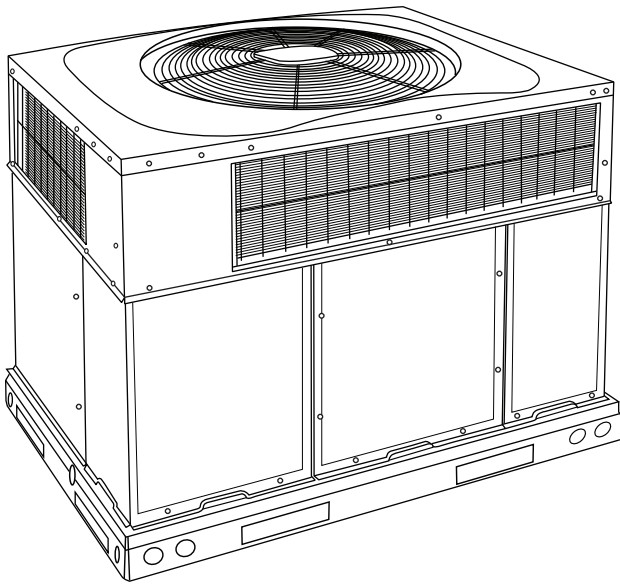


**50ES-A
Comfort™ 13 SEER
Single-Packaged Air Conditioner System with Puron®
(R-410A) Refrigerant Single and Three Phase
2 to 5 Nominal Tons (Sizes 24-60)**



Turn to the Experts.™

Product Data



A09034

Fig. 1 - Unit 50ES-A

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

- Up to 13.5 SEER
- Factory-Installed TXV
- Multi-Speed High Efficiency Brushless Blower-Standard
- Low Sound Levels

FEATURES/BENEFITS

One-piece cooling unit with optional electric heater, 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, electric cooling unit that is prewired, pre-piped, and pre-charged for minimum installation expense. These units are available in a variety of standard cooling sizes 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.

Innovative Unit Base Design

On the inside a high-tech composite material will not rust and incorporates a sloped drain pan which improves drainage and helps inhibit mold, algae and bacterial growth. On the outside metal base rails provide added stability as well as easier handling and rigging.

Convertible duct configuration

Unit is designed for use in either downflow or horizontal applications. Each unit is converted from horizontal to downflow and includes horizontal duct covers. Downflow operation is provided in the field to allow vertical ductwork connections. The basepan seals on the bottom openings to ensure a positive seal in the vertical airflow mode.

Efficient operation High-efficiency design offers SEER (Seasonal Energy Efficiency Ratios) of up to 13.5. (See page 4.)

Durable, dependable components

Scroll 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.

Direct-drive high efficiency brushless DC multi-speed blower motor is standard on all 50ES-A models.

Direct-drive PSC (Permanent Split Capacitor) condenser-fan motors are designed to help reduce energy consumption and provide for cooling operation down to 40°F (4.4°C) outdoor temperature. Motormaster® 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.

Low sound ratings ensure a quiet indoor and outdoor environment with sound ratings as low as 75dBA. (See Page 4.)

Easy to service cabinets provide easy 3-panel accessibility to serviceable components during maintenance and installation. The basepan with integrated drain pan provides easy ground level installation with a mounting pad. A nesting feature ensures a positive basepan to roof curb seal when the unit is roof mounted. A convenient 3/4-in. (19.1 mm) wide perimeter flange makes frame mounting on a rooftop easy.

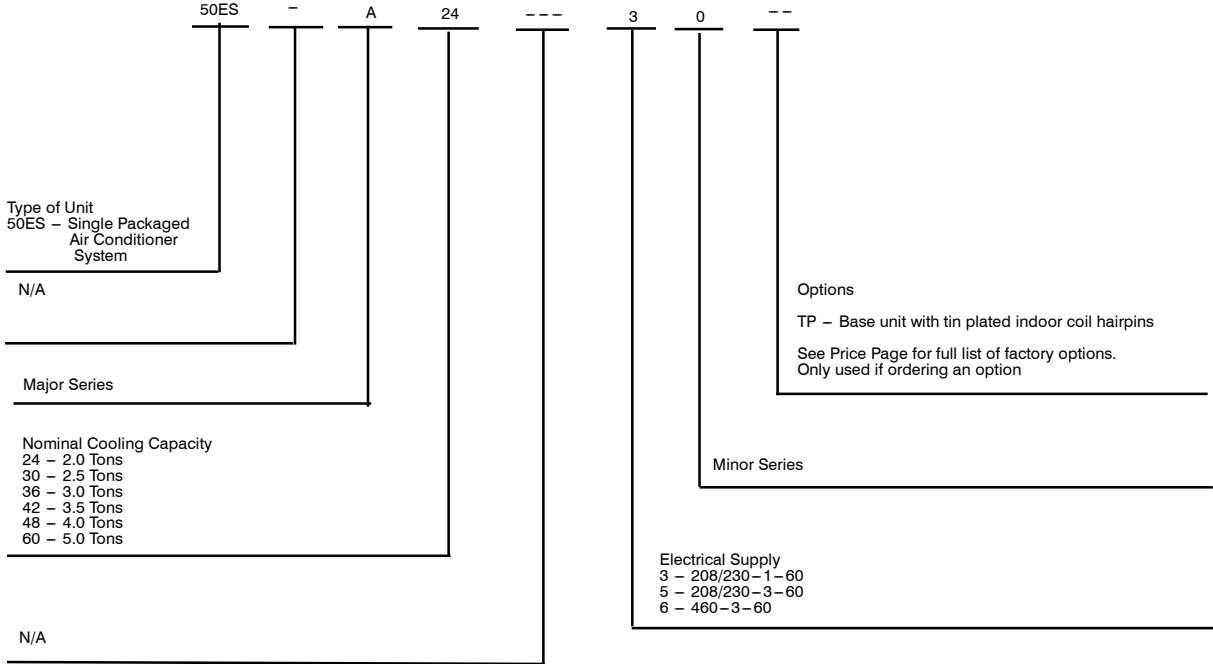
Standard horizontal metal duct covers with insulation come with the unit and cover the horizontal duct openings. These can be left in place if the units are converted to downflow.

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 No. 62P.) The sloped drain pan minimizes standing water in the drain. An external drain is provided.

TABLE OF CONTENTS

FEATURES/BENEFITS	1-2
MODEL NUMBER NOMENCLATURE	3
ARI CAPACITIES	4
PHYSICAL DATA	5
OPTIONS AND ACCESSORIES	6
BASE UNIT DIMENSIONS	8-9
ACCESSORY ROOF CURB	10
SELECTION PROCEDURE	11
PERFORMANCE DATA	12-19
TYPICAL PIPING AND WIRING	20
APPLICATION DATA	21
ELECTRICAL DATA	22-23
TYPICAL WIRING SCHEMATICS	24-26
CONTROLS	27
GUIDE SPECIFICATIONS	28-29

MODEL NUMBER NOMENCLATURE



50ES--A



ARI* CAPACITIES

Cooling Capacities and Efficiencies

UNIT 50ES-A	NOMINAL TONS	STANDARD CFM	NET COOLING CAPACITIES (Btuh)	EER**	SEER†
24	2	800	23,000	11.0	13.2
30	2-1/2	1000	28,400	11.2	13.5
36	3	1200	34,400	11.0	13.0
42	3-1/2	1400	40,500	11.2	13.2
48	4	1600	46,500	11.2	13.2
60	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—08.

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.

50ES--A

A-Weighted Sound Power Level (dBA)

UNIT 50ES-A	STANDARD RATING (dBA)	TYPICAL OCTAVE BAND SPECTRUM (dBA without tone adjustment)						
		125	250	500	1000	2000	4000	8000
24---30	76	66.0	66.0	70.5	71.5	67.5	62.5	58.5
30---30/50	75	66.0	63.5	68.0	68.5	67.5	61.5	55.0
36---30/50/60	75	64.0	63.5	68.0	70.5	64.5	61.0	61.0
42---30/50/60	77	67.0	67.0	69.5	70.5	68.0	65.5	61.0
48---30/50/60	78	71.5	66.5	73.0	71.5	68.0	64.0	57.0
60---30/50/60	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.

Physical Data-Unit 50ES-A

UNIT SIZE	24	30	36	42	48	60
NOMINAL CAPACITY (ton)	2	2-1/2	3	3-1/2	4	5
SHIPPING WEIGHT* lb.	279	284	290	378	384	406
SHIPPING WEIGHT* (kg)	127	129	132	171	174	184
COMPRESSORS	Scroll					
Quantity	1					
REFRIGERANT (R-410A)						
Quantity lb	4.8	6.2	6.4	6.1	6.4	10.0
Quantity (kg)	2.2	2.8	2.9	2.7	2.9	4.5
REFRIGERANT METERING DEVICE	TXV					
OUTDOOR COIL						
Rows...Fins/in.	1...21	1...21	1...21	1...21	1...21	2...21
Face Area (sq ft)	10.2	11.9	15.4	13.6	15.5	15.5
OUTDOOR FAN						
Nominal Cfm	2800	3000	3200	3600	4000	3200
Diameter in.	24	24	24	26	26	26
Diameter (mm)	610	610	610	660	660	660
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.	2...17	3...17	3...17	3...17	3...17	3...17
Face Area (sq ft)	3.7	3.7	3.7	4.7	4.7	5.7
INDOOR BLOWER						
Nominal Cooling Airflow (Cfm)	800	1000	1200	1400	1600	1750
Size in.	10x10	10x10	11x10	11x10	11x10	11x10
Size (mm.)	254x254	254x254	279.4x254	279.4x254	279.4x254	279.4x254
Motor HP (RPM)	1/2 (1050)	1/2 (1050)	3/4 (1000)	3/4 (1075)	1.0 (1075)	1.0 (1040)
HIGH-PRESSURE SWITCH (psig) Cut-out Reset (Auto)	650 +/- 15 420 +/- 25					
LOSS-OF-CHARGE / LOW-PRES-SURE SWITCH (Liquid Line) (psig) cut-out Reset (auto)	20 +/- 5 45 +/- 10					
RETURN-AIR FILTERS†‡						
Throwaway Size in.	20x20x1	20x24x1	24x30x1	24x36x1	24x36x1	24x36x1
Throwaway Size (mm)	508x508x25	508x610x25	610x762x25	610x914x25	610x914x25	610x914x25

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

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

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

50ES-A

ELECTRIC HEAT PRESSURE DROP TABLES (IN. W.C.)

