	35.0	30.4	22.3
	KW	4.94	5.12	5.30	5.06	5.23	5.39	5.18	5.32	5.49

48SS030										
TEMP (F) AIR ENT COND		EVAP AIR — CFM/BF								
		875/0.08			1000/0.09			1125/0.10		
		Evap Air — Ewb (F)								
		62	67	72	62	67	72	62	67	72
85	TC	27.5	30.7	33.7	28.0	31.1	34.0	28.4	31.3	34.5
	SHC	25.2	21.0	16.3	26.8	22.3	16.9	28.2	23.4	17.6
	KW	3.01	3.09	3.16	3.07	3.15	3.22	3.13	3.20	3.28
95	TC	25.8	28.8	31.7	26.3	29.2	32.3	26.9	29.4	32.4
	SHC	24.4	20.4	15.6	25.9	21.6	16.4	26.9	22.7	16.9
	KW	3.16	3.25	3.33	3.23	3.32	3.40	3.30	3.37	3.44
105	TC	23.9	26.9	29.9	24.6	27.2	30.1	25.3	27.5	30.5
	SHC	23.4	19.6	15.0	24.6	20.9	15.6	25.3	22.1	16.4
	KW	3.30	3.40	3.49	3.38	3.46	3.54	3.45	3.52	3.61
115	TC	21.9	24.8	27.6	22.9	25.0	28.0	23.6	25.2	28.1
	SHC	21.9	18.8	14.2	22.9	20.1	15.0	23.6	21.2	15.6
	KW	3.44	3.53	3.62	3.52	3.59	3.89	3.59	3.64	3.74

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 Cooling Capacity, 1000 Btuh (net)

NOTES:

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

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

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

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

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

4. The SHC is based on 80 F edb temperature of air entering indoor 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 = $1.10 \times (1 - BF) \times (edb - 80)$.



COOLING CAPACITIES (cont)

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 Cooling Capacity, 1000 Btuh (net)

NOTES:

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

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

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

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

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

4. The SHC is based on 80 F edb temperature of air entering indoor 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 = $1.10 \times (1 - \text{BF}) \times (\text{edb} - 80)$.

48SS048										
TEMP (F) AIR ENT COND		EVAP AIR — CFM/BF								
		1400/0.08			1600/0.10			1800/0.11		
		Evap Air — Ewb (F)								
		62	67	72	62	67	72	62	67	72
85	TC	43.8	48.3	52.9	44.5	49.1	53.7	45.1	49.6	53.9
	SHC	39.4	32.7	25.6	41.9	34.6	26.4	44.1	36.4	27.1
	kW	4.76	4.85	4.95	4.87	4.97	5.07	4.99	5.08	5.17
95	TC	41.9	46.4	50.9	42.6	47.0	51.7	43.3	47.5	52.2
	SHC	38.6	32.1	24.8	41.1	33.9	25.9	43.1	35.9	26.8
	kW	5.17	5.28	5.38	5.29	5.40	5.50	5.41	5.51	5.61
105	TC	39.3	44.2	48.8	40.1	44.7	49.2	41.2	45.2	49.6
	SHC	37.3	31.2	24.1	39.7	33.1	25.1	41.2	35.1	26.0
	kW	5.61	5.73	5.83	5.74	5.85	5.95	5.87	5.96	6.06
115	TC	36.6	41.5	46.4	37.7	42.4	47.0	39.0	42.8	47.4
	SHC	35.9	30.2	23.4	37.6	32.4	24.3	39.0	34.2	25.4
	kW	6.08	6.22	6.34	6.22	6.34	6.45	6.36	6.46	6.57

48SS060										
TEMP (F) AIR ENT COND		EVAP AIR — CFM/BF								
		1750/0.03			2000/0.04			2250/0.05		
		Evap Air — Ewb (F)								
		62	67	72	62	67	72	62	67	72
85	TC	55.0	62.0	69.4	56.3	63.1	70.5	58.2	63.9	71.3
	SHC	52.4	43.7	34.2	56.1	46.7	35.8	58.1	49.5	37.4
	kW	6.14	6.33	6.53	6.32	6.50	6.70	6.52	6.67	6.88
95	TC	51.8	58.8	66.2	53.6	59.6	67.3	55.6	60.2	68.1
	SHC	51.0	42.4	33.2	53.5	45.3	34.8	55.6	48.2	36.3
	kW	6.62	6.82	7.05	6.83	7.00	7.22	7.03	7.17	7.39
105	TC	48.7	55.1	62.9	51.0	56.0	63.9	53.0	56.7	64.5
	SHC	48.7	41.1	32.1	50.9	44.0	33.7	52.8	46.9	35.3
	kW	7.17	7.37	7.60	7.39	7.54	7.78	7.59	7.71	7.95
115	TC	45.8	52.0	59.5	48.5	52.8	60.5	50.4	53.4	60.8
	SHC	45.8	40.0	30.9	48.4	42.8	32.6	50.3	45.6	34.1
	kW	7.77	7.94	8.19	7.98	8.12	8.36	8.18	8.29	8.43

Performance data (cont)



DRY COIL AIR DELIVERY* — HORIZONTAL DISCHARGE (Deduct 10% for 208 v)

