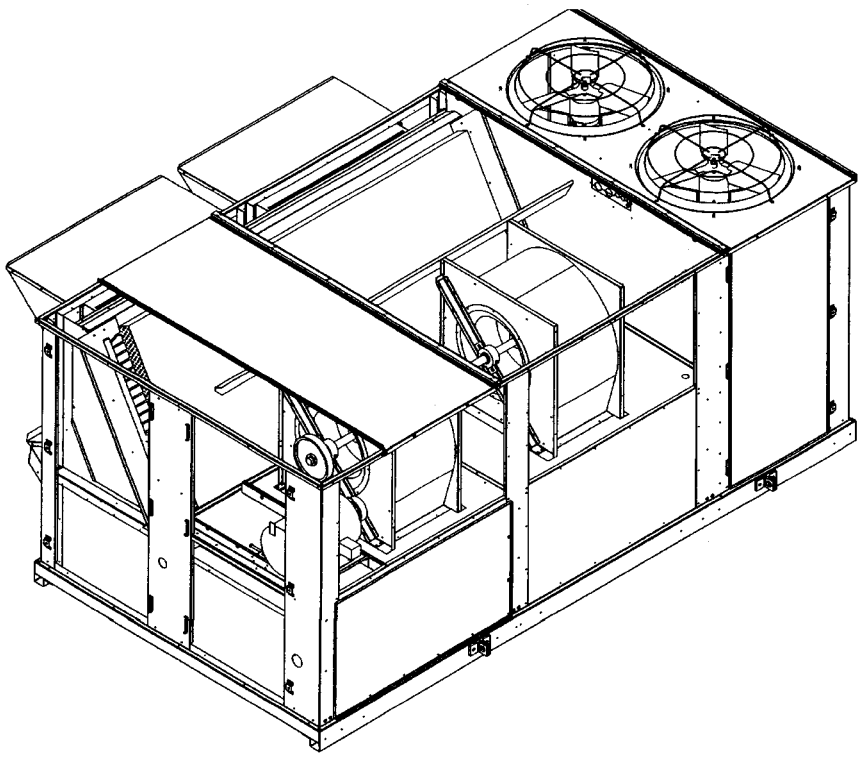
Carrier®

Product Data

50EJQ,EWQ Single-Package Rooftop Heat Pump Units With Optional Electric Heat

20 and 25 Nominal Tons



Single-Package Rooftop Units with:

- dedicated vertical and horizontal discharge configurations
- constant volume controls
- efficiencies from 9.2 to 9.8
- meets ASHRAE (American Society of Heating, Refrigeration, and Air Conditioning Engineers) Standard 62
- standard cooling operation at outdoor ambient temperatures as low as 35 F at full load
- aluminized steel, sloped condensate pan
- all internal surfaces are sheet metal lined or anti-microbial insulation
- two-inch return air filters
- single power entry to unit
- commercial duty, totally enclosed, 3-phase outdoor motors with permanently lubricated bearings
- pre-painted, galvanized steel cabinet
- commercial strength base rails (full perimeter, 14 gage)
- communicating DDC (Direct Digital Controls) unit controllers including intelligent defrost
- semi-hermetic compressors with service valves as standard
- dual independent refrigerant circuits with face-split indoor coils
- hinged access panels
- short cycle protection
- service diagnostics
- integrated economizer utilizing direct-drive actuators and opposed blade dampers
- IAQ (indoor air quality) options

Features/Benefits

Design flexibility

Dedicated vertical supply/return units (50EJQ) are ideal for new construction or retrofit to existing installations. The low unit profile is maintained when the unit is installed on the accessory roof curb, which is approved by the National Roofing Contractors Association (NRCA). The roof curb is made watertight by the roofer.

The ducts are attached directly to the roof curb to allow all ductwork to be completed before the unit is positioned.

Dedicated horizontal units (50EWQ) are ideal for replacement or applications such as through-the-wall jobs or jobs where sound must be attenuated before the duct penetrates the roof. Ducts connect directly to the unit. Horizontal units may be curb or slab mounted.

Direct Digital Controls (DDC) — standard

Unit features

- heating/cooling via thermostat
- heating/cooling during unoccupied periods using accessory remote sensor
- fan cycling head pressure control
- integrated economizer
- remote start/stop for non-thermostat applications
- provide a power exhaust output
- control of two stages of power exhaust
- control of modulating power exhaust with field installed accessory
- two-steps of capacity control
- LED (light-emitting diode) diagnostic capability
- field test checkout
- timed override from accessory remote sensor
- space temperature averaging from using accessory remote sensor
- unoccupied heating or cooling from using accessory remote sensor
- support supply air reset using accessory remote sensor

Additional features are available with accessory expansion board

- indoor air quality control
- inputs for fan status, filter status and field applied status
- demand limit input and function
- external alarm light function
- smoke control modes
- control of power exhaust under fire outputs

The Direct Digital Controls also have pre-loaded software that is available through the use of a computer and the associated software. The computer used to access the DDC may be permanent or used only during set-up and commissioning of the unit.

Unit features with computer access

- CCN (Carrier Comfort Network) protocol
- compatible with Building Supervisor, Service Tool, and ComfortWorks™ software, and LID-2B accessory
- perform demand limit functions
- alarm monitoring
- timeclock with back-up
- daylight savings time function
- occupancy control
- holiday table
- temperature compensated start
- Configuration, Maintenance, Service and Set Point data table display

Quality and reliability

Dual serviceable, semi-hermetic compressors on independent refrigeration circuits provide standby capacity should one circuit require service. These compressors are proven, reliable performers.

Solid core dessicant filter driers are sized at 30 cubic in. to assure longer compressor life. Solid core filters prevent erosion and dispersion of dessicant.

Totally enclosed outdoor-fan motors ensure many years of trouble-free operation.

Positive-locking bearings for the indoor fan ensure vibration-free operation of the supply fan assembly and remain locked during the life of the bearing.

Factory-installed economizer (standard)

All units come equipped with an integrated economizer which permits cooling utilizing an outdoor air sensor. The direct gear driven, low leakage blades eliminate conventional interblade linkages and the associated adjustments.

The economizer operates in conjunction with mechanical cooling when required and is factory-installed for either vertical or horizontal operation. The factory-supplied and field-installed rain hood/filter assembly prevents moisture or objects from entering the unit.

Factory-installed exhaust air relief is available for all 50EJQ units as barometric relief or power exhaust. Field-installed accessory barometric relief or power exhaust are available for 50EWQ units.

Field-adjustable set points on accessory modulating power exhaust prevent space pressurization problems. Factory-installed relief options are unit mounted on downflow units. Accessories must be duct mounted for horizontal applications.

Installation/serviceability

Dedicated design (vertical or horizontal) requires no alteration time to convert in the field. Single point electrical connections are standard on all units. Electrical service access can be made through roof curb or side of unit.

High static capability of standard units minimize the need to convert to higher static, oversized motors. The unit is less sensitive to distribution ductwork design.

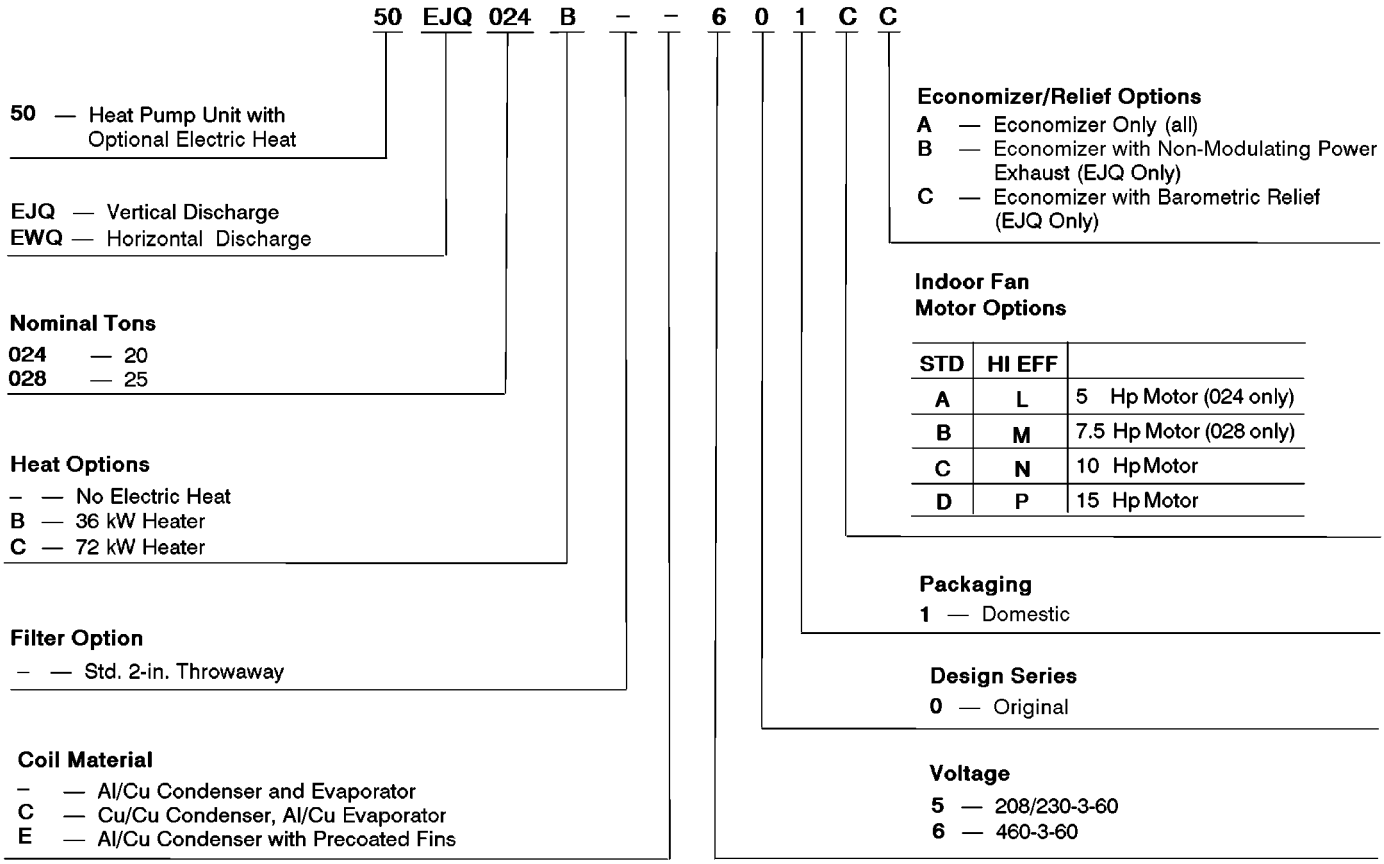
The standard microprocessor controls replace the need for field installed anti-short cycle timers. The controls are compatible with either a room sensor or conventional thermostat with no need to install an accessory interface. In addition, no special tools are required to run the unit through its operational steps. It's as simple as throwing a DIP (dual in-line package) switch to activate the automatic test mode. After the test cycle, the unit automatically returns to normal operation.