Small Cabinet: 24-36

	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600
5kw	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.06	0.07
7.5 kw	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.05	0.07	0.08	0.09
10 kw	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.06	0.07	0.09	0.10	0.11
15 kw	0.00	0.00	0.00	0.02	0.04	0.06	0.08	0.10	0.12	0.14	0.16	0.18
20 kw	0.00	0.00	0.02	0.04	0.06	0.08	0.09	0.11	0.13	0.15	0.17	0.19

Large Cabinet: 42-60

	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500
5kw	0.00	0.00	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12
7.5 kw	0.00	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13
10 kw	0.00	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13
15 kw	0.00	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13	0.14	0.15
20 kw	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13	0.14	0.15	0.16

OPTIONS AND ACCESSORIES

ITEM	DESCRIPTION	FACTORY INSTALLED OPTION	FIELD INSTALLED ACCESSORY
Coil Options	Base unit with tin plated indoor coil hairpins	X	
Compressor Start Kit	Compressor Start Kit assists compressor start-up by providing additional starting torque on sing phase units only.		X
Corporate Thermostats	Thermostats provide control for the system heating and cooling functions.		X
Crankcase Heater	Crankcase Heater provides anti-floodback protection for low-load cooling applications.		X*
Economizer	Horizontal Economizer with solid state controls and barometric relief dampers includes filter racks and provide outdoor air during cooling and reduce compressor operation.		X
	Vertical Economizer with solid state controls and barometric relief dampers includes filter racks and provide outdoor air during cooling and reduce compressor operation.		X
Electric Heaters	Electric Heat Supplement		X
Filter Rack	Filter Rack features easy installation, serviceability, and high-filtering performance for vertical applications. Includes 1-in. filter.		X
Flat Roof Curbs	Flat Roof Curbs in both 11-in (279 mm) and 14-in. (356 mm) sizes are available for roof mounted applications.		X
Low Ambient Kit	Low Ambient Kit (Motormaster II Control) allows the use of mechanical cooling down to outdoor temperatures as low as 0°F (-18°C) when properly installed.		X
Louver Metal Outdoor Coil Grilles	Louver Metal Outdoor Coil Grilles provides hail and vandalism protection.		X
Manual Outside Air Damper	Manual Outside Air Damper includes hood and filter rack with adjustable damper blade for up to 25% outdoor air.		X
Square-to-Round Duct Transition Kit	Square-to-Round Duct Transition Kit enable 24-48 size units to be fitted to 14 in. (356 mm) round ductwork.		X
Time Guard II	Automatically prevents the compressor from restarting for at least 4 minutes and 45 seconds after shutdown of the compressor. Not required when a corporate programmable thermostat is applied or with a RTU-MP control.		X

*Refer to Price Page for application detail.

Electric Heaters

CATALOG ORDERING NO.	NOMINAL CAPACITY (kW)	FUSE QTY	USED WITH SIZES					
			24	30	36	42	48	60
ELECTRIC HEATERS (208/230 — SINGLE PHASE — 60 Hz)								
CPHEATER052A00	5.0	—	X	X	X	X	X	X
CPHEATER064A00	5.0	4	X	X	X	X	X	X
CPHEATER069A00	7.2	—	X	X	X	X	X	X
CPHEATER070A00	7.2	4	X	X	X	X	X	X
CPHEATER065A00	10.0	—	X	X	X	X		
CPHEATER050A00	10.0	4	X	X	X	X	X	X
CPHEATER051A00	15.0	4		X	X	X		
CPHEATER066A00	15.0	6		X	X	X	X	X
CPHEATER053A00	20.0	4				X	X	X
CPHEATER05A00	20.0	6				X	X	X
ELECTRIC HEATERS (208/230 — THREE PHASE — 60 Hz)								
CPHEATER055A00	5.0	—		X	X	X	X	X
CPHEATER056A00	10.0	—		X	X	X	X	X
CPHEATER068A00	10.0	6		X	X	X	X	X
CPHEATER057A00	15.0	—		X	X	X	X	X
CPHEATER058A00	15.0	6		X	X	X	X	X
CPHEATER059A01	20.0	6				X	X	X
ELECTRIC HEATERS (460 — THREE PHASE — 60 Hz)								
CPHEATER060A00	5.0	—			X	X	X	X
CPHEATER061A00	10.0	—			X	X	X	X
CPHEATER062A00	15.0	—			X	X	X	X
CPHEATER063A00	20.0	—				X	X	X

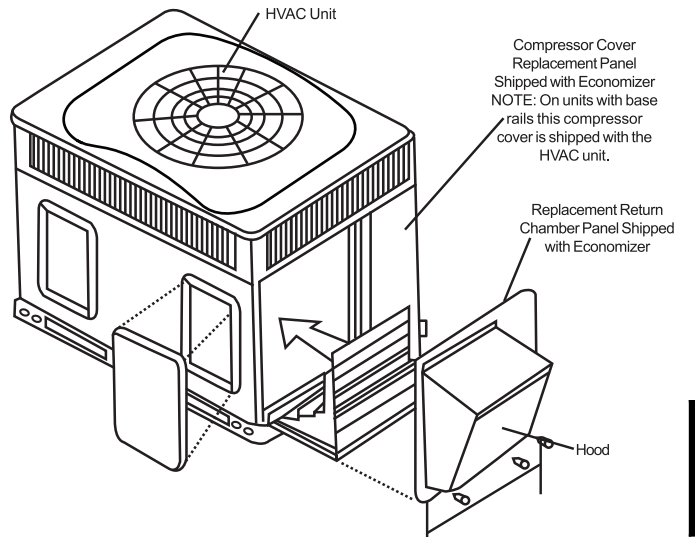
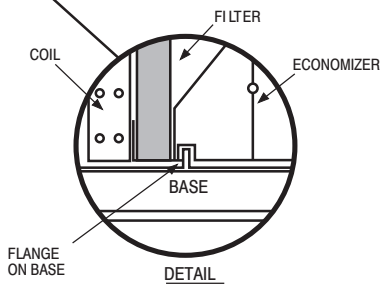
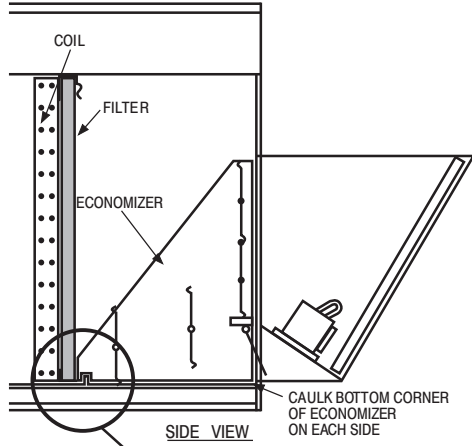
NOTE: Electric heaters are rated at 240v. Refer to Multiplication Factors table for other voltages.

X = Approved combinations.

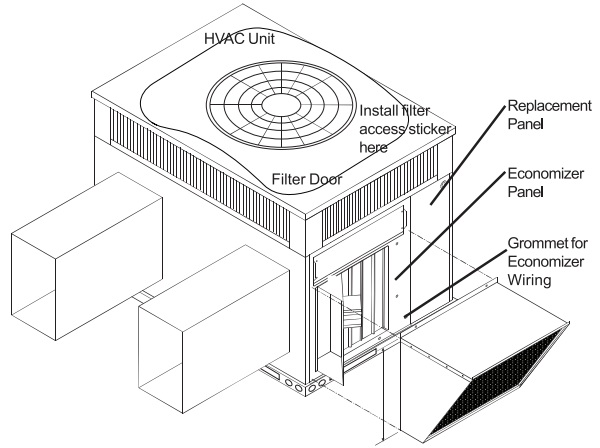
Minimum Airflow for Safe Electric Heater Operation (CFM)

SIZE	24	30	36	42	48	60
Cfm	800	1000	1200	1400	1600	1750

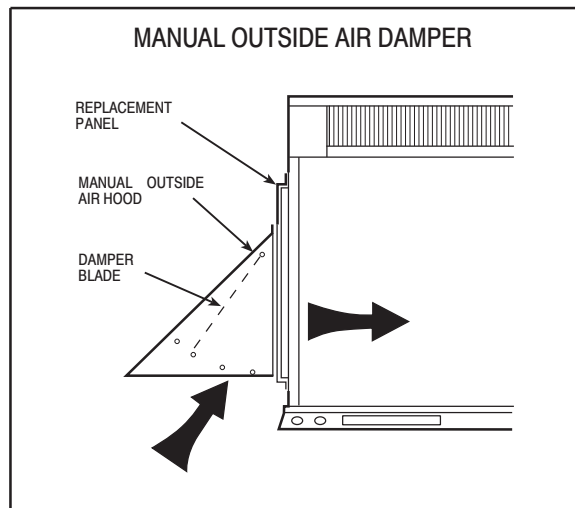
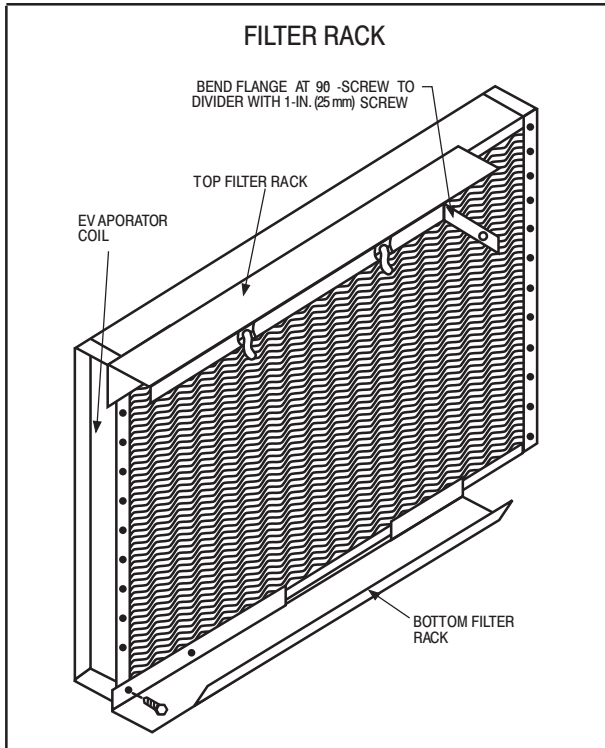
ECONOMIZER



Vertical Economizer



Horizontal Economizer



50ES--A

UNIT DIMENSIONS - 50ES-A24-36

UNIT	ELECTRICAL CHARACTERISTICS	UNIT WT.		CENTER OF GRAVITY IN/MM							
		LB	KG	"A"	X	Y	Z				
A24	208/230-1-60	272	123.3	40	1016.0	20-1/2	520.7	15-3/4	400.1	16-1/2	419.1
A30	208/230-1, 208/230-3-60	277	125.5	42	1066.8	20-1/2	520.7	15-3/4	400.1	16-13/16	427.0
A36	208/230-1, 208/230-3-60	283	128.3	46	1168.4	20-1/2	520.7	15-3/4	400.1	17	431.8
	460-3-60	297	134.6	46	1168.4	20-1/2	520.7	15-3/4	400.1	17	431.8

UNITS VOLTAGE	CORNER WEIGHT LB/KG			REQUIRED CLEARANCES TO COMBUSTIBLE MATL.					
	"1"	"2"	"3"	INCHES (MM)	INCHES (MM)				
A24	208/230	54.4	24.7	43.5	19.7	65.2	29.6	108.7	49.3
A30	208/230	55.4	25.1	44.3	20.1	66.4	30.2	110.7	50.3
A36	208/230	56.6	25.7	45.2	20.5	67.9	30.8	113.1	51.3
	460	56.6	25.7	45.2	20.5	67.9	34.9	118.1	53.6

REQUIRED CLEARANCES TO COMBUSTIBLE MATL.