UNIT SIZE 48SS	MOTOR SPEED		230 AND 460 VOLT HORIZONTAL DISCHARGE										
			External Static Pressure (in. wg)										
			0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
018	Low	Watts	230	225	220	210	195	170	—	—	—	—	—
		Cfm	760	745	725	695	640	540	—	—	—	—	—
	High	Watts	—	—	—	—	270	235	200	—	—	—	—
		Cfm	—	—	—	—	850	700	450	—	—	—	—
024, 030	Low	Watts	275	275	273	269	260	257	249	—	—	—	—
		Cfm	857	835	802	782	745	717	663	—	—	—	—
	Med	Watts	371	368	360	349	345	326	319	304	293	—	—
		Cfm	1079	1063	1027	996	978	919	865	783	726	—	—
	High	Watts	514	493	476	460	443	425	401	378	344	—	—
		Cfm	1409	1383	1324	1282	1223	1156	1068	984	857	—	—
036	Low	Watts	473	447	427	418	395	367	346	337	323	—	—
		Cfm	1253	1253	1172	1130	1047	946	865	829	768	—	—
	Med	Watts	519	500	478	459	439	410	377	357	340	—	—
		Cfm	1414	1366	1287	1234	1162	1074	920	829	743	—	—
	High	Watts	667	634	609	593	564	541	506	469	436	422	—
		Cfm	1734	1639	1563	1461	1370	1292	1157	960	829	743	—
042	Low	Watts	678	635	604	580	550	520	493	455	430	—	—
		Cfm	1540	1515	1475	1430	1375	1280	1225	1128	1020	—	—
	High	Watts	—	820	785	750	700	680	649	612	570	—	—
		Cfm	—	1825	1750	1685	1610	1525	1485	1335	1215	—	—
048	Low	Watts	—	—	854	786	744	706	641	606	557	511	—
		Cfm	—	—	2026	1905	1830	1752	1603	1513	1367	1228	—
	High	Watts	—	—	—	905	846	824	804	748	683	637	—
		Cfm	—	—	—	2025	1905	1830	1752	1603	1398	1228	—
060	Low	Watts	1104	1093	1072	1029	986	938	891	830	769	733	697
		Cfm	1876	1865	1840	1803	1765	1710	1641	1533	1425	1345	1264
	Med	Watts	1351	1295	1245	1197	1148	1096	1053	994	936	871	812
		Cfm	2249	2209	2157	2097	2036	1959	1882	1781	1679	1542	1405
	High	Watts	—	—	1391	1343	1296	1247	1191	1129	1067	1002	936
		Cfm	—	—	2299	2231	2152	2060	1975	1859	1746	1591	1441

*Air delivery values are based on operating voltage of 230 v or 460 v, dry coil, without filter. Deduct wet coil and filter pressure drops to obtain external static pressure available for ducting.

NOTES:

1. Do not operate the unit at a cooling airflow that is less than 350 cfm for each 12,000 Btuh of rated cooling capacity. Evaporator coil frosting may occur at airflows below this point.
2. Dashes indicate portions of table that are beyond the blower motor capacity or are not recommended.



**DRY COIL AIR DELIVERY* — VERTICAL DISCHARGE
(Deduct 10% for 208 v)**

UNIT SIZE 48SS	MOTOR SPEED		230 AND 460 VOLT VERTICAL DISCHARGE										
			External Static Pressure (in. wg)										
			0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
018	Low	Watts	—	295	251	223	201	176	149	124	—	—	—
		Cfm	—	821	817	753	665	536	343	164	—	—	—
	High	Watts	401	376	346	322	294	272	250	229	219	—	—
		Cfm	1334	1253	1128	996	816	658	461	246	167	—	—
024, 030	Low	Watts	—	285	284	282	278	274	270	261	251	244	230
		Cfm	—	798	761	727	682	634	581	525	450	371	304
	Med	Watts	—	378	371	368	362	357	343	332	315	301	283
		Cfm	—	1011	982	948	906	858	771	703	597	492	387
	High	Watts	—	520	511	487	472	451	431	411	385	362	341
		Cfm	—	1342	1289	1237	1181	1106	1007	892	745	610	471
036	Low	Watts	—	460	439	423	898	379	349	322	297	270	246
		Cfm	—	1191	1136	1081	1005	907	795	687	579	471	349
	Med	Watts	—	511	492	470	450	420	392	364	332	308	275
		Cfm	—	1316	1244	1178	1104	1005	891	784	657	535	389
	High	Watts	—	655	631	603	584	552	522	492	459	433	398
		Cfm	—	1541	1458	1367	1292	1178	1053	920	806	662	509
042	Low	Watts	—	637	612	587	560	536	493	455	—	—	—
		Cfm	—	1500	1450	1405	1350	1290	1200	1105	—	—	—
	High	Watts	—	790	750	700	699	639	608	574	547	—	—
		Cfm	—	1750	1625	1604	1509	1421	1323	1221	1094	—	—
048	Low	Watts	—	847	784	746	708	646	609	563	516	—	—
		Cfm	—	1995	1901	1822	1730	1580	1477	1319	1178	—	—
	High	Watts	—	—	909	852	820	801	751	687	639	—	—
		Cfm	—	—	2018	1896	1814	1729	1582	1380	1220	—	—
060	Low	Watts	—	983	960	923	885	845	804	751	697	665	633
		Cfm	—	1838	1808	1755	1702	1628	1553	1446	1339	1257	1175
	Med	Watts	—	1115	1083	1045	1006	964	921	872	823	783	742
		Cfm	—	2067	2023	1957	1891	1807	1723	1612	1501	1392	1282
	High	Watts	—	1284	1201	1166	1131	1092	1053	1001	950	907	864
		Cfm	—	2187	2108	2038	1968	1882	1796	1676	1555	1437	1318

*Air delivery values are based on operating voltage of 230 v or 460 v, dry coil, without filter. Deduct wet coil and filter pressure drops to obtain external static pressure available for ducting.