Hinged access panels are located for easy access to standard serviceable components for maintenance. No fasteners need to be removed, which reduces servicing time and prevents roof leaks caused by discarded screws.

Color coded wiring permits easy tracing and diagnostics.

The thermal insulation contains an EPA (Environmental Protection Agency) registered immobilized antimicrobial agent to inhibit the growth of bacteria and fungi.

Model number nomenclature



LEGEND
Al — Aluminum
Cu — Copper

Quality Assurance

Certificate No FM 21837

Approvals:
ISO 9001
EN 9000:2000

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Physical data

UNIT 50EJQ,EWQ	024			028		
NOMINAL CAPACITY (tons)	20			25		
OPERATING WEIGHT (lb)*						
Unit						
Al/Al†	4168			4168		
Al/Cu†	4388			4388		
Roof Curb (14-in. curb)	365			365		
COMPRESSOR						
Type Ckt 1	06D824			06D328		
Ckt 2	06D824			06D328		
Number of Refrigerant Circuits	2			2		
Oil (oz) (Ckt 1, Ckt 2)	115 ea.			115 ea.		
REFRIGERANT TYPE	R-22					
Expansion Device	Acutrol™ Refrigerant Metering Device					
Operating Charge (lb-oz)						
Circuit 1**	32-2			33-3		
Circuit 2	34-6			35-11		
OUTDOOR COIL	Cross-Hatched ⅜″ Copper Tubes, Aluminum Lanced, Aluminum Precoated or Copper Fins					
Quantity	1			1		
Rows...Fins/in.	4...15			4...15		
Total Face Area (sq ft)	33.3			33.3		
OUTDOOR FAN	Propeller Type					
Nominal Cfm	13,420			13,420		
Quantity...Diameter (in.)	2...30			2...30		
Motor Hp (1075 Rpm)	1			1		
INDOOR COIL	Cross-Hatched ⅜″ Copper Tubes, Aluminum Plate Fins, Face Split					
Rows...Fins/in.	4...15			4...15		
Total Face Area (sq ft)	31.7			31.7		
INDOOR FAN	Centrifugal Type					
Quantity...Size (in.)	2...20x15			2...20x15		
Type Drive	Belt			Belt		
Nominal Cfm	8,000			10,000		
Motor Hp	5	10††	15	7.5	10††	15
Motor Frame Size	S184T	S215T	D254T (std) S254T (hi)	S213T	S215T	D254T (std) S254T (hi)
Motor Bearing Type	Ball			Ball		
Maximum Allowable Rpm	1200			1200		
Motor Pulley Pitch Diameter	4.8	4.4	5.7	5.4	6.1	5.5
Nominal Motor Shaft Diameter (in.)	1⅛	1⅜	1⅝	1⅜	1⅜	1⅝
Fan Pully Pitch Diameter (in.)	12.4	8.6	9.1	12.4	11.1	8.7
Nominal Fan Shaft Diameter (in.)		1 15/16			1 15/16	
Belt, Quantity...Type	1...BX59	2...BX51	2...5VX530	1...BX59	1...5VX590	2...5VX530
Belt, Length (in.)	62	54	53	62	59	53
Pulley Center Line Distance (in.)	16.0-18.7	15.6-18.4	15.0-17.9	15.6-18.4	15.6-18.4	15.0-17.9
Factory Speed Setting (rpm)	717	924	1096	773	962	1106
HIGH-PRESSURE SWITCH (psig)						
Cutout	426			426		
Reset (Auto.)	320			320		
LOW-PRESSURE SWITCH (psig)						
Cutout	7			7		
Reset (Auto.)	22			22		
RETURN-AIR FILTERS						
Quantity...Size (in.)	10...20x24x2			10...20x24x2		
OUTDOOR-AIR FILTERS	8...16 x 25 4...20 x 25					
Quantity...Size (in.)						
POWER EXHAUST	Direct Drive, 3-Speed, Single-Phase Motor (Factory-Wired for High Speed) and Forward-Curved Fan					
Motor, Quantity...Hp	4...1			4...1		
Fan, Diameter...Width (in.)	11...10			11...10		

LEGEND

Al — Aluminum
Cu — Copper

*Weight of unit does not include barometric relief or power exhaust.
†Indoor coil fin material/outdoor coil fin material.
**Circuit 1 uses the upper portion of the outdoor coil, circuit 2 uses the lower portion. Circuit 1 uses the lower portion of the indoor coil, circuit 2 uses the upper portion.
††Motor and drive shown will deliver approximately 2.5 in. wg net external static.

ARI* capacities

UNIT 50EJQ,EWQ	COOLING				HEATING-HIGH TEMP			HEATING-LOW TEMP		
	Total kW	Net Capacity (Btuh)	Cfm	EER	Total Capacity (Btuh)	Total kW	COP	Total Capacity (Btuh)	Total kW	COP
024	23.4	230,000	6800	9.8	228,000	20.0	3.3	116,000	16.7	2.0
028	28.6	262,000	7500	9.2	266,000	23.7	3.3	140,000	19.5	2.1

LEGEND

COP — Coefficient of Performance
db — Dry Bulb
EER — Energy Efficiency Ratio
ESP — External Static Pressure
wb — Wet Bulb

*Air Conditioning and Refrigeration Institute.

Cooling ratings are net values, reflecting the effects of circulating fan heat. Ratings are based on:
ESP: −0.40 in. wg

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

High-Temp Heating Standard: 70 F db indoor coil entering-air temperature and 47 F db, 43 F wb outdoor coil entering-air temperature.

Low-Temp Heating Standard: 70 F db indoor coil entering-air temperature and 17 F db, 15 F wb outdoor coil entering-air temperature.

COOLING STAGING SEQUENCE — 50EJQ,EWQ

STAGES	0	1	2
COMP NO. 1	OFF	ON	ON
COMP NO. 2	OFF	OFF	ON
UNIT SIZE	**UNIT CAPACITY**		
024	0%	50%	100%
028	0%	50%	100%

NOTE: Field-installed accessory unloaders are **not** approved for these units due to low-load performance with fixed-orifice metering devices.

50EJQ,EWQ NOMINAL CFM RANGE (Electric Heat Units)

UNIT SIZE	DESIGN RANGE (Cfm)		
024	6,000	TO	10,000
028	7,500	TO	12,500

ELECTRIC RESISTANCE HEATER DATA

UNIT	HEATER kW Unit Voltages			HEATER STAGES	% HEAT PER STAGE	MINIMUM CFM
	208	230	460			
50EJQ024	27 54	36 72	36 72	1 1	100 100	6,000
50EJQ028	27 54	36 72	36 72	1 1	100 100	7,500
50EWQ024	27 —	36 —	36 72	1 1	100 100	6,000
50EWQ028	27 —	36 —	36 72	1 1	100 100	7,500

NOTES:
1. Due to the open design of the electric heaters, the airside pressure drop is negligible.
2. Heaters are rated at 208, 240 and 480 v. Refer to multiplication factors table to rate heaters at other voltages.