TOP OF UNIT..... 2 (50.8)
 DUCT SIDE OF UNIT..... 2 (50.8)
 SIDE OPPOSITE DUCTS..... 14 (355.6)
 BOTTOM OF UNIT..... 0 (0.0)
 ELECTRICAL PANEL..... 36 (914.4)

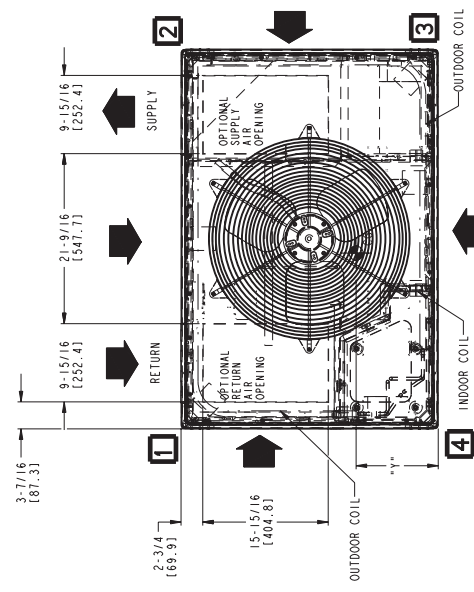
NEC REQUIRED CLEARANCES:

BETWEEN UNITS, POWER ENTRY SIDE..... 42 (1066.8)
 UNIT AND UNGROUNDED SURFACES, POWER ENTRY SIDE..... 36 (914.0)
 UNIT AND BLOCK OR CONCRETE WALLS AND OTHER GROUNDED SURFACES, POWER ENTRY SIDE..... 42 (1066.8)

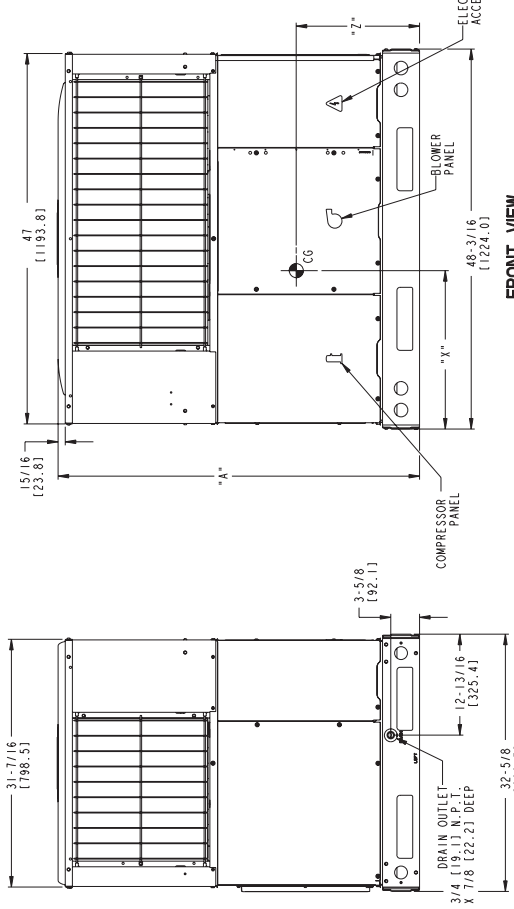
REQUIRED CLEARANCE FOR OPERATION AND SERVICING

EVAP. COIL ACCESS SIDE..... 36 (914.0)
 POWER ENTRY SIDE..... 42 (1066.8)
 (APPLICABLE FOR NEC REQUIREMENTS)
 UNIT TOP (FOR NEC REQUIREMENTS)..... 48 (1219.2)
 SIDE OPPOSITE DUCTS..... 36 (914.0)
 DUCT PANEL..... 12 (304.8)*

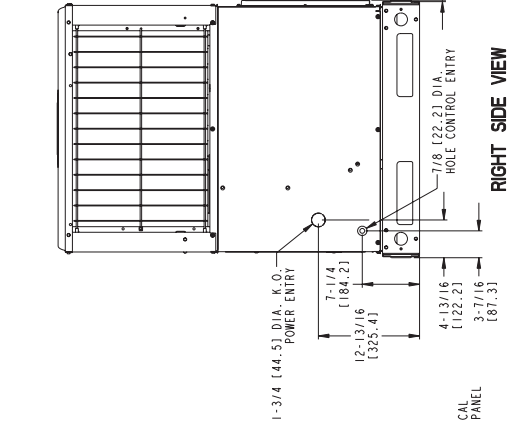
*MINIMUM DISTANCES IF UNIT IS PLACED LESS THAN 12 (304.8) FROM WALL SYSTEM, THEN SYSTEM PERFORMANCE MAY BE COMPROMISED.



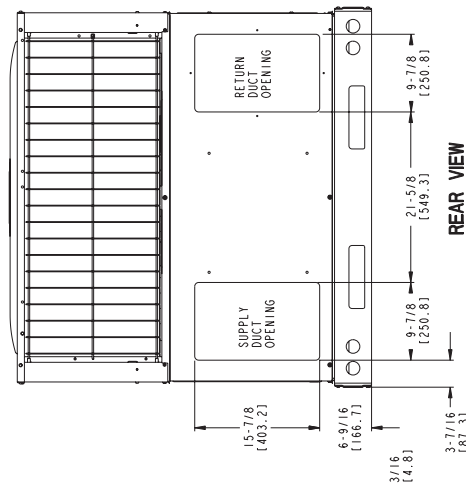
TOP VIEW



FRONT VIEW



RIGHT SIDE VIEW



REAR VIEW

REV 2.0
50ES500151

DIMENSIONS IN () ARE IN MILLIMETERS

UNIT DIMENSIONS - 50ES-A42-60

UNIT	ELECTRICAL CHARACTERISTICS	UNIT WT.		CENTER OF GRAVITY IN/MM			
		LB	KG	"A"	"X"	"Y"	"Z"
A42	208/230-1, 208/230-3-60	389	167.5	39-15/16 [1014.4]	20-1/4 [514.4]	17-1/2 [444.5]	17-1/8 [435.0]
A48	208/230-1, 208/230-3-60	383	173.8	39-15/16 [1014.4]	20-1/4 [514.4]	17-1/2 [444.5]	17-1/8 [435.0]
A60	208/230-1, 208/230-3-60	397	180.2	41-15/16 [1065.2]	20-1/4 [514.4]	17-1/2 [444.5]	17-5/8 [447.7]

UNITS	VOLTAGE	CORNER WEIGHT LB/KG		INCHES (MM)					
		"2"	"4"						
A42	208/230	13.8	33.5	59.1	26.8	88.6	40.2	147.7	67.1
A48	208/230	15.0	34.1	60.0	27.3	90.1	40.9	150.1	68.3
A60	208/230	19.4	36.1	63.6	28.9	104.3	43.3	158.9	74.4

REQUIRED CLEARANCES TO COMBUSTIBLE MATL.

TOP OF UNIT..... 2 [50.8]
 DUCT SIDE OF UNIT..... 14 [355.6]
 SIDE OPPOSITE DUCTS..... 0 [0.0]
 BOTTOM OF UNIT..... 0 [0.0]
 ELECTRICAL PANEL..... 36 [914.4]

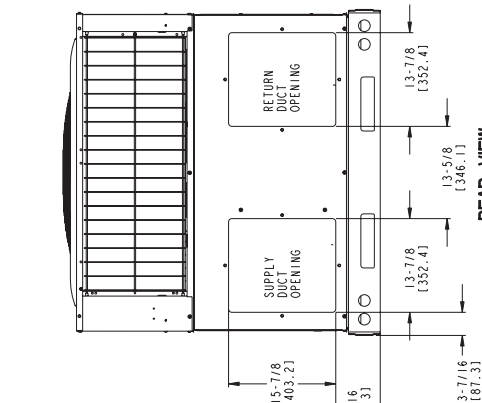
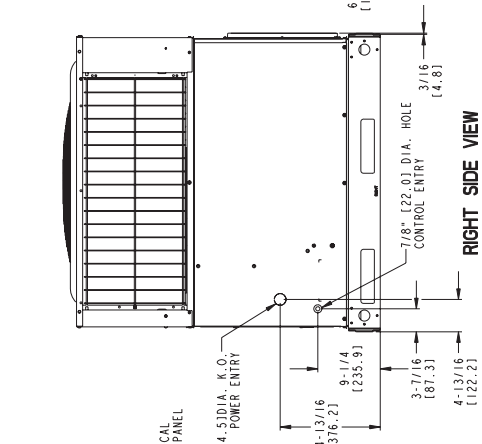
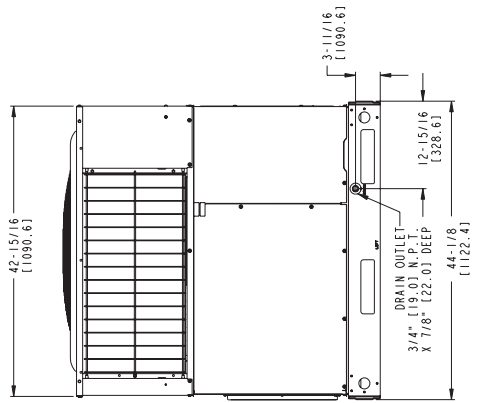
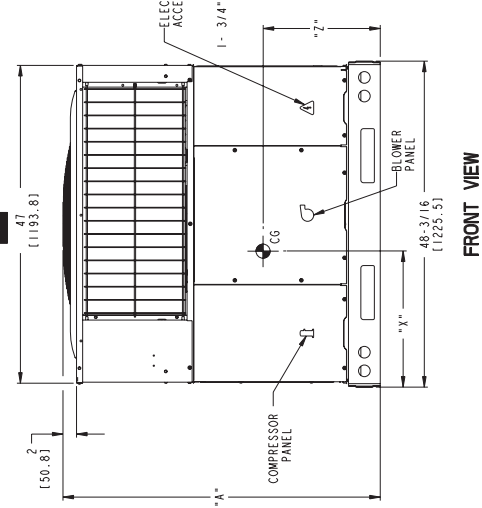
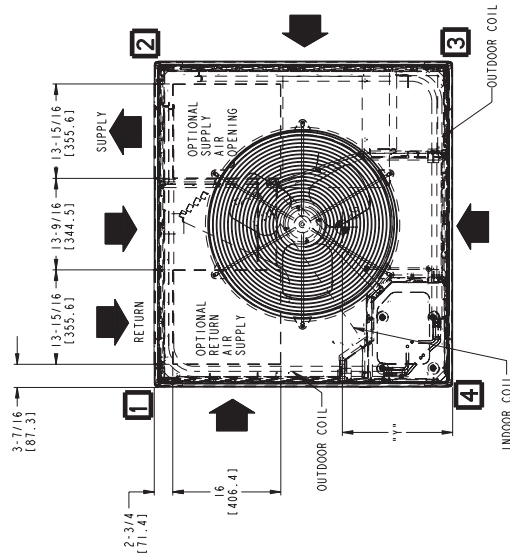
NEC - REQUIRED CLEARANCES:

BETWEEN UNITS, POWER ENTRY SIDE..... 42 [1066.8]
 UNIT AND UNGROUND SURFACES, POWER ENTRY SIDE..... 36 [914.0]
 UNIT AND BLOCK OR CONCRETE WALLS AND OTHER GROUND SURFACES, POWER ENTRY SIDE..... 42 [1066.8]

REQUIRED CLEARANCE FOR OPERATION AND SERVICING

EVAP. COIL ACCESS SIDE..... 36 [914.0]
 POWER ENTRY SIDE..... 42 [1066.8]
 UNIT TOP OR NEC REQUIREMENTS..... 48 [1219.2]
 UNIT TOP OR NEC REQUIREMENTS..... 36 [914.0]
 SIDE OPPOSITE DUCTS..... 36 [914.0]
 DUCT PANEL..... 12 [304.8]

*MINIMUM DISTANCES: IF UNIT IS PLACED LESS THAN 1/2 [304.8] FROM WALL SYSTEM, THEN SYSTEM PERFORMANCE MAY BE COMPROMISED.

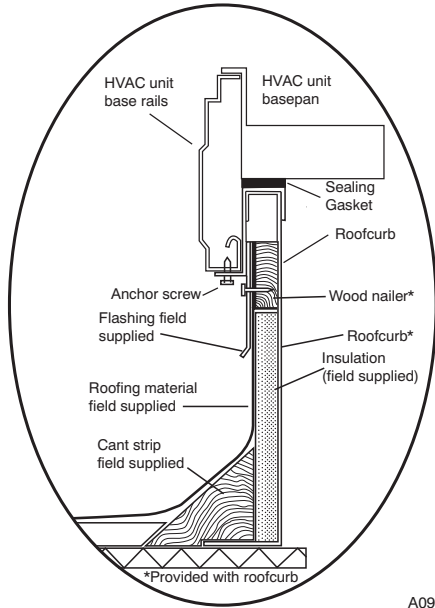


50ES500152
 REV 2.0

50ES--A

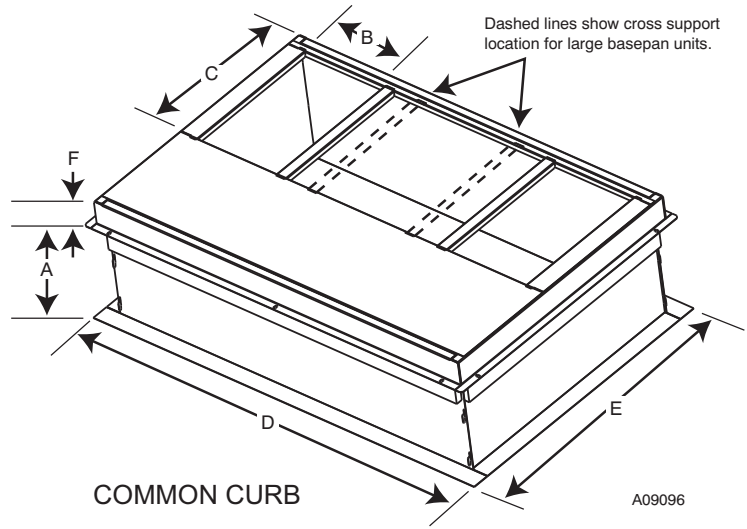
ACCESSORY ROOF CURB - 50ES-A24-60

50ES--A



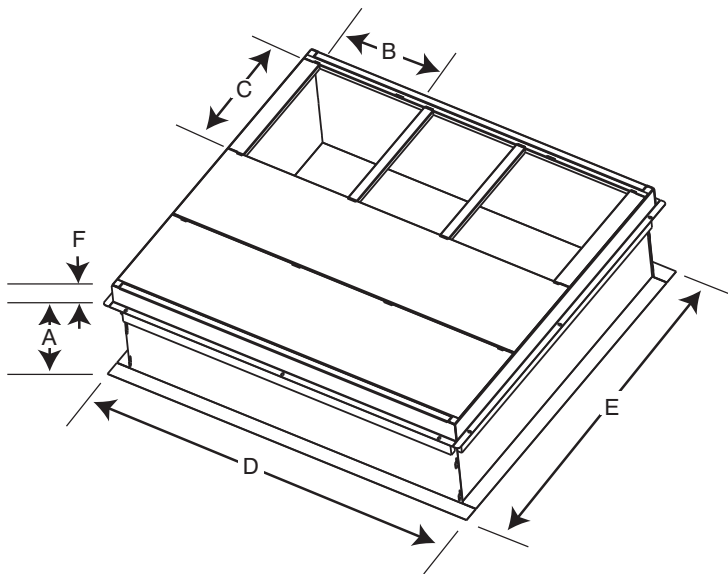
A09090

ROOF CURB DETAIL



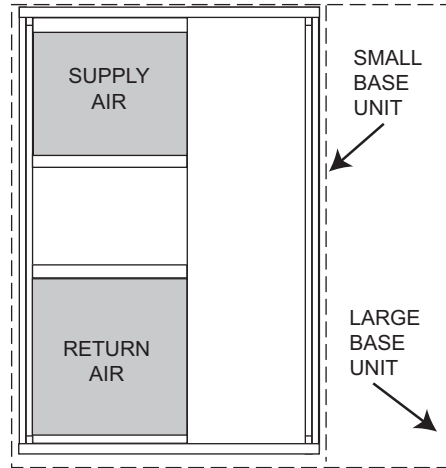
A09096

COMMON CURB



A09095

LARGE CURB



A09094

UNIT PLACEMENT ON COMMON CURB

SMALL OR LARGE BASE UNIT

A09097

UNIT SIZE	CATALOG NUMBER	A IN. (mm)	B (small base) IN. (mm)*	B (large base) IN. (mm)*	C IN. (mm)	D IN. (mm)	E IN. (mm)	F IN. (mm)
Small or Large	CPRFCURB010A00	11 (279)	10 (254)	14 (356)	16 (406)	47.8 (1214)	32.4 (822)	2.7 (69)
	CPRFCURB011A00	14 (356)						
Large	CPRFCURB012A00	11 (279)	14 (356)				43.9 (1116)	
	CPRFCURB013A00	14 (356)						

* Part Numbers CPRFCURB010A00 and CPRFCURB011A00 can be used on both small and large basepan units. The cross supports must be located based on whether the unit is a small basepan or a large basepan.

NOTES:

1. Roof curb must be set up for unit being installed.
2. Seal strip must be applied, as required, to unit being installed.
3. 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.

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 30,000 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 0.30 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), indoor air entering at 1200 cfm and 67°F (19°C) ewb (entering wet bulb). The unit will provide a total capacity of 34,400 Btuh and a SHC of 25,900 Btuh.

3. Select electric heat.

The required heating capacity is 30,000 Btuh.

Determine additional electric heat capacity in kW.

30,000 Btuh = 8.8kW of heat required
3,414 Btuh/kW

Enter the electric Heater Packages table for 208/240, single-phase, 50ES-A36 unit. The 10 kW heater at 240v most closely satisfies the heating required. To calculate kW at the 230v, multiply the heater kW by multiplication factor 0.92 found in the Wattage Multiplication Factors table.

10 kW x 0.92 = 9.2 kW

9.2 kW x 3414 = 31,409 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	0.30 IN. W.C.
Filter	0.14 IN. W.C.
Wet Coil Pressure Drop	<u>0.10 IN. W.C.</u>
Total Static Pressure	0.54 IN. W.C.

Enter the table for Wet Coil Air Delivery—horizontal discharge, 230. At 0.60 IN. W.C. ESP (external static pressure) and medium-high speed, the fan will deliver 1316 cfm.

5. Select unit that corresponds to power source available.

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

PERFORMANCE DATA

50ES-A24

EVAPORATOR AIR CFM/BF	EWB °F (°C)	CONDENSER ENTERING AIR TEMPERATURES °F (°C)												Total Sys KW	Capacity MBTuh	Total Sys KW	Capacity MBTuh	Total Sys KW						
		75 (23.9)			85 (29.4)			95 (35)			105 (40.6)								115 (46.1)			125 (51.7)		
		Capacity MBTuh	Sens	Total Sys kW	Capacity MBTuh	Sens	Total Sys KW	Capacity MBTuh	Sens	Total Sys KW	Capacity MBTuh	Sens	Total Sys KW						Capacity MBTuh	Sens	Total Sys KW			
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	19.57	19.57	1.86	20.42	18.59	2.07	17.59	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	16.12	16.12	1.86	20.88	15.23	2.07	14.35	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	16.65	16.65	1.86	22.49	15.76	2.07	14.86	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	13.70	13.70	1.87	24.76	12.88	2.08	12.07	12.07	2.31	20.56	11.25	2.56	18.45	10.43	2.83					
	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	20.99	20.99	1.87	20.94	19.93	2.08	18.83	18.83	2.31	17.46	17.46	2.56	15.85	15.85	2.82					
800/0.09	63* (17.2)	25.10	18.06	1.68	17.14	17.14	1.88	21.36	16.21	2.09	15.29	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	17.73	17.73	1.88	23.00	16.80	2.09	15.87	15.87	2.32	19.01	14.94	2.57	17.00	14.00	2.83					
	72 (22.2)	29.85	15.23	1.69	14.39	14.39	1.89	25.30	13.54	2.10	12.71	12.71	2.33	20.96	11.86	2.58	18.77	11.01	2.84					
	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	22.27	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)	25.80	19.06	1.70	18.11	18.11	1.89	21.74	17.15	2.10	16.20	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	18.76	18.76	1.90	23.40	17.80	2.11	16.83	16.83	2.34	19.29	15.87	2.59	17.23	14.89	2.85					
900/0.1	72 (22.2)	30.21	15.91	1.71	15.04	15.04	1.90	25.72	14.18	2.11	13.31	13.31	2.35	21.26	12.45	2.60	19.02	11.58	2.86					

See Legend and Notes on Page 18.