NOTES:

1. Do not operate the unit at a cooling airflow that is less than 350 cfm for each 12,000 Btuh of rated cooling capacity. Evaporator coil frosting may occur at airflows below this point.
2. Dashes indicate portions of table that are beyond the blower motor capacity or are not recommended.

Performance data (cont)

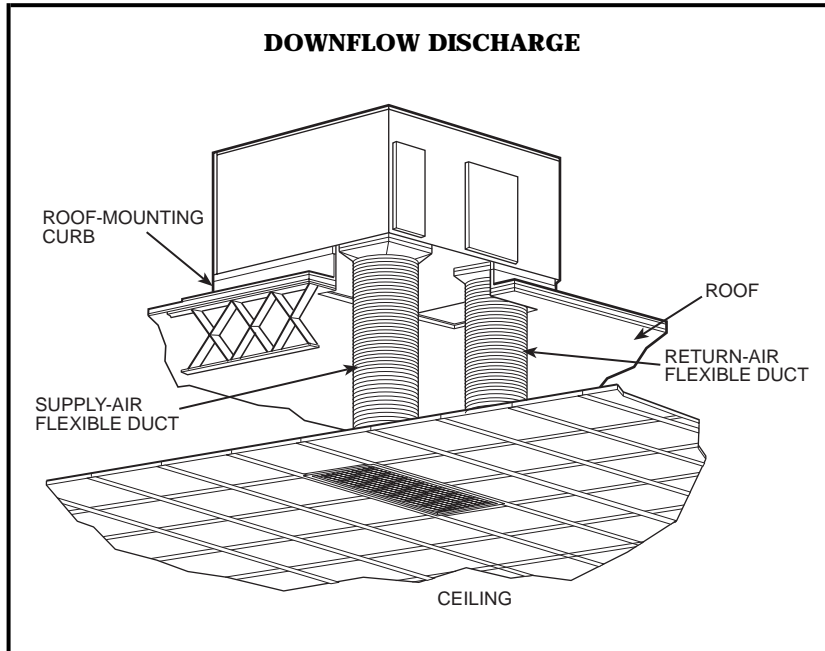
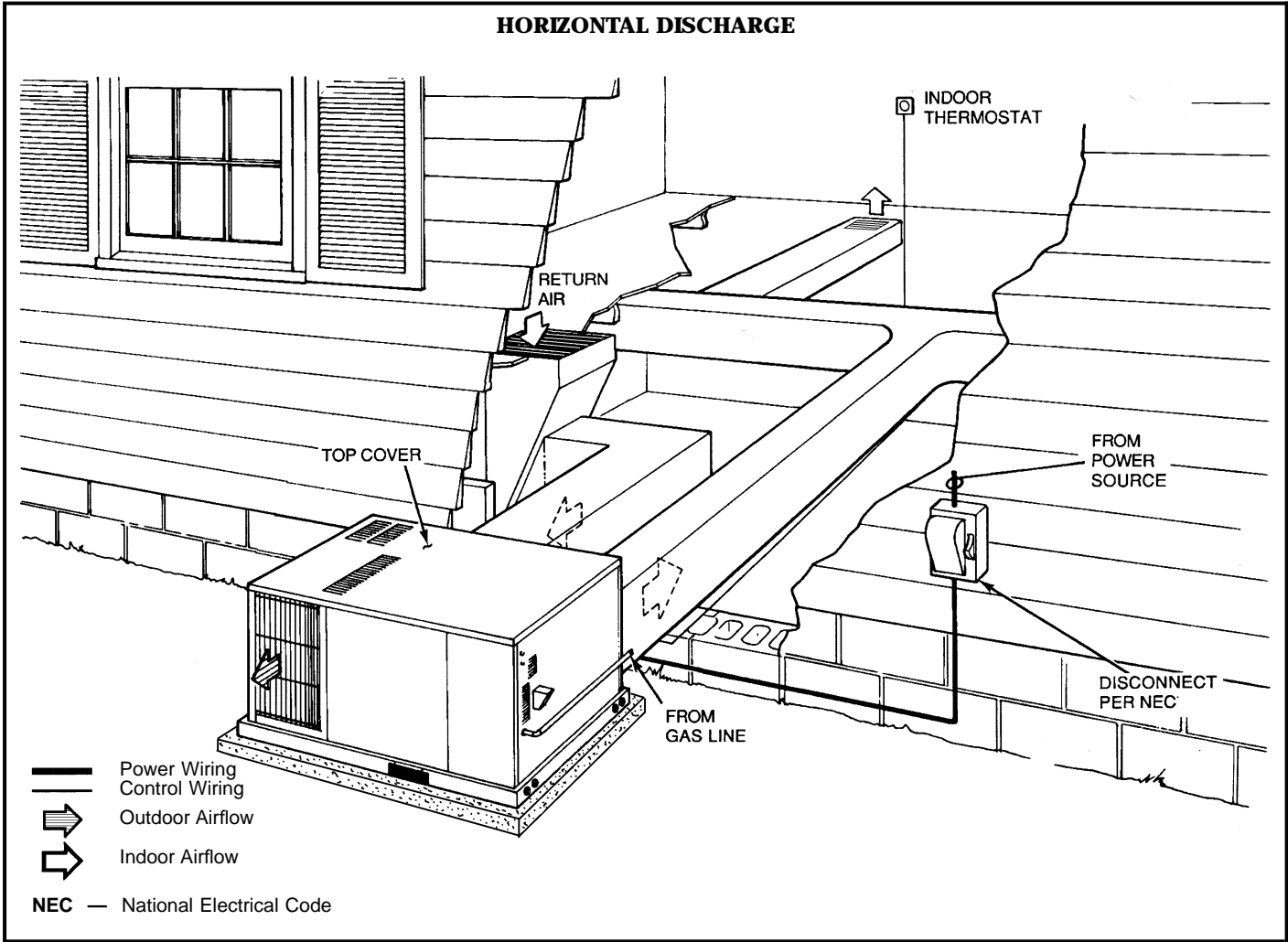