MULTIPLICATION FACTORS

HEATER kW RATING	VOLTAGE DISTRIBUTION V-3-60	MULTIPLICATION FACTOR
240	200 208 230 240	0.694 0.751 0.918 1.000
480	440 460 480	0.840 0.918 1.000

EXAMPLE: 32.0 kW (at 240 v) heater on 208 v
= 32.0 (.75 mult factor)
= 24.0 kW capacity at 208 v

Options and accessories

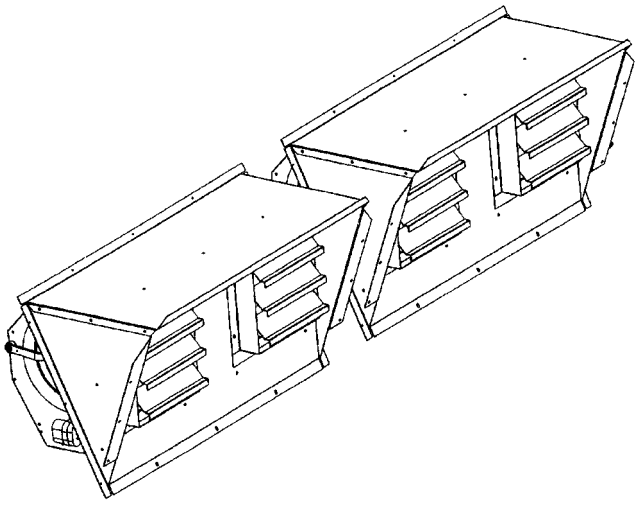
ITEM	OPTION*	ACCESSORY†
Barometric Relief**	X	X
Copper/Copper Condenser Coil	X	
Pre-Coated Aluminum Fin Condenser Coil	X	
Non-Modulating Power Exhaust**	X	X
Power Exhaust Conversion, Non-Modulating to Modulating**		X
Electric Heat	X	X
Roof Curb		X
Motormaster® III Head Pressure Control		X
Outdoor Coil Hail Guard Assembly		X
Electronic Programmable Thermostat		X
Thermostat and Subbase		X
Space Temperature Sensor		X
Space Temperature Sensor with Offset (T-56)		X
IAQ (CO_2) Sensor		X
Enthalpy Control for Integrated Economizer		X
Expansion Electronic Board		X
Roof Curb Retrofit Kit		X
LID-2B Interface Device		X

LEGEND

IAQ — Indoor Air Quality

*Factory installed.
†Field installed.
**Not available as a factory-installed option on 50EWQ units. Accessory must be field-installed in the ductwork on 50EWQ units.

POWER EXHAUST FANS

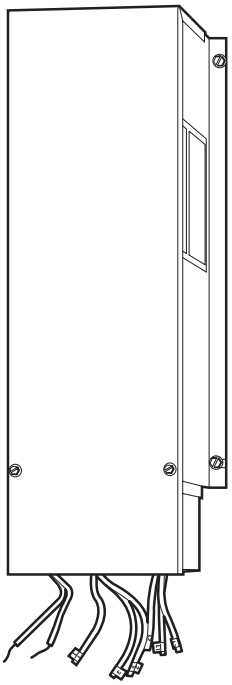


When combined with the economizer, the power exhaust can be used to exhaust the return air and eliminate over-pressurization of the building. The power exhaust utilizes multiple forward-curved fans, each driven by its own motor.

The constant volume power exhaust stages the motors according to economizer position to control the building pressure.

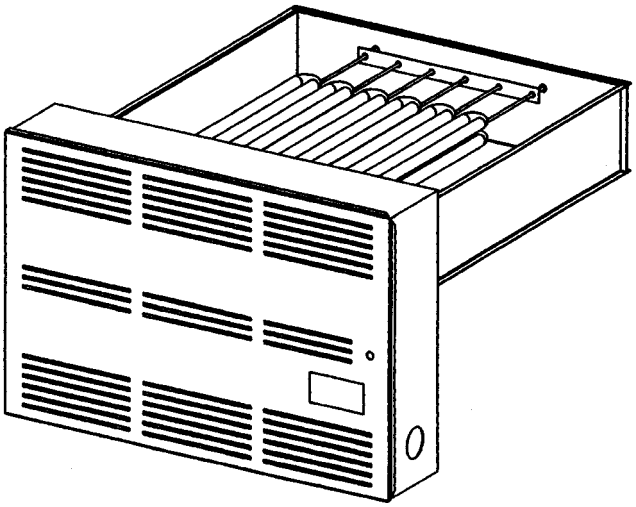
The modulating power exhaust stages the motors according to interior space pressure (field-installed accessory only).

HEAD PRESSURE CONTROL



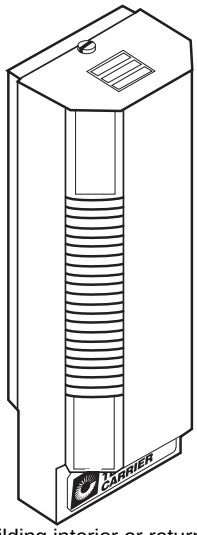
The standard units are designed to operate in cooling at outdoor temperatures down to 35 F. With accessory Motormaster III control (condenser fan speed modulation) units can operate at outdoor temperatures down to −20 F. The head pressure controls, which mount in the condenser section, control the condenser-fan motor to maintain correct condensing temperature. Refer to price pages or contact your local Carrier representative for appropriate accessory combinations for desired outdoor ambient temperature operation.

ELECTRIC HEATER



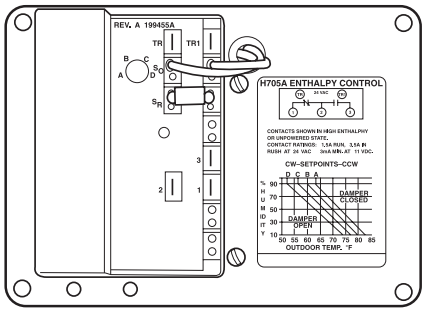
Electric heaters are available in a wide range of capacities for factory or field installation.

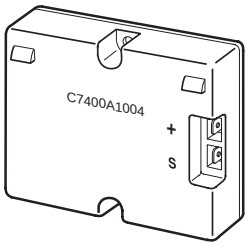
CO_2 SENSOR



This sensor monitors building interior or return air carbon dioxide levels and automatically activates the outdoor fan and opens the economizer for rapid dilution of CO_2 levels above an adjustable set point.

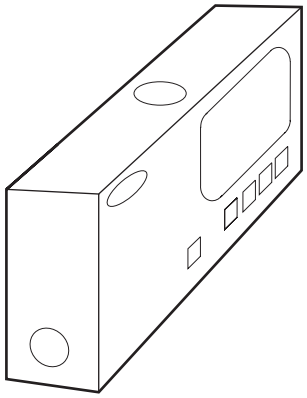
ENTHALPY CONTROL FOR INTEGRATED ECONOMIZER





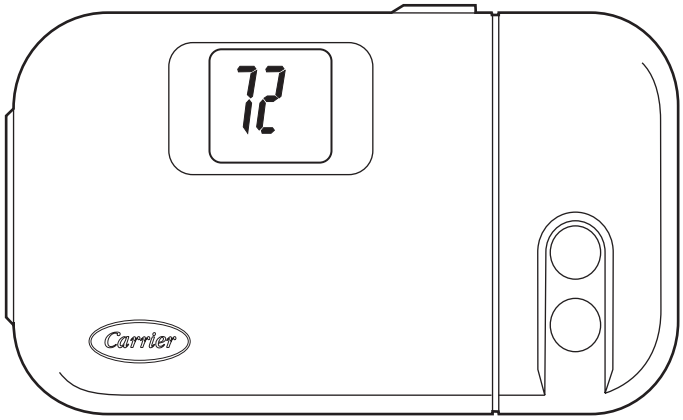
Enthalpy economizer controls help provide efficient, economical economizer operation. Solid-state enthalpy control includes the logic and one sensor to calculate both dry and wet bulb of the outdoor air to provide an accurate enthalpy reading. It then decides when to energize the economizer based on this reading. A second sensor provides information for comparison of outdoor temperature and humidity to return-air temperature and humidity and determines the most economical mixture of air (purchased in addition to first solid-state enthalpy sensor for differential enthalpy sensing).

LID-2B FIELD-INSTALLED INTERFACE DEVICE



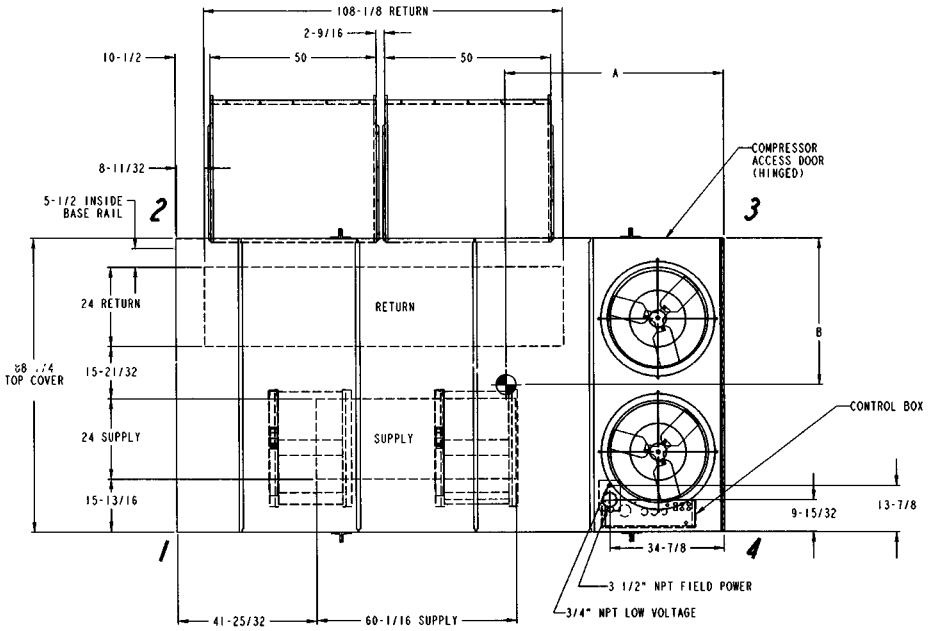
The LID-2B (30HX900007) enhanced display provides access to the unit software for specific application time schedules and control configurations. The LID-2B has a separate dedicated 24-v power source.