PERFORMANCE DATA

50ES-A30

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)		
		CFM/BF	EWB °F (°C)	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		
875/0.03	57 (13.8)	29.20	27.20	2.09	27.20	2.30	25.19	25.19	2.52	23.18	23.18	21.16	21.16	19.13	19.13	3.32			
	62 (16.6)	30.09	27.78	2.09	25.28	2.30	25.48	24.10	2.52	23.22	23.22	21.16	21.16	19.12	19.12	3.32			
	63* (17.2)	30.75	28.36	2.09	20.61	2.30	25.99	19.56	2.52	23.63	23.63	21.26	21.26	18.90	18.90	3.32			
	67 (19.4)	33.12	30.58	2.08	21.34	2.29	28.05	20.29	2.52	25.52	25.52	23.00	23.00	20.48	20.48	3.32			
	72 (22.2)	36.50	33.73	2.08	17.33	2.29	30.97	16.37	2.52	28.22	28.22	25.48	25.48	22.73	22.73	3.32			
	57 (13.8)	30.51	28.39	2.12	28.39	2.33	26.27	26.27	2.56	24.14	24.14	22.01	22.01	19.87	19.87	3.35			
	62 (16.6)	30.85	28.49	2.12	28.24	2.33	26.26	26.26	2.56	24.14	24.14	22.01	22.01	19.86	19.86	3.35			
1000/0.03	63* (17.2)	31.44	28.97	2.12	22.02	2.33	26.51	20.93	2.56	24.07	24.07	21.63	21.63	19.21	19.21	3.35			
	67 (19.4)	33.86	31.22	2.12	22.85	2.33	28.60	21.75	2.55	25.99	25.99	23.40	23.40	20.80	20.80	3.35			
	72 (22.2)	37.30	34.43	2.11	18.29	2.32	31.58	17.30	2.55	28.74	28.74	25.91	25.91	23.07	23.07	3.35			
	57 (13.8)	31.61	29.39	2.15	29.39	2.36	27.17	27.17	2.59	24.95	24.95	22.72	22.72	20.48	20.48	3.39			
	62 (16.6)	31.61	29.39	2.15	29.39	2.36	27.17	27.17	2.59	24.95	24.95	22.72	22.72	20.48	20.48	3.39			
	63* (17.2)	31.97	29.43	2.15	23.38	2.36	26.91	22.25	2.59	24.41	24.41	21.92	21.92	19.45	19.45	3.39			
	67 (19.4)	34.42	31.71	2.15	24.30	2.36	29.02	23.16	2.59	26.35	26.35	23.69	23.69	21.05	21.05	3.39			
1125/0.04	72 (22.2)	37.91	34.96	2.14	19.20	2.35	32.03	18.19	2.58	29.12	29.12	26.22	26.22	23.32	23.32	3.39			

See Legend and Notes on Page 18.

PERFORMANCE DATA (CONT)

50ES-A36

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	Sens	Total Sys KW	Capacity MBtuh	Sens	Total Sys KW	Capacity MBtuh	Sens	Total Sys KW	Capacity MBtuh	Sens	Total Sys KW	Capacity MBtuh	Sens	Total Sys KW	Capacity MBtuh	Sens	Total Sys KW
1050/0.04	EWB °F (°C)	35.66	32.84	30.06	27.32	24.62	3.07	3.06	3.07	27.32	24.62	21.93	3.47	3.47	3.47	24.62	21.93	18.77	3.91
	57 (13.8)	35.66	32.84	30.06	27.32	24.62	3.07	3.06	3.07	27.32	24.62	21.93	3.47	3.47	3.47	24.62	21.93	18.77	3.91
	62 (16.6)	37.06	33.82	30.65	27.56	24.62	3.07	30.65	28.68	26.88	24.62	21.93	3.47	3.47	3.47	24.62	21.93	18.77	3.91
	63* (17.2)	37.87	34.55	31.28	28.09	24.95	3.08	31.28	23.37	21.82	20.29	18.77	3.48	3.48	3.48	24.95	21.88	18.77	3.91
	67 (19.4)	40.79	37.23	33.74	30.32	26.96	3.08	33.74	24.21	22.64	21.09	19.54	3.48	3.48	3.48	26.96	23.65	19.54	3.92
	72 (22.2)	44.91	41.02	37.19	33.45	29.78	3.09	37.19	19.62	18.21	16.82	15.44	3.49	3.49	3.49	29.78	26.16	15.44	3.93
1200/0.04	EWB °F (°C)	37.24	34.27	31.33	28.44	25.58	3.12	31.33	28.44	25.58	22.76	22.76	3.52	3.52	3.52	25.58	22.76	22.76	3.96
	57 (13.8)	37.24	34.27	31.33	28.44	25.58	3.12	31.33	28.44	25.58	22.76	22.76	3.52	3.52	3.52	25.58	22.76	22.76	3.96
	62 (16.6)	37.97	34.64	31.35	28.43	25.58	3.12	31.35	28.43	25.58	22.75	22.75	3.52	3.52	3.52	25.58	22.75	22.75	3.96
	63* (17.2)	38.73	35.29	31.91	28.60	25.37	3.12	31.91	24.95	23.33	21.73	20.12	3.52	3.52	3.52	25.37	22.21	20.12	3.96
	67 (19.4)	41.71	38.02	34.40	30.86	27.40	3.13	34.40	25.90	24.26	22.63	21.00	3.53	3.53	3.53	27.40	24.00	21.00	3.97
	72 (22.2)	45.90	41.86	37.91	34.05	30.26	3.13	37.91	20.68	19.23	17.79	16.36	3.54	3.54	3.54	30.26	26.53	16.36	3.98
1350/0.05	EWB °F (°C)	38.59	35.47	32.40	29.37	26.38	3.17	32.40	29.37	26.38	23.43	23.43	3.57	3.57	3.57	26.38	23.43	23.43	4.01
	57 (13.8)	38.59	35.47	32.40	29.37	26.38	3.17	32.40	29.37	26.38	23.43	23.43	3.57	3.57	3.57	26.38	23.43	23.43	4.01
	62 (16.6)	38.77	35.46	32.39	29.37	26.38	3.17	32.39	29.37	26.38	23.43	23.43	3.57	3.57	3.57	26.38	23.43	23.43	4.01
	63* (17.2)	39.40	35.85	32.88	28.99	25.69	3.17	32.88	26.47	24.78	23.09	21.40	3.57	3.57	3.57	25.69	22.46	21.40	4.01
	67 (19.4)	42.41	38.61	34.89	31.27	27.52	3.18	34.89	27.52	25.81	24.10	22.39	3.58	3.58	3.58	27.52	24.26	22.39	4.02
	72 (22.2)	46.65	42.51	38.45	34.49	20.20	3.18	38.45	21.70	20.20	18.72	17.24	3.58	3.58	3.58	30.61	26.80	17.24	4.03

See Legend and Notes on Page 18.

PERFORMANCE DATA (CONT)

50ES-A42

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)		
		CFM/BF	EWB °F (°C)	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		
1225/0.03	57 (13.8)	40.45	37.98	3.00	35.49	3.78	32.98	4.20	30.44	4.65	27.84	5.10	25.15	4.52	23.46	4.99			
	62 (16.6)	42.06	35.73	2.94	36.25	3.74	33.37	4.18	30.48	4.64	27.88	5.10	25.15	4.52	23.46	4.99			
	63* (17.2)	42.83	29.27	2.91	36.96	3.72	33.97	4.17	30.95	4.63	27.90	5.10	25.15	4.52	23.46	4.99			
	67 (19.4)	46.12	30.23	2.80	39.72	3.61	36.53	4.05	33.31	4.52	30.04	5.10	25.15	4.52	23.46	4.99			
	72 (22.2)	50.58	24.61	2.65	43.59	3.46	40.11	3.90	36.60	4.37	33.04	5.10	25.15	4.52	23.46	4.99			
	57 (13.8)	42.24	39.61	2.98	36.97	3.76	34.32	4.18	31.63	4.63	28.88	5.10	25.15	4.52	23.46	4.99			
	62 (16.6)	43.11	40.44	2.95	37.15	3.75	34.31	4.18	31.62	4.63	28.88	5.10	25.15	4.52	23.46	4.99			
1400/0.04	63* (17.2)	43.91	32.97	2.92	37.71	3.73	34.61	4.18	31.49	4.64	28.35	5.12	25.96	4.53	25.20	5.00			
	67 (19.4)	47.15	34.07	2.81	40.50	3.62	37.19	4.06	33.86	4.53	30.50	5.12	25.96	4.53	25.20	5.00			
	72 (22.2)	51.67	27.51	2.65	44.42	3.46	40.81	3.91	37.19	4.38	33.51	5.12	25.96	4.53	25.20	5.00			
	57 (13.8)	43.75	43.75	2.97	38.22	3.75	35.43	4.17	32.62	4.62	29.74	5.07	32.62	4.62	29.74	5.07			
	62 (16.6)	44.02	42.95	2.96	38.21	3.75	35.43	4.17	32.61	4.62	29.74	5.07	32.61	4.62	29.74	5.07			
	63* (17.2)	44.67	34.90	2.94	38.28	3.75	35.10	4.20	31.91	4.66	28.70	5.14	32.61	4.62	29.74	5.07			
	67 (19.4)	47.93	36.13	2.82	41.09	3.63	37.69	4.08	34.28	4.54	30.85	5.14	32.61	4.62	29.74	5.07			
1575/0.05	72 (22.2)	52.51	28.80	2.67	45.05	3.48	41.34	3.93	37.63	4.39	33.86	5.14	22.28	4.39	20.67	4.87			
	See Legend and Notes on Page 18.																		