WET COIL PRESSURE DROP

UNIT SIZE	AIRFLOW (cfm)	PRESSURE DROP (in. wg)
018	600	0.069
	700	0.082
	800	0.102
	900	0.116
024	600	0.039
	700	0.058
	800	0.075
	900	0.088
030	900	0.088
	1000	0.095
	1200	0.123
036	1000	0.068
	1200	0.088
	1400	0.108
	1600	0.123
042	1000	0.048
	1200	0.069
	1400	0.088
	1600	0.102
048	1400	0.068
	1600	0.075
	1800	0.088
060	1700	0.082
	1900	0.095
	2100	0.108
	2300	0.123

FILTER PRESSURE DROP (in. wg)

UNIT SIZE	FILTER SIZE (in.)	CFM																		
		500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
018, 024	20 x 20	0.05	0.07	0.08	0.10	0.12	0.13	—	—	—	—	—	—	—	—	—	—	—	—	—
030, 036	20 x 24	—	—	—	—	0.09	0.10	0.11	0.13	0.14	0.15	0.16	—	—	—	—	—	—	—	—
042	24 x 24	—	—	—	—	—	—	—	—	0.11	0.12	0.14	0.15	—	—	—	—	—	—	—
048, 060	24 x 30	—	—	—	—	—	—	—	—	—	0.09	0.10	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18



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 or horizontal discharge — Units are equipped with factory-installed duct covers on both the downflow and horizontal openings. Remove appropriate duct panel covers for intended discharge application. Units with downflow option do not require duct panel cover removal.

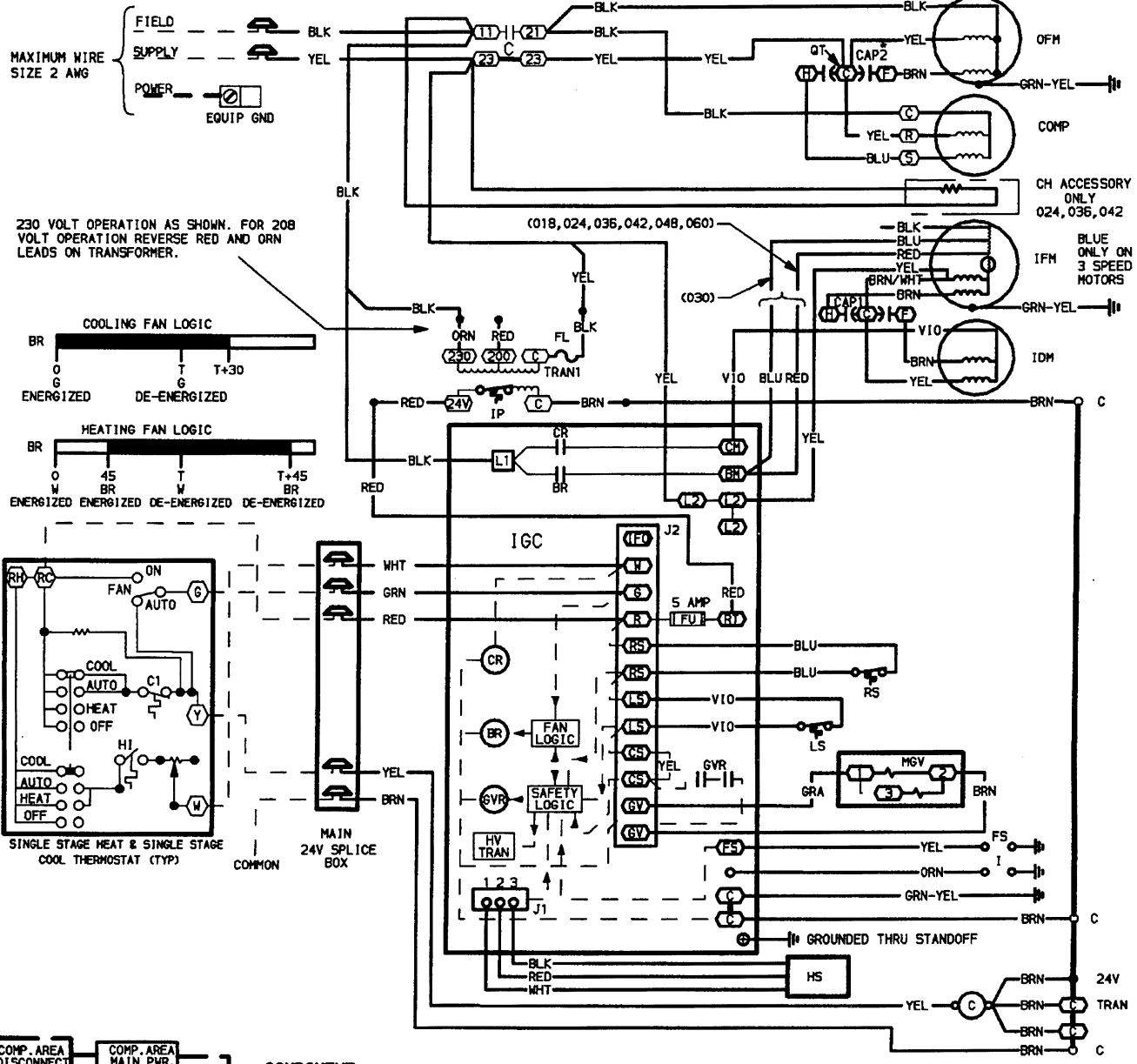
Airflow — Units are draw-thru on cooling and blow-thru on heating.