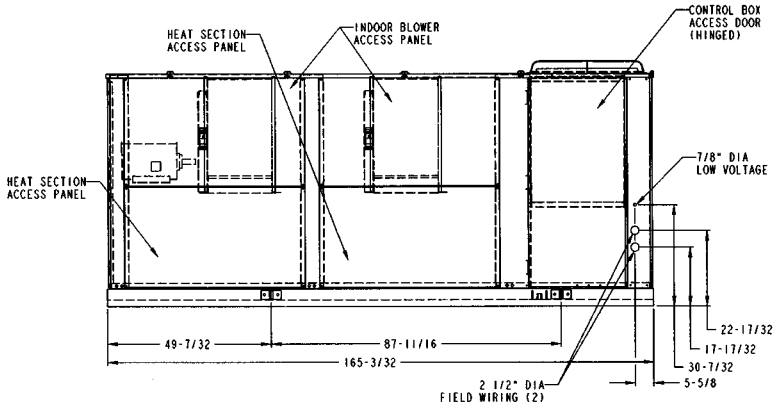
ELECTRONIC PROGRAMMABLE THERMOSTAT

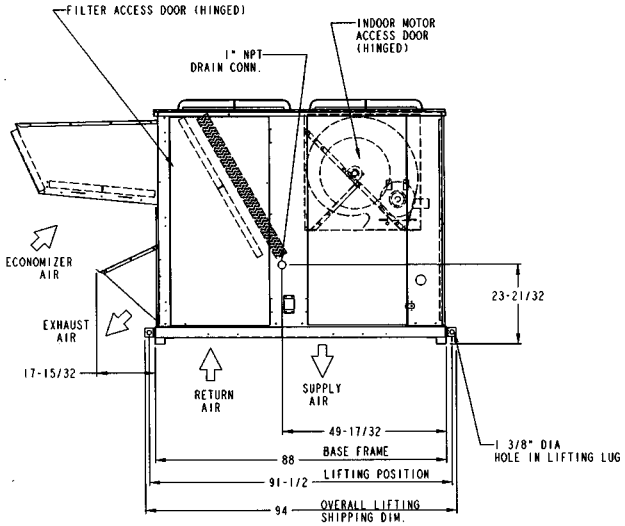


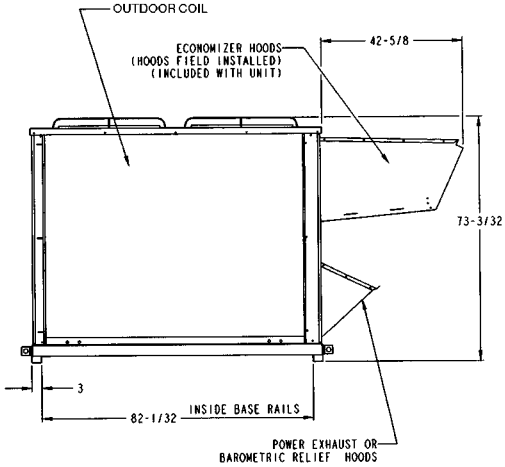
Carrier's electronic programmable thermostat provides efficient temperature control by allowing you to program heating and cooling setbacks and set ups with provisions for weekends and holidays.

Base unit dimensions, 50EJQ024,028





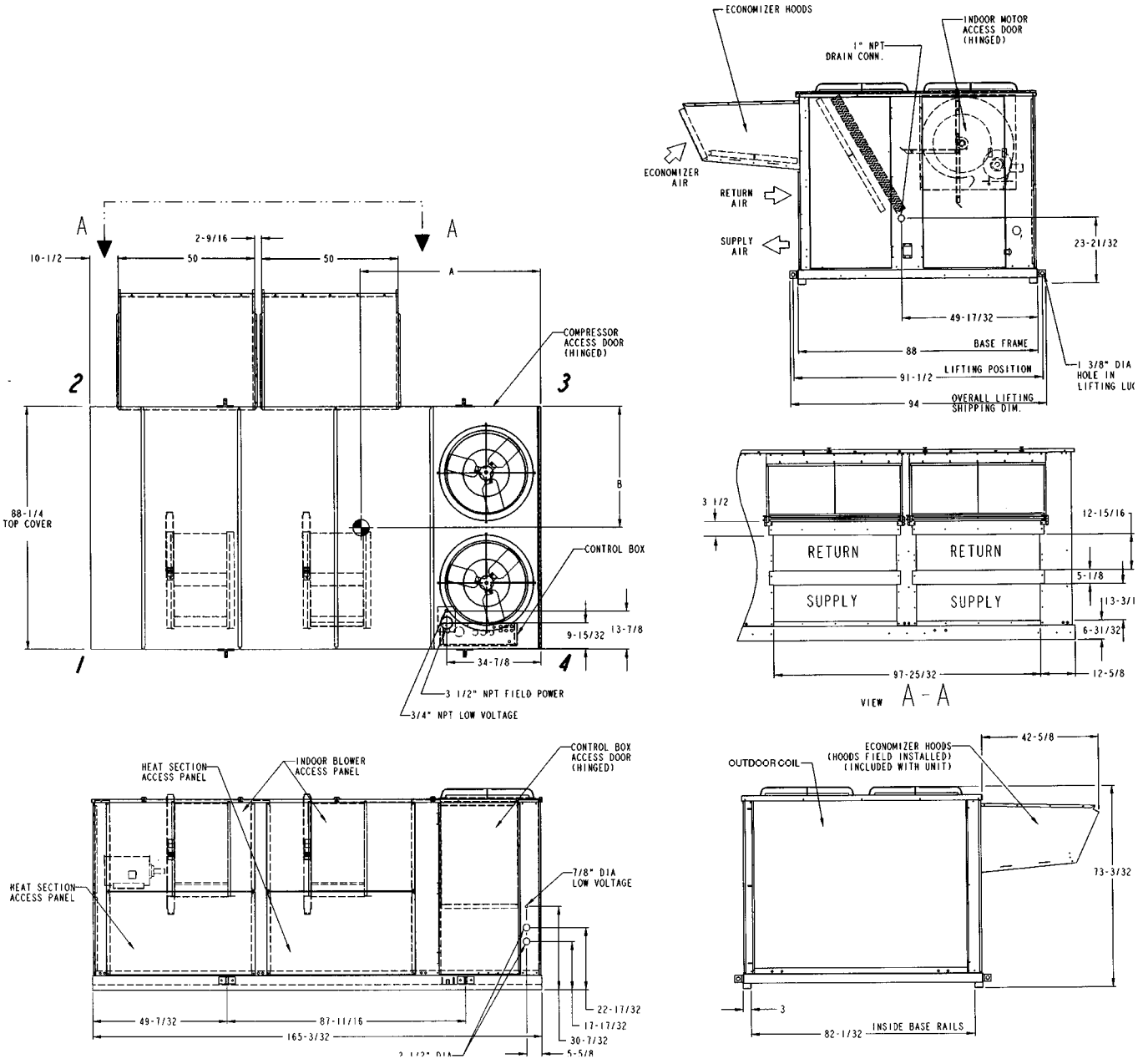




NOTES:
1. Weights include economizer (Std)
2. ◒ Center of gravity.
3. Do not locate adjacent units with discharge facing economizer inlet. Minimum clearances to be:
   Adjacent Units: 15′-0″
   Top of Units: No overhang
   Outdoor Coil: 4′-0″
   Economizer Side: 6′-0″
   Filter Access Side: 10′-0″ (for removal of indoor coil)
4. For smaller service and operational clearances, contact Carrier Application Engineering department.
5. Bottom ducts designed to be attached to accessory roof curb. If unit is mounted on dunnage, it is recommended the ducts be supported by cross braces as done on accessory roof curb.
6. Dimensions are in inches.
7. For units with electric heat, a field-supplied 90° elbow must be installed in the supply ductwork below the unit discharge.