PERFORMANCE DATA (CONT)

50ES-A48

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)		
		CFMBF	EWB °F (°C)	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		
1400/0.04	57 (13.8)	46.51	43.60	3.29	3.68	40.66	4.11	37.70	4.56	34.70	5.05	31.64	5.55	31.64	5.55	31.64	5.55		
	62 (16.6)	48.43	40.09	3.29	3.68	41.60	4.10	38.19	4.56	34.81	5.05	31.64	5.55	31.64	5.55	31.64	5.55		
	63* (17.2)	49.45	32.87	3.29	3.68	42.43	4.10	38.89	4.56	35.34	5.05	31.75	5.55	31.75	5.55	31.75	5.55		
	67 (19.4)	53.14	33.95	3.29	3.68	45.62	4.10	41.85	4.55	38.05	5.04	34.20	5.55	34.20	5.55	34.20	5.55		
	72 (22.2)	58.33	27.68	3.28	3.67	50.11	4.09	46.00	4.55	41.85	5.03	37.64	5.54	37.64	5.54	37.64	5.54		
	57 (13.8)	48.55	45.46	3.35	3.74	42.35	4.16	39.21	4.61	36.04	5.10	32.81	5.60	32.81	5.60	32.81	5.60		
	62 (16.6)	49.82	44.99	3.35	3.74	42.60	4.16	39.21	4.61	36.04	5.10	32.80	5.60	32.80	5.60	32.80	5.60		
1600/0.05	63* (17.2)	50.57	35.02	3.35	3.74	43.27	4.16	39.61	4.61	35.94	5.10	32.24	5.60	32.24	5.60	32.24	5.60		
	67 (19.4)	54.31	36.23	3.34	3.73	46.50	4.15	42.59	4.61	38.66	5.09	34.70	5.60	34.70	5.60	34.70	5.60		
	72 (22.2)	59.58	29.12	3.34	3.73	51.05	4.15	46.80	4.60	42.51	5.08	38.17	5.59	38.17	5.59	38.17	5.59		
	57 (13.8)	50.26	47.02	3.40	3.79	43.76	4.21	40.47	4.66	37.15	5.15	33.76	5.65	33.76	5.65	33.76	5.65		
	62 (16.6)	50.84	47.06	3.40	3.79	43.75	4.21	40.46	4.66	37.14	5.15	33.76	5.65	33.76	5.65	33.76	5.65		
	63* (17.2)	51.44	37.10	3.40	3.79	43.92	4.21	40.16	4.67	36.40	5.15	32.82	5.66	32.82	5.66	32.82	5.66		
	67 (19.4)	55.22	38.45	3.40	3.79	47.17	4.21	43.16	4.66	39.13	5.14	35.08	5.65	35.08	5.65	35.08	5.65		
1800/0.06	72 (22.2)	60.54	30.51	3.40	3.78	51.77	4.20	47.40	4.65	43.00	5.13	38.55	5.64	38.55	5.64	38.55	5.64		
	See Legend and Notes on Page 18.																		

PERFORMANCE DATA (CONT)

50ES-A60

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	Sens	Capacity MBtuh	Total Sys KW	Sens	Capacity MBtuh	Total Sys KW	Sens	Capacity MBtuh	Total Sys KW	Sens	Capacity MBtuh	Total Sys KW	Sens	Capacity MBtuh	Total Sys KW	Sens										
1750/0.02	EWB °F (°C)	57 (13.8)	57.89	4.22	54.53	4.64	51.13	5.08	47.68	5.56	44.15	6.06	40.50	6.59	36.74	5.57	34.78	6.06	32.78	6.58	29.75	5.84	33.68	5.84	31.73	6.32	29.75	6.82	
	62 (16.6)	59.66	4.24	49.84	4.65	47.68	5.09	47.84	5.56	44.15	6.06	40.49	6.59	36.74	5.57	34.78	6.06	32.78	6.58	29.75	5.84	33.68	5.84	31.73	6.32	29.75	6.82		
	63* (17.2)	60.79	4.25	40.64	4.66	38.69	5.10	48.53	5.57	44.37	6.06	40.12	6.58	36.74	5.57	34.78	6.06	32.78	6.58	29.75	5.84	33.68	5.84	31.73	6.32	29.75	6.82		
	67 (19.4)	65.28	4.28	60.89	4.70	41.97	4.70	56.50	5.14	52.08	5.61	47.59	6.10	43.00	6.62	38.03	5.61	36.03	6.10	34.00	6.62	31.00	6.62	28.00	6.62	26.57	6.66	24.00	6.66
	72 (22.2)	71.52	4.34	66.71	4.75	33.95	4.75	61.88	5.19	57.02	5.66	52.07	6.15	47.01	6.66	45.74	5.66	45.74	6.15	41.85	6.66	39.00	6.66	36.00	6.66	33.00	6.66	30.00	6.66
	62 (16.6)	60.39	4.33	56.80	4.74	60.39	4.74	53.18	5.18	49.50	5.66	45.74	6.16	41.85	6.66	45.74	5.66	45.74	6.16	41.85	6.66	39.00	6.66	36.00	6.66	33.00	6.66	30.00	6.66
	63* (17.2)	61.11	4.33	55.94	4.74	53.59	4.74	53.18	5.18	49.50	5.66	45.74	6.16	41.85	6.66	45.74	5.66	45.74	6.16	41.85	6.66	39.00	6.66	36.00	6.66	33.00	6.66	30.00	6.66
2000/0.02	EWB °F (°C)	57 (13.8)	62.07	4.34	57.83	4.75	53.59	5.19	49.33	5.66	45.03	6.15	40.84	6.67	45.41	5.19	41.36	5.66	37.28	6.15	35.18	6.67	31.18	6.67	28.18	6.70	25.18	6.70	
	62 (16.6)	66.80	4.38	46.95	4.79	42.84	5.23	52.89	40.78	5.69	48.25	6.19	43.52	6.70	46.95	4.38	42.84	5.23	38.70	6.19	36.58	6.70	34.58	6.70	32.58	6.70	30.58	6.70	
	67 (19.4)	72.91	37.66	4.43	67.90	4.85	62.90	5.28	57.85	5.75	52.74	6.24	47.52	6.74	67.90	4.43	33.90	5.28	30.11	6.24	28.18	6.74	26.18	6.74	24.18	6.74	22.18	6.74	
	72 (22.2)	72.91	37.66	4.43	67.90	4.85	62.90	5.28	57.85	5.75	52.74	6.24	47.52	6.74	72.91	4.43	33.90	5.28	30.11	6.24	28.18	6.74	26.18	6.74	24.18	6.74	22.18	6.74	
	57 (13.8)	62.47	4.43	58.69	4.84	54.87	4.84	54.86	5.28	51.00	5.75	47.03	6.25	42.94	6.77	62.47	4.43	54.87	4.84	47.03	6.25	42.94	6.77	40.94	6.77	38.94	6.77	36.94	6.77
	62 (16.6)	62.48	4.43	58.68	4.84	54.86	4.84	54.86	5.28	50.99	5.75	47.03	6.25	42.94	6.77	62.48	4.43	54.86	4.84	47.03	6.25	42.94	6.77	40.94	6.77	38.94	6.77	36.94	6.77
	63* (17.2)	63.04	4.43	48.14	4.84	43.93	4.84	54.31	5.28	49.93	5.74	45.52	6.23	41.04	6.75	63.04	4.43	43.93	4.84	41.81	6.23	39.67	6.75	37.45	6.75	35.45	6.75	33.45	6.75
2250/0.03	EWB °F (°C)	67 (19.4)	67.80	4.47	62.90	4.88	58.21	5.32	53.50	5.78	48.74	6.27	43.81	6.78	67.80	4.47	45.59	5.32	43.44	6.27	41.27	6.78	39.04	6.78	36.84	6.78	34.64	6.78	
	72 (22.2)	73.95	39.47	4.53	68.79	4.94	63.63	5.37	58.45	5.84	53.20	6.32	47.86	6.82	73.95	39.47	45.59	5.32	43.44	6.27	41.27	6.78	39.04	6.78	36.84	6.78	34.64	6.78	
	72 (22.2)	73.95	39.47	4.53	68.79	4.94	63.63	5.37	58.45	5.84	53.20	6.32	47.86	6.82	73.95	39.47	45.59	5.32	43.44	6.27	41.27	6.78	39.04	6.78	36.84	6.78	34.64	6.78	
	72 (22.2)	73.95	39.47	4.53	68.79	4.94	63.63	5.37	58.45	5.84	53.20	6.32	47.86	6.82	73.95	39.47	45.59	5.32	43.44	6.27	41.27	6.78	39.04	6.78	36.84	6.78	34.64	6.78	

See Legend and Notes on Page 18.

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:

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

$$t_{lwb} = \text{Wet-bulb temperature corresponding to enthalpy of air leaving evaporator coil (} t_{lwb} \text{)}$$
$$h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4.5 \times \text{cfm}}$$

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

4. The SHC is based on 805 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 805 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 (CFM)