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

Minimum cooling airflow is 350 cfm/ton.

Minimum ambient operating temperature in cooling for all standard units is 40 F. With accessory low ambient temperature kit, units can operate at temperatures down to 0° F.

Typical control wiring schematic, 48SS018-060; 208/230-1-60

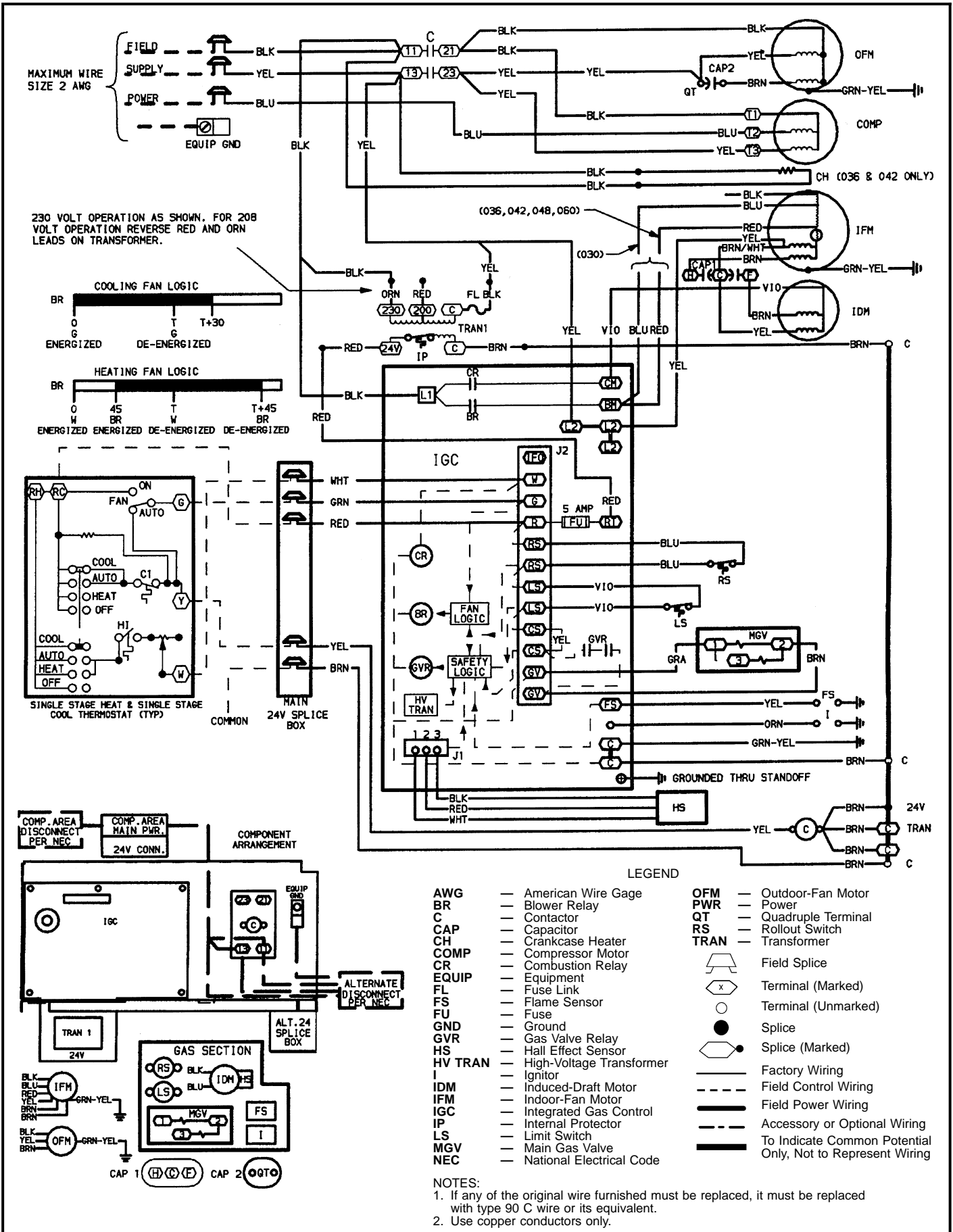


AWG	— American Wire Gage	OFM	— Outdoor-Fan Motor
BR	— Blower Relay	PWR	— Power
C	— Contactor	QT	— Quadruple Terminal
CAP	— Capacitor	RS	— Rollout Switch
CH	— Crankcase Heater	TRAN	— Transformer
COMP	— Compressor Motor		
CR	— Combustion Relay		
EQUIP	— Equipment		
FL	— Fuse Link		
FS	— Flame Sensor		
FU	— Fuse		
GND	— Ground		
GVR	— Gas Valve Relay		
HS	— Hall Effect Sensor		
HV TRAN	— High-Voltage Transformer		
I	— Ignitor		
IDM	— Induced-Draft Motor		
IFM	— Indoor-Fan Motor		
IGC	— Integrated Gas Control		
IP	— Internal Protector		
LS	— Limit Switch		
MGV	— Main Gas Valve		
NEC	— National Electrical Code		

	Field Splice
	Terminal (Marked)
	Terminal (Unmarked)
	Splice
	Splice (Marked)
	Factory Wiring
	Field Control Wiring
	Field Power Wiring
	Accessory or Optional Wiring
	To Indicate Common Potential Only, Not to Represent Wiring

NOTES:
 1. If any of the original wire furnished must be replaced, it must be replaced with type 90 C wire or its equivalent.
 2. Use copper conductors only.