UNIT SIZE 50EJQ	OPERATING WEIGHT	A	B	CORNER WEIGHT (lb)			
	lb	ft-in.	ft-in.	1	2	3	4
024	4168	5-7⅜	3-7⅝	843	859	1245	1222
028	4168	5-7⅜	3-7⅝	843	859	1245	1222

Base unit dimensions, 50EWQ024,028



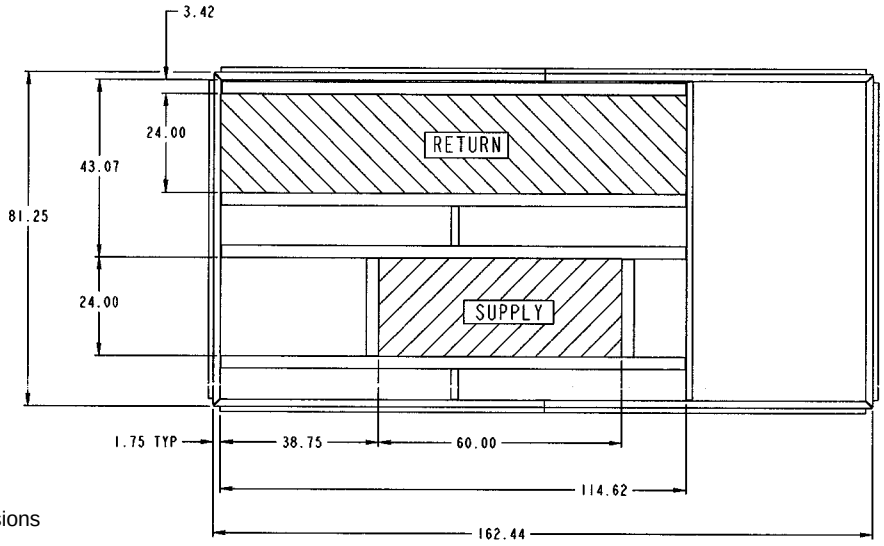
NOTES:

1. Weights include economizer (Std)
2. Center of gravity.
3. Do not locate adjacent units with discharge facing economizer inlet. Minimum clearances to be:
   Adjacent Units: 15′-0″
   Top of Units: No overhang
   Condenser Coil: 4′-0″
   Economizer Side: 6′-0″
   Filter Access Side: 10′-0″ (for removal of evaporator coil)
4. For smaller service and operational clearances, contact Carrier Application Engineering department.
5. Dimensions are in inches.
6. For units equipped with electric heat, a field-supplied 90° elbow must be installed in the supply ductwork below the unit discharge.
7. For side-supply/return applications, a single return and supply ductwork connection is recommended for covering both return and both supply openings.

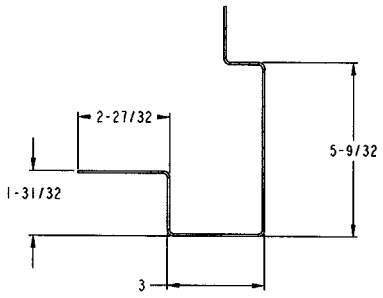
UNIT SIZE 50EWQ	OPERATING WEIGHT	A	B	CORNER WEIGHT (lb)			
	lb	ft-in.	ft-in.	1	2	3	4
024	4168	5-7⅜	3-7⅝	843	859	1245	1222
028	4168	5-7⅜	3-7⅝	843	859	1245	1222

Accessory dimensions

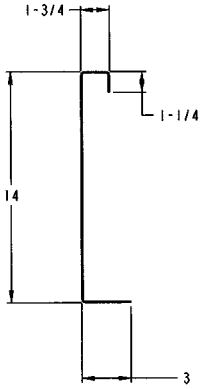
ROOF CURB



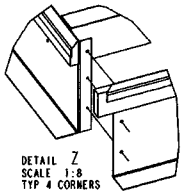
NOTES:
1. Unless otherwise specified, all dimensions are to outside of part.
2. Roof curb accessory CRRFCURB005A00 is shipped disassembled.
3. All roof curb parts are to be 14 gage galvanized steel.

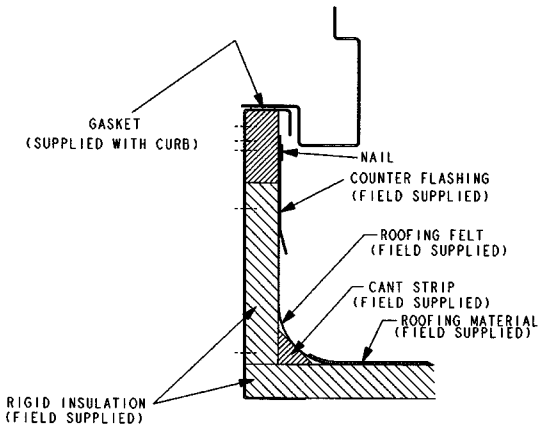


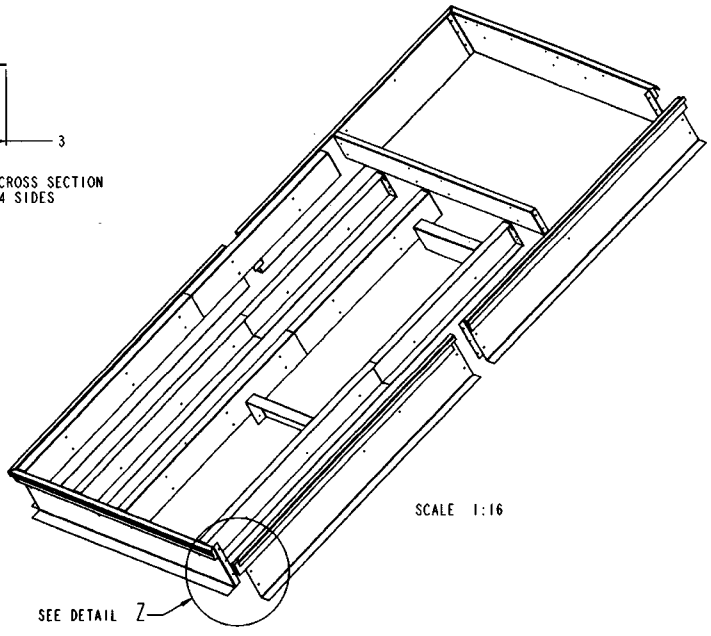
BASE RAIL CROSS SECTION
TYP 2 SIDES



ROOF CURB CROSS SECTION
TYP 4 SIDES





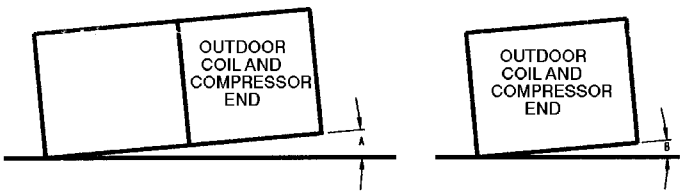


DIMENSIONS*
(degrees and inches)

A		B	
Deg.	**in.**	**Deg.**	**in.**
1.0	2.9	.50	.75

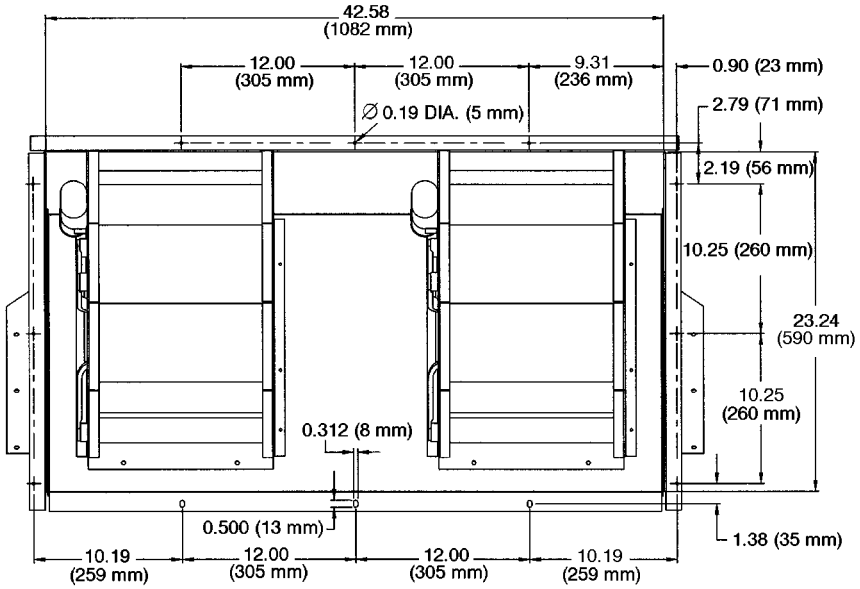
UNIT LEVELING TOLERANCES

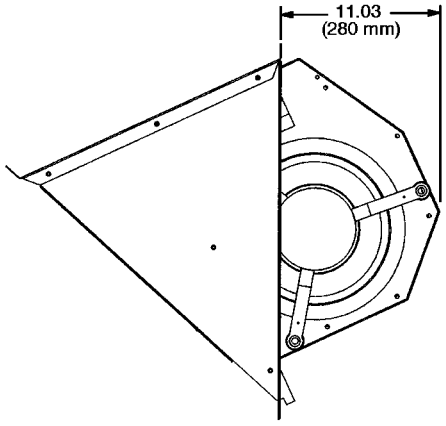
*From edge of unit to horizontal.