UNIT	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	
50ES-A24	Low	Blue	CFM	754	650	538	429	---	---	---	---	---	---
	Med-Low	Pink	CFM	851	777	675	591	475	---	---	---	---	---
	Medium ¹	Red	CFM	941	851	774	684	576	479	---	---	---	---
	Med-High	Orange	CFM	1009	917	840	759	667	577	447	---	---	---
	High	Black	CFM	1241	1167	1111	1036	969	881	818	731	640	---
50ES-A30	Low	Blue	CFM	741	638	547	415	---	---	---	---	---	---
	Med-Low	Pink	CFM	973	887	823	733	665	538	451	---	---	---
	Medium	Red	CFM	1088	1023	954	881	800	723	658	563	461	---
	Med-High ¹	Orange	CFM	1140	1064	996	915	840	758	687	564	480	---
	High	Black	CFM	1202	1140	1082	1015	961	881	810	732	631	---
50ES-A36	Low	Blue	CFM	1234	1168	1093	1021	961	894	825	759	687	---
	Med-Low	Pink	CFM	1290	1223	1154	1090	1027	977	894	828	762	---
	Medium ¹	Red	CFM	1354	1290	1226	1158	1102	1046	981	918	843	---
	Med-High	Orange	CFM	1606	1546	1489	1430	1371	1316	1258	1208	1140	---
	High	Black	CFM	1630	1580	1517	1463	1407	1339	1277	1210	1131	---
50ES-A42	Low	Blue	CFM	1295	1234	1182	1126	1075	1016	955	898	857	---
	Med-Low	Pink	CFM	1345	1282	1235	1194	1140	1095	1027	974	921	---
	Medium	Red	CFM	1505	1452	1413	1358	1323	1282	1234	1169	1130	---
	Med-High ¹	Orange	CFM	1545	1492	1449	1411	1362	1313	1278	1231	1188	---
	High	Black	CFM	1705	1643	1607	1568	1518	1483	1448	1404	1360	---
50ES-A48	Low	Blue	CFM	1402	1351	1311	1263	1224	1172	1136	1080	1041	---
	Med-Low	Pink	CFM	1457	1404	1367	1318	1284	1233	1197	1144	1104	---
	Medium ¹	Red	CFM	1736	1695	1642	1601	1553	1512	1465	1427	1381	---
	Med-High	Orange	CFM	2149	2111	2062	2026	1980	1945	1905	1864	1793	---
	High	Black	CFM	2344	2306	2259	2203	2141	2070	1991	1902	1803	---
50ES-A060	Med-Low	Pink	CFM	1678	1635	1602	1558	1513	1474	1438	1404	1349	---
	Medium ¹	Red	CFM	1962	1915	1880	1843	1794	1753	1711	1675	1628	---
	Med-High	Orange	CFM	2131	2088	2065	2013	1982	1941	1888	1860	1785	---
	High	Black	CFM	2461	2409	2339	2286	2192	2140	2062	1968	1874	---

* Air delivery values are without air filter and are for dry coil (See 50ES--A Horizontal Wet Coil Pressure Drop table).

¹ Factory-shipped cooling speed

Note: For horizontal applications deduct field-supplied air filter pressure drop and wet coil pressure drop to obtain external static pressure available for ducting. For downflow applications see Wet Coil Air Delivery Downflow-Hight Speed with 1-in Filter and Economizer Table for available static including wet coil, 1-in. filter and economizer.

Shaded areas indicate airflows that are not recommended for dehumidification control.

50ES--A

Horizontal Wet Coil Pressure Drop (IN. W.C.)

UNIT SIZE	STANDARD CFM (S.C.F.M)														
	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
24	0.030	0.037	0.044	0.053	0.063	---	---	---	---	---	---	---	---	---	---
30	---	0.037	0.044	0.053	0.063	0.072	0.081	0.105	---	---	---	---	---	---	---
36	---	---	---	0.055	0.060	0.090	0.100	0.110	0.140	---	---	---	---	---	---
42	---	---	---	---	0.045	0.050	0.060	0.065	0.075	0.080	0.090	0.094	0.110	---	---
48	---	---	---	---	---	---	0.041	0.063	0.085	0.100	0.104	0.110	0.120	0.130	---
60	---	---	---	---	---	---	---	---	---	0.060	0.065	0.072	0.077	0.085	0.100

Wet Coil Air Delivery (CFM) - Downflow - High Speed with 1-in. (25 mm) 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

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)	---	---	---	.09	.10	.11	.13	.14	.15	.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

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

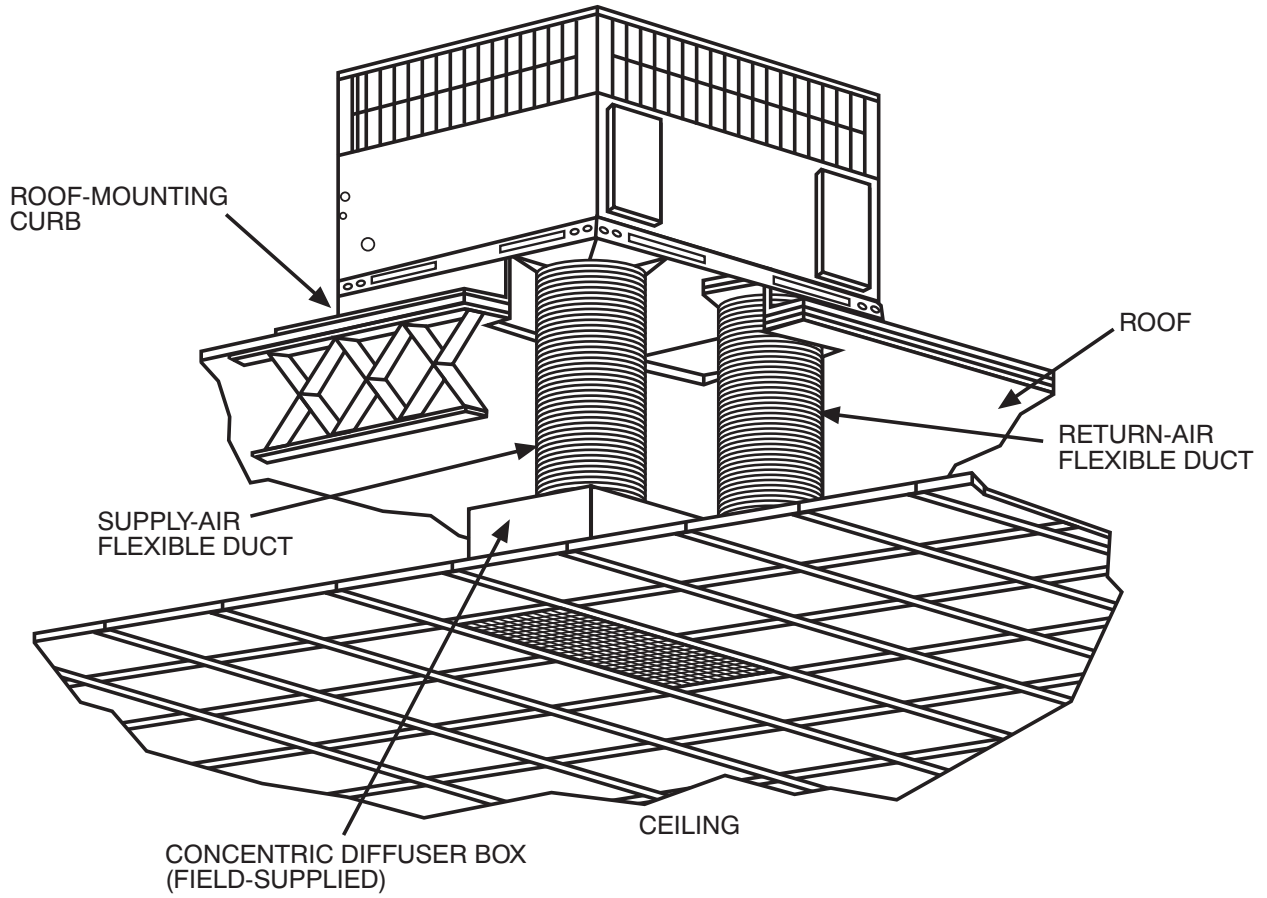
UNIT 50ES-A	PRESSURE DROP
24-36	0.20
42-60	0.25

Multiplication Factors

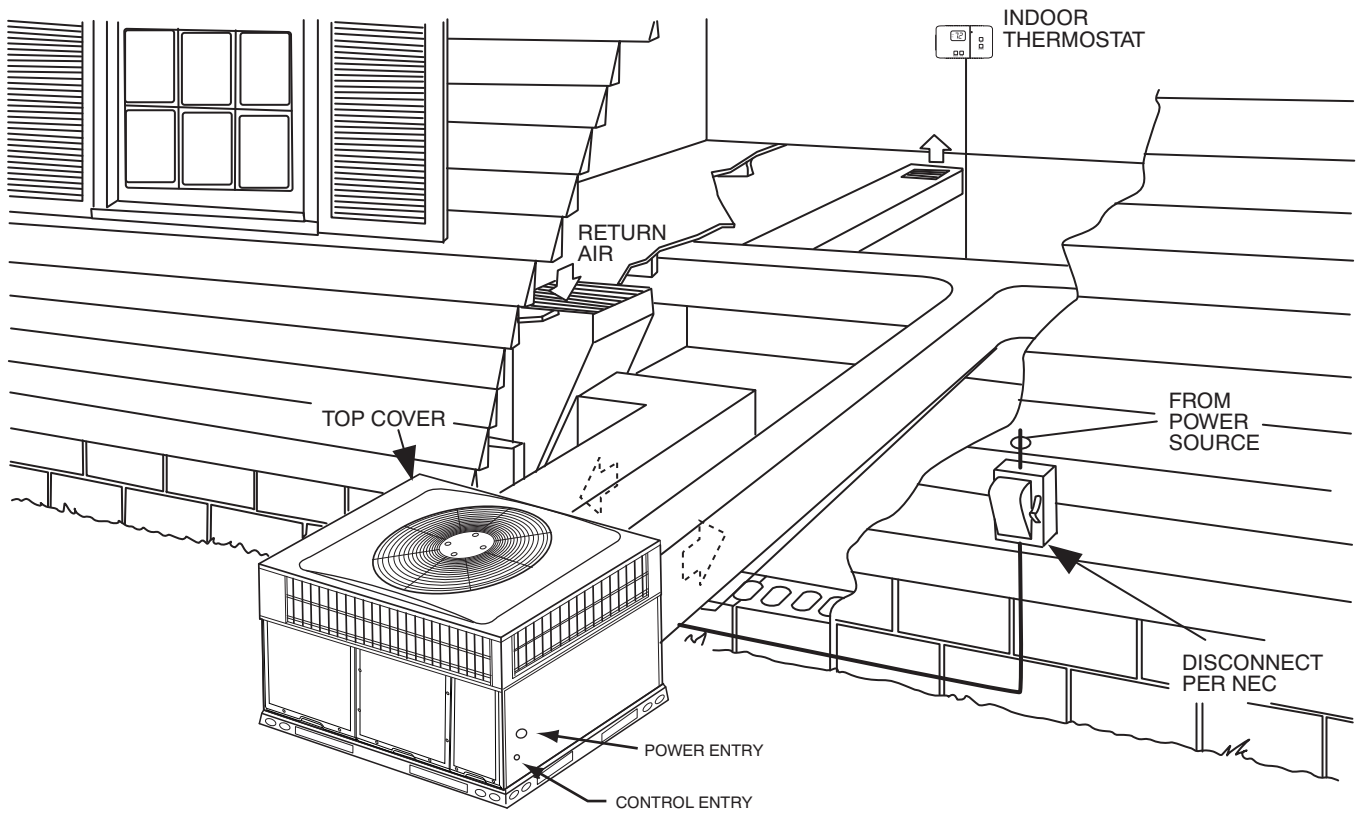
HEATER KW RATING	VOLTAGE DISTRIBUTION V/3/60	MULTIPLICATION FACTOR
240	200	0.69
	208	0.75
	230	0.92
	240	1.00

TYPICAL PIPING AND WIRING

50ES--A



A09230



A09240

APPLICATION DATA

Condensate trap — A 2-in. (50.8 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 downflow openings. Removal of the inserts is similar to removing an electrical knock-out.