Typical control wiring schematic, 48SS030-060; 208/230-3-60



MAXIMUM WIRE SIZE 2 AWG

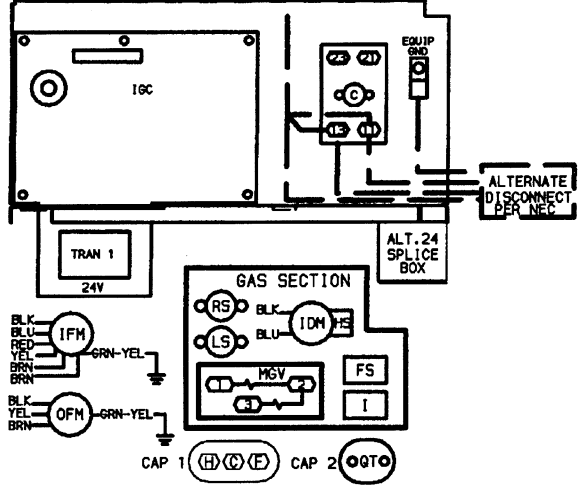
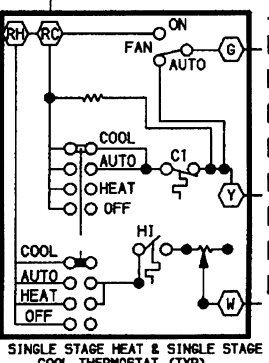
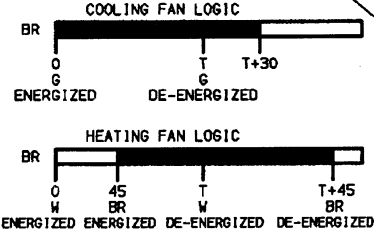
FIELD --- BLK

SUPPLY --- YEL

POWER --- BLU

EQUIP GND

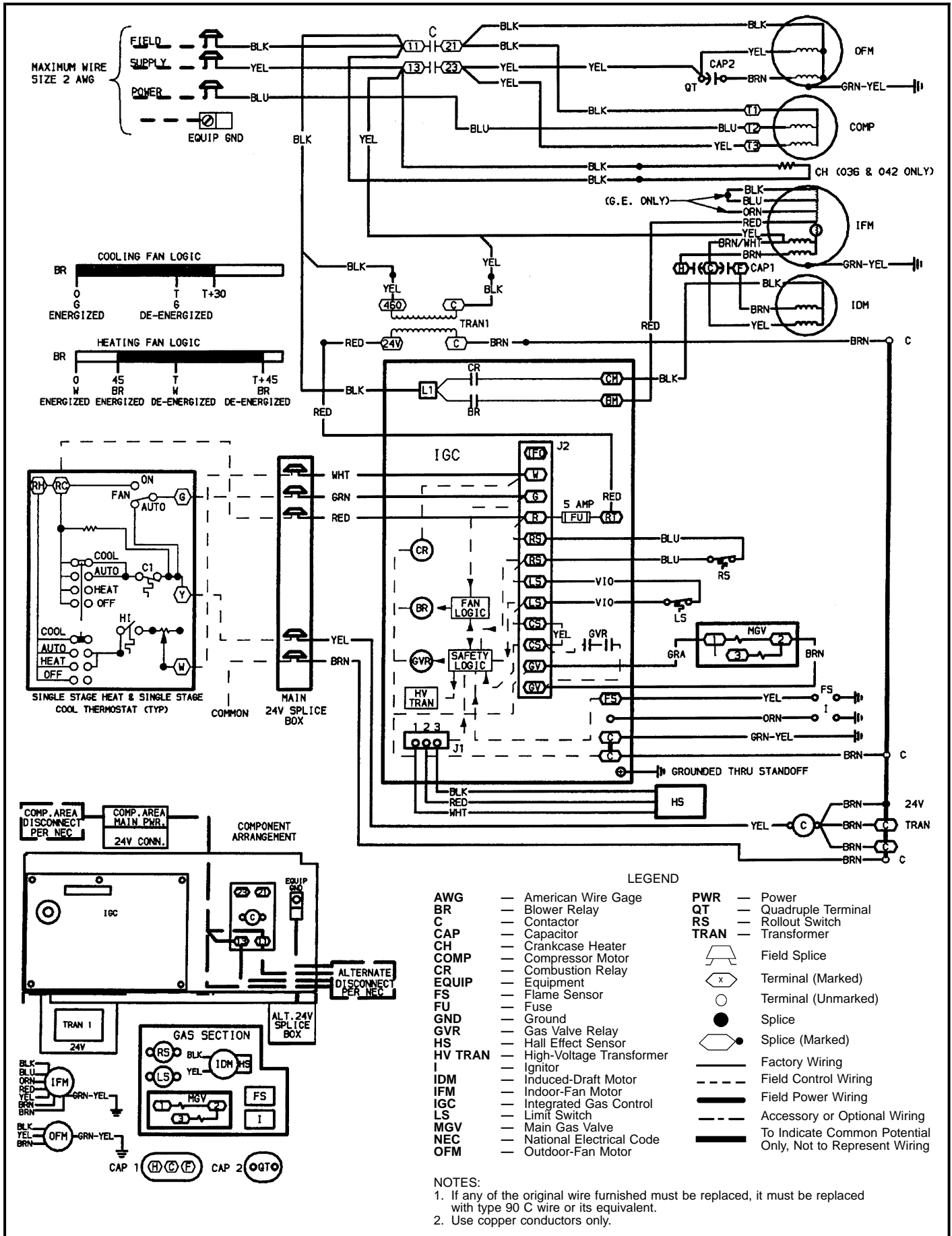
230 VOLT OPERATION AS SHOWN. FOR 208 VOLT OPERATION REVERSE RED AND ORN LEADS ON TRANSFORMER.