NOTE: To prevent standing water in the drain pan of the indoor section and the heat exchangers, **UNIT CAN ONLY BE PITCHED AS SHOWN.**

POWER EXHAUST AND BAROMETRIC RELIEF





LEGEND

ø — Diameter

NOTES:
1. Unless otherwise specified, all dimensions are to outside of part.
2. Dimensions are in inches.
3. There are 2 assemblies per unit.

Selection procedure (with example)

I Determine heating and cooling requirements at design conditions.

Given:

Required Cooling Capacity (TC) ..... 250,000 Btuh
Sensible Heat Capacity (SHC) ..... 180,000 Btuh
Required Heating Capacity ..... 218,000 Btuh
Outdoor-Air Temperature (Cooling) ..... 95 F
Indoor Entering-Air Temperature
(Cooling) ..... 80 F Edb/67 F Ewb
Outdoor Coil Entering-Air Temperature
(Heating) ..... 0° F
Indoor Winter Design Temperature ..... 70 F
Indoor-Air Quantity ..... 10,000 Cfm
External Static Pressure (ESP) ..... 1.40 in. wg
Electrical Characteristics (V-Ph-Hz) 230-3-60
Vertical unit is specified.
Economizer is specified.
Edb — Entering dry bulb
Ewb — Entering wet bulb

II Select unit based on required cooling capacity.

Enter Cooling Capacity table at outdoor-air entering temperature of 95 F, indoor air entering at 10,000 cfm and 67 F ewb. The 50EJQ028 will provide a total capacity (TC) of 276,000 Btuh, a sensible heat capacity (SHC) of 208,400 Btuh and a compressor kW of 24.90.

For indoor-air temperature other than 80 F edb, calculate sensible heat capacity correction, as required, using the formula found in Note 3 following the Cooling Capacities tables on page 14.

NOTE: Unit ratings are gross capacities and do not include the effect of indoor-fan motor heat. To calculate net capacities, see Step V.

III Select electric heat.

Enter the Integrated Heating Capacities table on page 15 at 10,000 cfm. At 70 F return indoor air and 0° F air entering the outdoor coil, the integrated heating capacity is 105,600 Btuh with a unit input kW of 17.69.

The required heating capacity is 218,000 Btuh; therefore, 112,400 Btuh (218,000 −105,600) additional electric heat is necessary.

Determine the additional electric heat capacity in kW.

$$\frac{112{,}400 \text{ Btuh}}{3{,}412 \text{ Btuh/kW}} = 32.9 \text{ kW}$$

Enter the Electric Resistance Heater Data table at 240-3-60. Heater is rated at 240 v. Multiply 36 kW heater times 0.918 from the Multiplication Factors table to get 33.05 kW rating at 230 v. The 36-kW heater satisfies the electric heater requirement.

IV Determine fan speed and motor horsepower requirements at design conditions.

Tabulated fan performance includes 2-in. throwaway filters, wet evaporator coil, economizer, cabinet loss, and roof curb. Find fan rpm and bhp at 1.4 in. wg and 10,000 cfm on 50EJQ028 Fan Performance table for vertical applications. Find that the fan speed is 832 rpm and the power required is 7.95 bhp. See Motor Limitations table on page 17. The 7.5 hp motor is required.

V Determine net cooling capacities.

Cooling capacities are gross and do not include the effect of indoor-fan motor (IFM) heat.

Determine net cooling capacity as follows:

Net capacity = Gross capacity − IFM heat

$$= 276{,}000 - 7.95 \text{ bhp} \times \frac{2545 \ \frac{\text{Btuh}}{\text{hp}}}{.81}$$

$$= 276{,}000 - 24{,}979$$

$$= 251{,}021 \text{ Btuh}$$

Net sensible capacity = 208,400 − 24,979
= 183,421 Btuh

NOTE: Heating capacity is net capacity.

Performance data

COOLING CAPACITIES

50EJQ,EWQ024 (20 TONS)

Temp (F) Air Entering Outdoor Coil (Edb)		Indoor Entering Air — Cfm/BF											
		6000 / 0.05			7000 / 0.06			8000 / 0.07			9000 / 0.08		
		Indoor Entering Air — Ewb (F)											
		62	67	72	62	67	72	62	67	72	62	67	72
75	TC	227.0	251.0	273.0	232.0	260.0	277.0	237.0	259.0	282.0	240.0	264.0	283.0
	SHC	189.2	158.3	125.9	203.9	171.8	140.1	218.0	180.6	141.7	229.0	190.2	149.8
	kW	15.42	15.90	16.31	15.60	16.13	16.43	15.74	16.13	16.53	15.83	16.31	16.59
85	TC	216.0	242.0	268.0	223.0	248.0	273.0	228.0	252.0	275.0	232.0	257.0	279.0
	SHC	185.2	156.2	125.5	200.2	167.7	131.6	215.0	177.7	141.1	225.0	188.3	145.3
	kW	16.89	17.49	18.07	17.09	17.72	18.24	17.31	17.83	18.34	17.46	17.99	18.46
95	TC	205.0	230.0	257.0	211.0	237.0	261.0	217.0	241.0	265.0	223.0	245.0	268.0
	SHC	180.3	152.4	122.5	195.8	163.8	127.0	208.7	174.3	133.8	219.0	185.5	139.3
	kW	18.32	19.03	19.73	18.58	19.28	19.89	18.82	19.42	19.99	19.05	19.59	20.17
105	TC	192.7	218.0	244.0	199.0	223.0	250.0	205.0	228.0	255.0	211.0	230.0	256.0
	SHC	174.7	147.3	118.1	189.1	159.2	124.9	201.0	170.0	131.8	209.0	181.0	136.5
	kW	19.73	20.55	21.30	20.08	20.80	21.60	20.31	21.00	21.80	20.62	21.20	21.90
115	TC	180.4	205.0	231.0	187.3	210.0	236.0	193.6	213.0	238.0	200.0	216.0	242.0
	SHC	169.2	142.8	114.1	181.9	154.4	120.4	192.0	165.5	127.4	200.0	175.9	133.5
	kW	21.10	22.00	23.00	21.50	22.30	23.30	21.80	22.50	23.30	22.20	22.70	23.50

LEGEND

BF — Bypass Factor
Edb — Entering Dry Bulb
Ewb — Entering Wet Bulb
kW — Compressor Motor Power Input
SHC — Sensible Heat Capacity (1000 Btuh)
TC — Total Capacity (1000 Btuh) Gross

NOTES:
1. Direct interpolation is permissible. Do not extrapolate.
2. The following formulas may be used:

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

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

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

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

3. 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.*

BF	ENTERING AIR DRY-BULB TEMP (F)					
	79	78	77	76	75	under 75
	81	*82*	*83*	*84*	*85*	*over 85*
	Correction Factor					
.05	1.04	2.07	3.11	4.14	4.18	Use formula shown below.
.10	.98	1.96	2.94	3.92	4.91	
.20	.87	1.74	2.62	3.49	4.36	

Interpolation is permissible.
Correction factor = 1.10 x (1 − BF) x (edb − 80)

4. Cooling capacities are gross and do not include deduction for indoor fan motor heat.

Performance data (cont)

COOLING CAPACITIES (cont)

50EJQ,EWQ028 (25 TONS)

Temp (F) Air Entering Outdoor Coil (Edb)		Indoor Entering Air — Cfm/BF											
		7500 / 0.06			8750 / 0.07			10,000 / 0.08			11,250 / 0.09		
		Indoor Entering Air — Ewb (F)											
		62	67	72	62	67	72	62	67	72	62	67	72
75	TC	263.0	292.0	320.0	268.0	295.0	316.0	271.0	297.0	319.0	275.0	297.0	320.0
	SHC	228.0	189.7	150.7	243.0	200.3	164.3	259.0	216.0	175.9	271.0	222.0	173.5
	kW	19.67	20.39	21.00	19.99	20.56	21.00	20.25	20.80	21.40	20.60	21.00	21.60
85	TC	252.0	282.0	310.0	257.0	287.0	314.0	262.0	289.0	314.0	265.0	291.0	312.0
	SHC	223.0	187.0	146.6	240.0	199.1	153.8	254.0	212.0	165.5	263.0	223.0	171.6
	kW	21.40	22.20	23.00	21.80	22.60	23.30	22.20	23.00	23.50	22.50	23.20	23.70
95	TC	239.0	269.0	298.0	244.0	273.0	302.0	250.0	276.0	305.0	255.0	277.0	307.0
	SHC	217.0	183.3	144.5	234.0	195.3	151.2	246.0	208.4	158.3	255.0	219.0	165.3
	kW	23.10	24.20	25.00	23.60	24.50	25.40	24.10	24.90	25.70	24.50	25.20	26.00
105	TC	225.0	255.0	285.0	231.0	259.0	290.0	238.0	261.0	293.0	244.0	263.0	293.0
	SHC	210.0	177.8	140.7	226.0	190.9	148.6	237.0	205.1	155.2	244.0	215.0	161.8
	kW	24.90	26.00	27.00	25.40	26.40	27.50	26.00	26.80	27.80	26.50	27.20	28.10
115	TC	213.0	240.0	270.0	220.0	243.0	274.0	226.0	246.0	277.0	232.0	247.0	278.0
	SHC	204.6	172.1	136.4	217.0	185.5	144.2	226.0	199.0	152.2	232.0	209.5	158.9
	kW	26.60	27.80	28.90	27.20	28.30	29.40	27.90	28.70	29.80	28.40	29.00	30.20