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).

ELECTRICAL DATA

50ES-A

50ES-A

UNIT	NOMINAL V- PH-HZ	VOLTAGE RANGE		COMPRESSOR		OFM	IFM	ELECTRIC HEAT			POWER SUPPLY				
		MIN	MAX	RLA	LRA	FLA	FLA	NOMINAL kW *	FLA		MCA			MOCP **	
									208	240	460	208	230		460
24	208/230-1-60	197	253	12.8	58.3	1.2	4.1	-/-	-	-	-	21.3	21.3	-	30
								3.8/5	18.1	20.8	-	27.8	31.1	-	30/35
								5.4/7.2	25.9	30.0	-	37.5	42.6	-	40/45
								7.5/10	36.1	41.7	-	50.3	57.3	-	60/60
								-/-	-	-	-	21.3	21.3	-	30
30	208/230-1-60	197	253	12.8	64.0	1.2	4.1	-/-	-	-	-	21.3	21.3	-	30
								3.8/5	18.1	20.8	-	27.8	31.1	-	30/35
								5.4/7.2	25.9	30.0	-	37.5	42.6	-	40/45
								7.5/10	36.1	41.7	-	50.3	57.3	-	60/60
								11.3/15	54.2	62.5	-	72.9	83.3	-	80/90
	208/230-3-60	197	253	8.4	58.0	1.2	4.1	-/-	-	-	-	15.8	15.8	-	20
								3.8/5	10.4	12.0	-	18.1	20.1	-	20/25
								7.5/10	20.8	24.1	-	31.1	35.3	-	35/40
								11.3/15	31.3	36.1	-	44.3	50.3	-	45/60
								-/-	-	-	-	-	-	-	-
36	208/230-1-60	197	253	16.7	79.0	1.2	6.0	-/-	-	-	-	28.0	28.0	-	40
								3.8/5	18.1	20.8	-	30.1	33.5	-	40/40
								5.4/7.2	25.9	30.0	-	39.9	45.0	-	40/45
								7.5/10	36.1	41.7	-	52.6	59.6	-	60/60
								11.3/15	54.2	62.5	-	75.3	85.6	-	80/90
	208/230-3-60	197	253	10.4	88.0	1.2	6.0	-/-	-	-	-	20.3	20.3	-	30
								3.8/5	10.4	12.0	-	20.5	22.5	-	30/30
								7.5/10	20.8	24.1	-	33.5	37.6	-	35/40
								11.3/15	31.3	36.1	-	46.6	52.6	-	50/60
								-/-	-	-	-	-	-	-	-
	460-3-60	414	506	5.8	38.0	0.5	3.0	-	-	-	-	-	-	10.7	15
								5	-	-	6.0	-	-	11.3	15
								10	-	-	12.0	-	-	18.8	20
								15	-	-	18.0	-	-	26.3	30
								20	-	-	24.1	-	-	33.9	35
42	208/230-1-60	197	253	17.9	112.0	1.2	6.0	-/-	-	-	-	29.6	29.6	-	40
								3.8/5	18.1	20.8	-	30.1	33.5	-	40/40
								5.4/7.2	25.9	30.0	-	39.9	45.0	-	40/45
								7.5/10	36.1	41.7	-	52.6	59.6	-	60/60
								11.3/15	54.2	62.5	-	75.3	85.6	-	80/90
	208/230-3-60	197	253	13.5	88.0	1.2	6.0	-/-	-	-	-	24.1	24.1	-	35
								3.8/5	10.4	12.0	-	24.1	24.1	-	35/35
								7.5/10	20.8	24.1	-	33.5	37.6	-	35/40
								11.3/15	31.3	36.1	-	46.6	52.6	-	50/60
								15/20	41.4	47.9	-	59.3	67.4	-	60/70
	460-3-60	414	506	6.0	44.0	0.5	3.0	-	-	-	-	-	-	11.0	15
								5	-	-	6.0	-	-	11.3	15
								10	-	-	12.0	-	-	18.8	20
								15	-	-	18.0	-	-	26.3	30
								20	-	-	24.1	-	-	33.9	35
48	208/230-1-60	197	253	21.8	117.0	1.2	7.6	-/-	-	-	-	36.0	36.0	-	50
								3.8/5	18.1	20.8	-	36.0	36.0	-	50/50
								5.4/7.2	25.9	30.0	-	41.9	47.0	-	50/50
								7.5/10	36.1	41.7	-	54.6	61.6	-	60/70
								11.3/15	54.2	62.5	-	77.3	87.6	-	80/90
	208/230-3-60	197	253	13.7	83.1	1.2	7.6	-/-	-	-	-	25.9	25.9	-	35
								3.8/5	10.4	12.0	-	25.9	25.9	-	35/35
								7.5/10	20.8	24.1	-	35.5	39.6	-	40/40
								11.3/15	31.3	36.1	-	48.6	54.6	-	50/60
								15/20	41.4	47.9	-	61.3	69.4	-	70/70
	460-3-60	414	506	6.2	41.0	0.5	3.8	-	-	-	-	-	-	12.1	15
								5	-	-	6.0	-	-	12.3	15
								10	-	-	12.0	-	-	19.8	20
								15	-	-	18.0	-	-	27.3	30
								20	-	-	24.1	-	-	34.9	35
60	208/230-1-60	197	253	26.4	134.0	1.2	7.6	-/-	-	-	-	41.8	41.8	-	60
								3.8/5	18.1	20.8	-	41.8	41.8	-	60/60
								5.4/7.2	25.9	30.0	-	41.9	47.0	-	60/60
								7.5/10	36.1	41.7	-	54.6	61.6	-	60/70
								11.3/15	54.2	62.5	-	77.3	87.6	-	80/90
	208/230-3-60	197	253	16.0	110.0	1.2	7.6	-/-	-	-	-	28.8	28.8	-	40
								3.8/5	10.4	12.0	-	28.8	28.8	-	40/40
								7.5/10	20.8	24.1	-	35.5	39.6	-	40/40
								11.3/15	31.3	36.1	-	48.6	54.6	-	50/60
								15/20	41.4	47.9	-	61.3	69.4	-	70/70
	460-3-60	414	506	7.8	52.0	0.5	3.8	-	-	-	-	-	-	14.0	20
								5	-	-	6.0	-	-	14.0	20
								10	-	-	12.0	-	-	19.8	20
								15	-	-	18.0	-	-	27.3	30
								20	-	-	24.1	-	-	34.9	35

* kW @ 208/240 or 480 volts

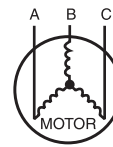
** FUSE OR CIRCUIT BREAKER

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.

50ES--A

A06564

CONTROLS

Operating sequence

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 motor (IFM). The normally open contacts of C close and complete the circuit through compressor motor (COMP) to outdoor (condenser) fan motor (OFM). Both motors start instantly. Simultaneously, 24 volts is supplied through G to the Interface Fan Board (IFB) and to the 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 90-second delay, the IFM shuts off. If the thermostat fan selector switch is in the “ON” position, the IFM will run continuously. For the 460 V units there is a step down autotransformer supplying 230 V to the Indoor Fan Motor.

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.

Heating — If accessory electric heaters are installed, on a call for heat, circuit R-W is made through the thermostat contacts. Circuit R-G is made which energizes the IFM. If the heaters are staged, then the thermostat closes a second set of contacts (W2) when second stage is required. When thermostat is satisfied, contacts open, deenergizing the heater relay and the IFM.

GUIDE SPECIFICATIONS

Packaged Electric Cooling Unit Constant Volume Application HVAC Guide Specifications

Size Range: **2 to 5 Tons, Nominal Cooling**

Model Number: 50ES

Part 1 — General

SYSTEM DESCRIPTION

Outdoor rooftop mounted or ground mounted, 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 90A requirements for flame spread and smoke generation.**
- G. Cabinet insulation shall meet ASHRAE Standard 62P.**

DELIVERY, STORAGE AND HANDLING

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

Part 2 — Products

EQUIPMENT

A. General:

Factory-assembled, single-piece, heating and cooling unit. Contained within the 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 3 removable cabinet panels.
- 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 motor shall be high efficiency brushless direct-drive multi-speed motor and control, 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. Tube sheet openings shall be belled to prevent tube wear.

F. Refrigerant Components:

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

G. Filters:

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

H. Controls and Safeties:

- 1. Unit controls shall be complete with a self-contained low voltage control circuit.
- 2. Units shall incorporate high and low pressure switches.

I. 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. Unit shall be provided with 60-second fan time delay after the thermostat is satisfied.

J. Electrical Requirements:

All unit power wiring shall enter the 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.
- 4. Evaporator fan motor to be high efficiency brushless DC motor.

L. Special Features:

- 1. Coil Options:
Base unit with tin plated indoor coil hairpins available as a factory installed option.
- 2. Compressor Start Kit (single phase units only):
Shall provide additional starting torque for single-phase compressors.
- 3. Thermostat:
To provide for one-stage heating and cooling in addition manual or automatic changeover and indoor fan control.
- 4. Crankcase Heater:
Shall provide anti-floodback protection for low-load cooling applications.
- 5. 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.

50ES--A

GUIDE SPECIFICATIONS (CONT)

6. Electric Heaters:
 - a. Electric heater shall be available as a field-installed option.
 - b. Heater elements shall be open wire type, adequately supported and insulated with ceramic bushings.
 - c. Electric heater packages must provide single point power connection capability.
7. Filter Rack Kit:

Shall provide filter mounting for downflow applications.
8. Flat Roof Curb:

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

Wire grille shall be standard on all units. Louvered grille shall be available as a field-installed option to provide hail guard and vandalism protection.
11. Manual Outdoor Air Damper:

Package shall consist of damper, birdscreen, and rainhood which can be preset to admit outdoor air for year-round ventilation.
12. Square-To-Round Duct Transitions (24-48 size):

Shall have the ability to convert the supply and return openings from rectangular to round.
13. Time Guard II
Automatically prevents the compressor from restarting for at least 4 minutes and 45 seconds after shutdown of the compressor. Not required when a corporate programmable thermostat is applied or with a RTU-MP control.