- LEGEND**
- | | | | |
|---------|----------------------------|------|----------------------|
| AWG | — American Wire Gage | OFM | — Outdoor-Fan Motor |
| BR | — Blower Relay | PWR | — Power |
| C | — Contactor | QT | — Quadruple Terminal |
| CAP | — Capacitor | RS | — Rollout Switch |
| CH | — Crankcase Heater | TRAN | — Transformer |
| COMP | — Compressor Motor | | |
| CR | — Combustion Relay | | |
| EQUIP | — Equipment | | |
| FL | — Fuse Link | | |
| FS | — Flame Sensor | | |
| FU | — Fuse | | |
| GND | — Ground | | |
| GVR | — Gas Valve Relay | | |
| HS | — Hall Effect Sensor | | |
| HV TRAN | — High-Voltage Transformer | | |
| I | — Ignitor | | |
| IDM | — Induced-Draft Motor | | |
| IFM | — Indoor-Fan Motor | | |
| IGC | — Integrated Gas Control | | |
| IP | — Internal Protector | | |
| LS | — Limit Switch | | |
| MGV | — Main Gas Valve | | |
| NEC | — National Electrical Code | | |

- NOTES:**
1. If any of the original wire furnished must be replaced, it must be replaced with type 90 C wire or its equivalent.
 2. Use copper conductors only.

Typical control wiring schematic, 48SS036-060; 460-3-60



Electrical data



UNIT 48SS	V-PH-HZ	VOLTAGE RANGE		COMPRESSOR		COND FAN MOTOR	INDOOR FAN	POWER SUPPLY		AWG 60 C MIN WIRE SIZE†	MAX WIRE LENGTH (ft)
		Min	Max	RLA	LRA	FLA	FLA	MCA	MOCP*		
018	208/230-1-60	187	253	7.6	45	0.7	1.8	12.0	15	14	75
024	208/230-1-60	187	253	12.4	61	0.7	2.0	18.2	30	12	80
030	208/230-1-60	187	253	14.4	82	1.4	2.0	21.8	30	10	100
	208/230-3-60	187	253	9.4	66	1.4	2.0	15.5	25	12	80
036	208/230-1-60	187	253	18.0	96	1.4	2.8	26.7	40	10	90
	208/230-3-60	187	253	11.7	75	1.4	2.8	18.8	30	12	65
	460-3-60	414	506	5.6	40	0.8	1.4	9.2	10	14	100
042	208/230-1-60	187	253	20.4	104	1.4	4.0	30.9	50	8	100
	208/230-3-60	187	253	14.0	91	1.4	4.0	22.9	35	10	85
	460-3-60	414	506	6.4	42	0.8	2.0	10.8	15	14	100
048	208/230-1-60	187	253	26.4	129	2.1	5.0	40.1	60	6	100
	208/230-3-60	187	253	15.0	99	2.1	5.0	25.9	40	10	75
	460-3-60	414	506	8.2	50	1.1	2.3	13.7	20	14	100
060	208/230-1-60	187	253	32.1	169	2.1	6.8	49.0	60	6	100
	208/230-3-60	187	253	19.3	123	2.1	6.8	33.0	50	8	90
	460-3-60	414	506	10.0	62	1.1	3.2	16.8	25	12	100

LEGEND

- AWG — American Wire Gage
- CSA — Canadian Standards Association
- FLA — Full Load Amps
- HACR — Heating, Air Conditioning and Refrigeration
- LRA — Locked Rotor Amps
- MCA — Minimum Circuit Amps
- MOCP — Maximum Overcurrent Protection (fuses or HACR-type circuit breaker)
- NEC — National Electrical Code
- RLA — Rated Load Amps

*Fuse or HACR breaker.

†Minimum wire size is based on 60 C copper wire. If other than 60 C if used, determine size from NEC. Voltage drop of wire must be less than 2% of rated voltage.

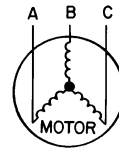
NOTES:

1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. The CSA units may be fuse or circuit breaker.
2. **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.

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

EXAMPLE: Supply voltage is 460-3-60.

- AB = 452 v
- BC = 464 v
- AC = 455 v



$$\begin{aligned} \text{Average Voltage} &= \frac{452 + 464 + 455}{3} \\ &= \frac{1371}{3} \\ &= 457 \end{aligned}$$

Determine maximum deviation from average voltage.

- (AB) 457 - 452 = 5 v
- (BC) 464 - 457 = 7 v
- (AC) 457 - 455 = 2 v

Maximum deviation is 7 v.

Determine percent of voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{7}{457} = 1.53\%$$

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.



Sequence of operation

Heating — On a call for heating, terminal “W” of the thermostat is energized, starting the induced-draft motor. When the hall-effect sensor on the induced-draft motor senses that it has reached the required speed, the burner sequence begins. This function is performed by the integrated control board (IGC). The indoor-fan motor is energized 45 seconds after flame is established. When the thermostat is satisfied and “W” is deenergized, the indoor-fan motor stops after a 45-second time-off delay.

Cooling — With the room thermostat SYSTEM switch in the COOL position and the FAN switch in the AUTO. position, the cooling sequence of operation is as follows:

When the room temperature rises to a point that is slightly above the cooling control setting of the thermostat, the thermostat completes the circuit between thermostat 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) and condenser (outdoor) fan motor (OFM). Both motors start instantly.

The set of normally-open contacts of energized relay BR close and complete the circuit through evaporator blower (indoor) fan motor (IFM). The blower motor starts instantly.