LEGEND

BF — Bypass Factor
Edb — Entering Dry Bulb
Ewb — Entering Wet Bulb
kW — Compressor Motor Power Input
SHC — Sensible Heat Capacity (1000 Btuh)
TC — Total Capacity (1000 Btuh) Gross

NOTES:
1. Direct interpolation is permissible. Do not extrapolate.
2. The following formulas may be used:

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

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

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

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

3. 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.*

BF	ENTERING AIR DRY-BULB TEMP (F)					
	79	78	77	76	75	under 75
	81	*82*	*83*	*84*	*85*	*over 85*
	Correction Factor					
.05	1.04	2.07	3.11	4.14	4.18	Use formula shown below.
.10	.98	1.96	2.94	3.92	4.91	
.20	.87	1.74	2.62	3.49	4.36	

Interpolation is permissible.
Correction factor = 1.10 x (1 − BF) x (edb − 80)

4. Cooling capacities are gross and do not include deduction for indoor fan motor heat.

INTEGRATED HEATING CAPACITIES

50EJQ,EWQ024 (20 TONS)

CFM	Return Air Temp F (db)	Temp Air Entering Outdoor Coil (F db at 75% RH)																			
		−10		0		10		17		20		30		40		47		50		60	
		Cap.	kW	Cap.	kW	Cap.	kW	Cap.	kW	Cap.	kW	Cap.	kW	Cap.	kW	Cap.	kW	Cap.	kW	Cap.	kW
6000	55	67.2	12.45	90.3	13.44	111.0	14.37	123.8	15.05	130.5	15.39	152.7	16.49	208.0	17.67	238.0	18.69	250.0	19.14	294.0	20.70
	70	54.7	12.84	79.8	14.02	101.4	15.14	115.6	16.00	121.8	16.39	142.4	17.70	193.2	19.09	222.0	20.20	234.0	20.80	277.0	22.60
	80	50.0	12.95	74.8	14.25	96.3	15.52	109.9	16.53	115.8	16.97	135.6	18.42	184.0	19.94	212.0	21.20	224.0	21.80	265.0	23.70
7000	55	67.0	12.67	92.4	13.60	112.1	14.48	126.5	15.10	133.5	15.40	156.7	16.40	212.0	17.46	244.0	18.31	255.0	18.65	295.0	19.81
	70	54.3	13.11	79.3	14.21	103.8	15.28	118.1	16.07	124.5	16.44	145.8	17.65	198.4	18.91	228.0	20.00	240.0	20.40	281.0	21.90
	80	48.0	13.27	73.3	14.52	97.0	15.71	112.2	16.62	118.4	17.04	138.9	18.40	189.2	19.82	218.0	21.00	230.0	21.60	271.0	23.20
8000	55	68.7	12.90	94.4	13.79	114.2	14.62	128.9	15.20	135.9	15.47	159.6	16.39	217.0	17.31	245.0	18.01	255.0	18.28	289.0	19.18
	70	55.0	13.35	82.3	14.42	105.6	15.44	120.3	16.19	126.9	16.53	148.9	17.67	202.0	18.83	232.0	19.77	244.0	20.20	284.0	21.40
	80	46.2	13.56	72.7	14.77	99.2	15.88	114.4	16.76	102.8	17.14	141.7	18.44	193.2	19.76	222.0	20.80	235.0	21.40	276.0	22.80
9000	55	71.4	13.12	95.9	13.99	116.1	14.78	131.0	15.32	138.3	15.58	162.6	16.44	220.0	17.25	242.0	17.76	251.0	17.99	281.0	18.75
	70	56.4	13.59	85.0	14.62	107.6	15.61	122.2	16.33	128.9	16.65	151.4	17.73	206.0	18.82	234.0	19.57	245.0	19.90	281.0	21.00
	80	45.9	13.83	73.7	15.00	101.2	16.07	116.5	16.92	122.9	17.28	144.3	18.52	196.7	19.76	227.0	20.80	239.0	21.20	278.0	22.40

50EJQ,EWQ028 (25 TONS)

CFM	Return Air Temp F (db)	Temp Air Entering Outdoor Coil (F db at 75% RH)																			
		−10		0		10		17		20		30		40		47		50		60	
		Cap.	kW	Cap.	kW	Cap.	kW	Cap.	kW	Cap.	kW	Cap.	kW	Cap.	kW	Cap.	kW	Cap.	kW	Cap.	kW
7,500	55	85.8	15.31	108.8	16.35	131.2	17.32	147.9	17.99	156.1	18.33	181.9	19.47	247.0	20.70	280.0	21.60	292.0	21.90	322.0	22.70
	70	72.6	16.04	100.0	17.23	124.3	18.36	139.5	19.20	147.2	19.62	171.5	21.00	233.0	22.40	266.0	23.60	280.0	24.10	327.0	25.80
	80	69.5	16.36	94.3	17.75	118.4	19.02	134.1	19.91	141.6	20.40	165.0	21.90	223.0	23.50	256.0	24.80	271.0	25.40	317.0	27.40
8,750	55	88.3	15.56	110.9	16.57	133.9	17.47	150.7	18.09	159.2	18.40	185.6	19.42	253.0	20.50	281.0	21.10	293.0	21.50	332.0	22.50
	70	71.4	16.37	102.3	17.46	126.2	18.53	142.1	19.31	150.2	19.70	175.2	20.90	238.0	22.30	270.0	23.20	285.0	23.70	325.0	25.00
	80	68.7	16.71	92.8	18.02	120.8	19.20	136.6	20.09	144.4	20.50	168.4	21.90	228.0	23.30	262.0	24.60	275.0	25.10	320.0	26.70
10,000	55	88.8	15.88	112.9	16.82	136.2	17.67	153.3	18.23	161.7	18.53	188.7	19.47	254.0	20.30	276.0	20.80	283.0	21.00	304.0	21.30
	70	72.3	16.67	105.6	17.69	128.1	18.74	144.5	19.47	152.7	19.80	178.1	21.00	242.0	22.20	273.0	23.00	288.0	23.50	327.0	24.70
	80	67.5	17.05	94.5	18.30	123.0	19.41	138.9	20.19	146.8	20.60	171.2	22.00	232.0	23.30	266.0	24.40	279.0	24.80	319.0	26.10
11,250	55	90.8	16.18	114.6	17.09	138.1	17.90	155.2	18.42	163.8	18.70	191.0	19.54	248.0	20.20	275.0	20.80	283.0	21.10	306.0	21.40
	70	74.0	16.97	107.4	17.96	130.0	18.98	146.6	19.67	154.9	20.01	180.6	21.20	245.0	22.20	261.0	22.50	283.0	23.10	314.0	24.00
	80	67.7	17.38	98.9	18.53	124.6	19.64	140.8	20.40	148.8	20.80	173.8	22.10	236.0	23.40	267.0	24.30	279.0	24.70	315.0	25.80

LEGEND

ARI — Air Conditioning and Refrigeration Institute
Cap. — Integrated Heating Capacity — 1000 Btuh (includes effect of defrost and indoor-fan motor heat) at ARI conditions.
kW — Total Unit Power Input — Includes compressors, outdoor-fan motors, and indoor-fan motors. Indoor-fan motor heat based on unit operating at cfm shown and external static pressures (ESP) of 0.35.
RH — Relative Humidity

Conversion formula: Btuh = kW x 3412

FAN PERFORMANCE — POWER EXHAUST

50EJQ,EWQ024 AND 028 (20 AND 25 TONS)

Airflow (Cfm)	Low Speed						Medium Speed						High Speed					
	208 v			230,460 v			208 v			230,460 v			208 v			230,460 v		
	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts
6,500	0.32	2.82	3160	0.70	2.98	3340	—	—	—	—	—	—	—	—	—	—	—	—
6,700	0.23	2.87	3220	0.63	3.03	3400	0.60	3.01	3380	0.82	3.23	3620	—	—	—	—	—	—
6,900	0.17	2.92	3270	0.59	3.09	3460	0.55	3.07	3440	0.78	3.28	3680	—	—	—	—	—	—
7,100	0.13	2.93	3290	0.56	3.11	3490	0.49	3.12	3500	0.73	3.34	3740	—	—	—	—	—	—
7,300	0.09	2.97	3330	0.53	3.15	3530	0.43	3.18	3560	0.68	3.39	3800	—	—	—	—	—	—
7,500	—	—	—	0.51	3.19	3580	0.39	3.24	3630	0.64	3.44	3860	—	—	—	—	—	—
7,700	—	—	—	0.48	3.23	3620	0.33	3.27	3670	0.59	3.48	3900	0.60	3.69	4140	0.73	3.98	4460
7,900	—	—	—	0.45	3.27	3670	0.27	3.32	3720	0.54	3.52	3950	0.56	3.74	4190	0.69	4.02	4510
8,100	—	—	—	0.40	3.33	3730	0.22	3.36	3770	0.49	3.57	4000	0.51	3.78	4240	0.65	4.07	4560
8,500	—	—	—	—	—	—	0.17	3.47	3890	0.40	3.67	4120	0.41	3.83	4290	0.56	4.12	4620
8,900	—	—	—	—	—	—	0.00	3.58	4010	0.30	3.77	4230	0.31	3.93	4410	0.47	4.23	4740
9,300	—	—	—	—	—	—	—	—	—	0.22	3.87	4340	0.20	4.07	4560	0.37	4.37	4900
9,700	—	—	—	—	—	—	—	—	—	0.16	3.95	4430	0.11	4.17	4670	0.30	4.47	5010
10,100	—	—	—	—	—	—	—	—	—	0.12	4.03	4520	0.04	4.25	4770	0.23	4.56	5110
10,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.17	4.66	5220
10,900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.12	4.75	5330
10,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.17	4.66	5220
10,900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.12	4.75	5330
11,300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.07	4.80	5380
11,700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.04	4.83	5420

LEGEND

Bhp — Brake Horsepower
ESP — External Static Pressure (in. wg)
Watts — Input Watts to Motor

Performance data (cont)

FAN PERFORMANCE — VERTICAL DISCHARGE UNITS

For 50EWQ units, reduce net available external static pressure by 0.3 in. wg.