The cooling cycle remains “on” until the room temperature drops to point that is slightly below the cooling control setting of the room thermostat. At this point, the thermostat “breaks” the circuit between thermostat terminal R to terminals Y and G. These open circuits deenergize contactor coil C and relay coil BR. The condenser and compressor motors stop. After a 30-second delay, the blower motor stops. The unit is in a “standby” condition, waiting for the next “call for cooling” from the room thermostat.

Packaged Heating/Cooling Units Constant Volume Application

HVAC Guide Specifications

Size Range: **1½ to 5 Tons, Nominal Cooling
40,000 to 140,000 Btuh,
Nominal Input Heating**

Carrier Model Number: **48SS**

Part 1 — General

1.01 SYSTEM DESCRIPTION

Outdoor rooftop mounted, gas heating/electric cooling unit utilizing a rotary, reciprocating, or scroll hermetic compressor for cooling duty. Unit shall discharge supply air downward or horizontally as shown on contract drawings. Outdoor fan/coil section shall have a blow-thru design for minimum sound levels.

1.02 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 564.
- C. Unit shall be UL listed and CSA certified as a total package for safety requirements.
- D. Roof curb shall be designed to conform to NRCA Standards.
- E. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
- F. Cabinet insulation shall meet ASHRAE standard no. 62.

1.03 DELIVERY, STORAGE, AND HANDLING

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

Part 2 — Products

2.01 EQUIPMENT

A. General:

Factory-assembled, single-piece heating and cooling unit. Contained within the enclosure shall be all factory wiring, piping, controls, refrigerant charge (R-22), 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 hours in salt spray.
2. Cabinet panels shall be easily removed for servicing.
3. Indoor blower compartment interior cabinet surfaces shall be insulated with a minimum ½-in. thick, flexible cleanable insulation, coated on the air side. Aluminum foil-faced cleanable insulation shall be used in the entire section.

4. Unit shall utilize a sloped condensate drain pan. External trap required.

C. Fans:

1. The indoor (evaporator) fan shall be 2- or 3-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 and be dynamically balanced.
3. Outdoor (condenser) fan shall be of the direct driven, propeller type with aluminum blades riveted to corrosion resistant steel spiders, be dynamically balanced, and discharge air vertically upwards and horizontally.

D. Compressor:

1. Fully hermetic compressor with factory-installed vibration isolation.
2. Rotary compressors shall be standard on unit size 018. Reciprocating compressors shall be standard on unit sizes 024-042. Scroll compressors shall be standard on unit sizes 048 and 060.

E. Coils:

Evaporator and condenser coils shall have aluminum plate fins mechanically bonded to seamless copper tubes with all joints brazed. 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 be provided with solid-state hall effects sensor to ensure adequate airflow for combustion.
3. The heat exchangers shall be constructed of aluminumized steel for corrosion resistance.
4. Burners shall be of the in-shot type constructed of aluminum coated steel.
5. Integrated gas control board shall provide control of heating and simplify troubleshooting through its built-in diagnostic function. The IGC shall provide timed control of indoor-fan functioning and burner ignition. A light-emitting diode (LED) shall provide diagnostic information. The IGC board shall also contain anti-short cycle protection for gas heat operation.
6. All gas piping and electric power shall enter the unit cabinet at a single location.

G. Refrigerant Components:

Refrigerant components shall be of the Acutrol™ feed system type.

H. Controls:

Unit shall be complete with self-contained low-voltage control circuit.



I. Operating Characteristics:

1. Unit shall be capable of starting and running at 125 F ambient outdoor temperature per maximum load criteria of ARI Standard 210/240.
2. Compressor with standard controls shall be capable of operation in cooling down to 40 F ambient outdoor temperature.
3. Unit provided with fan time delay to prevent cold air delivery before heat exchanger warms up.
4. Unit provided with fan time-delay after the thermostat is satisfied.

J. Electrical Requirements:

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

K. 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.

L. Special Features:

1. Roof Curb:
Curb shall have seal strip and a wood nailer for flashing and shall be installed per manufacturer's instructions.
2. 25% Open Manual Outdoor-Air Damper:
Manual damper package shall consist of damper, birdscreen, and rainhood which can be preset to admit outdoor air for year-round ventilation.
3. Thermostat and Subbase:
To provide for one-stage heating and cooling in addition to manual or automatic changeover and fan control.
4. Electronic Programmable Thermostat:
Thermostat provides 2-stage heating and 2-stage cooling control with remote communication ability.
5. Natural-to-Propane Conversion Kit:
Kit shall be complete with burner orifice(s).

6. Low Ambient Package:

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

7. Compressor Short-Cycle Protection:

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

8. Lifting Bracket Kit:

Kit shall provide attachment points for rigging straps. (Not required with optional base rail or downflow option applications.)

9. High- and Low-Pressure Switch Kits:

Switches provide additional safety features and protect the unit from running at unsuitable pressures.

10. Filter Rack:

Rack provides mounting location for filters when unit is in downflow application.

11. Crankcase Heater:

Heater warms crankcase oil to reduce refrigerant migration (recommended on 208/230-v, single-phase units in sizes 024-042).

12. Base Rail:

Base rail provides holes for rigging and handling, and an elevated base for horizontal applications.

13. Downflow Option:

Option provides for vertical ductwork connections. Unit shall be equipped with base rail.

14. High Altitude Kit:

Kit shall have new burner orifices for use in applications from 2001 to 5000 feet.

15. Low NO_x Kit:

Kit shall provide low NO_x emissions for units being installed in California Air Quality Management Districts which require NO_x emissions of 40 nanograms/joule or less.