50EJQ,EWQ024 AND 028 (20 AND 25 TONS)

Airflow (Cfm)	Available External Static Pressure (in. wg)															
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
6,000	403	1.62	468	2.01	526	2.41	577	2.81	624	3.21	668	3.62	709	4.04	748	4.46
7,000	448	2.22	508	2.65	561	3.08	609	3.50	654	3.93	696	4.37	736	4.81	773	5.25
8,000	495	2.97	549	3.42	599	3.88	645	4.33	687	4.79	727	5.25	765	5.71	801	6.18
8,250	507	3.18	560	3.64	609	4.10	654	4.56	696	5.02	735	5.49	773	5.96	809	6.43
9,000	543	3.85	593	4.34	639	4.82	682	5.30	723	5.78	761	6.27	797	6.76	832	7.24
10,000	592	4.90	638	5.41	682	5.91	722	6.42	760	6.93	797	7.44	832	7.95	865	8.46
11,000	642	6.10	685	6.64	725	7.17	764	7.70	800	8.24	835	8.77	868	9.30	900	9.84
12,000	693	7.48	733	8.04	771	8.60	807	9.15	841	9.71	874	10.26	906	10.82	937	11.38
12,500	718	8.23	757	8.80	794	9.37	829	9.94	862	10.51	895	11.08	926	11.64	956	12.21

50EJQ,EWQ024 AND 028 (20 AND 25 TONS)

Airflow (Cfm)	Available External Static Pressure (in. wg)															
	1.8		2.0		2.2		2.4		2.6		2.8		3.0		3.2	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
6,000	785	4.89	820	5.32	854	5.76	886	6.21	918	6.65	948	7.11	977	7.56	1006	8.02
7,000	809	5.70	843	6.16	876	6.61	908	7.08	939	7.54	968	8.01	997	8.49	1025	8.96
8,000	836	6.65	869	7.12	901	7.60	932	8.08	962	8.57	991	9.05	1019	9.55	1046	10.04
8,250	843	6.91	876	7.39	908	7.87	938	8.36	968	8.84	997	9.34	1025	9.83	1052	10.33
9,000	865	7.74	898	8.23	929	8.73	959	9.23	988	9.74	1016	10.24	1043	10.75	1070	11.27
10,000	897	8.98	928	9.49	958	10.01	987	10.53	1016	11.06	1043	11.58	1070	12.11	1096	12.64
11,000	931	10.37	961	10.91	990	11.45	1018	11.99	1046	12.54	1073	13.08	1099	13.63	1124	14.18
12,000	967	11.94	996	12.49	1024	13.06	1051	13.62	1078	14.18	1104	14.75	1129	15.31	1154	15.88
12,500	985	12.78	1014	13.35	1041	13.92	1068	14.49	1094	15.07	1120	15.64	1145	16.22	1169	16.80

50EJQ,EWQ024 AND 028 (20 AND 25 TONS)

Airflow (Cfm)	Available External Static Pressure (in. wg)					
	3.4		3.6		3.8	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
6,000	1034	8.49	1061	8.96	1087	9.43
7,000	1052	9.44	1079	9.93	1105	10.42
8,000	1073	10.54	1099	11.04	1125	11.55
8,250	1079	10.84	1105	11.34	1130	11.85
9,000	1096	11.78	1122	12.30	1147	12.82
10,000	1122	13.18	1147	13.71	1171	14.25
11,000	1149	14.73	1173	15.29	1197	15.84
12,000	1178	16.45	1202	17.03	—	—
12,500	1193	17.38	—	—	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:
1. Fan performance is based on wet coils, economizer, roof curb, cabinet losses, and clean 2-in. filters.
2. Conversion — Bhp to watts:

$$\text{Watts} = \frac{\text{Bhp} \times 746}{\text{Motor efficiency}}$$

MOTOR LIMITATIONS

STANDARD EFFICIENCY MOTORS

Nominal Hp	Maximum Bhp	Maximum Amps		Maximum Watts	Motor Efficiency
		230	460		
5	5.9	14.6	—	5,030	87.5
	5.9	—	7.9	5,030	87.5
7.5	8.7	22.0	—	7,334	88.5
	9.5	—	12.0	8,008	88.5
10	10.2	28.0	—	8,502	89.5
	11.8	—	14.6	9,836	89.5
15	15.3	43.8	—	12,543	91.0
	18.0	—	21.9	14,756	91.0

HIGH EFFICIENCY MOTORS

Nominal Hp	Maximum Bhp	Maximum Amps		Maximum Watts	Motor Efficiency
		230	460		
5	5.9	15.8	—	4,918	89.5
	5.9	—	7.9	4,918	89.5
7.5	8.7	22.0	—	7,078	91.7
	9.5	—	12.0	7,728	91.7
10	10.2	28.0	—	8,298	91.7
	11.8	—	15.0	9,600	91.7
15	15.3	43.8	—	12,273	93.0
	18.0	—	21.9	14,439	93.0

LEGEND

BHP — Brake Horsepower

NOTE: Extensive motor and electrical testing on the Carrier units has ensured that the full horsepower range of the motor can be utilized with confidence. Using your fan motors up to the horsepower ratings shown on the Motor Limitations table will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.

Electrical data

UNIT SIZE 50EJQ,EWQ	NOMINAL VOLTAGE (3 Ph 60 Hz)	VOLTAGE RANGE		COMPRESSORS		OFM			IFM		POWER EXHAUST		ELECTRIC HEAT*		POWER SUPPLY	
		MIN	MAX	RLA	LRA	Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	kW	FLA	MCA	MOCP†
024	208/230	187	254	35.6	198	2	1	5.3	5	16.7/15.2	— 23.6	— 4.16	—/— —/—	—/— —/—	107.4/105.9 131.0/129.5	125/125 150/150
											— 23.6	— 4.16	27/36 27/36	75.1/86.6 75.1/86.6	201.2/214.2 224.8/237.8	225/225 225/250
											— **23.6**	— **4.16**	**54/72** **54/72**	**150.1/173.2** **150.1/173.2**	**257.5/279.1** **281.1/302.7**	**275/300** **300/350**
									10	30.8/28	— 23.6	— 4.16	—/— —/—	—/— —/—	121.5/118.7 145.1/142.3	150/150 175/175
											— 23.6	— 4.16	27/36 27/36	75.1/86.6 75.1/86.6	215.3/227.0 230.7/250.6	225/250 250/275
											— **23.6**	— **4.16**	**54/72** **54/72**	**150.1/173.2** **150.1/173.2**	**271.6/291.9** **295.2/315.5**	**300/300** **300/350**
									15	46.2/42	— 23.6	— 4.16	—/— —/—	—/— —/—	136.9/132.7 160.5/156.3	150/150 175/175
											— 23.6	— 4.16	27/36 27/36	75.1/86.6 75.1/86.6	230.7/241.0 254.3/264.6	250/250 275/275
											— **23.6**	— **4.16**	**54/72** **54/72**	**150.1/173.2** **150.1/173.2**	**287.0/305.9** **310.6/329.5**	**300/350** **350/350**
	460	414	508	17.8	99	2	1	2.7	5	7.6	— 23.6	— 41.6	— —	— —	53.1 65.7	70 80
											— 23.6	— 41.6	36 36	43.3 43.3	107.2 119.8	110 125
											— 23.6	— 41.6	72 72	86.6 86.6	139.7 152.3	150 175
									10	14	— 23.6	— 41.6	— —	— —	59.5 72.1	70 80
											— 23.6	— 41.6	36 36	43.3 43.3	113.6 126.2	125 150
											— 23.6	— 41.6	72 72	86.6 86.6	146.1 158.7	150 175
									15	21	— 23.6	— 41.6	— —	— —	66.5 79.1	80 90
											— 23.6	— 41.6	36 36	43.3 43.3	120.6 133.2	125 150
											— 23.6	— 41.6	72 72	86.6 86.6	153.1 165.7	175 175
028	208/230	187	254	39.7	228	2	1	5.3	7.5	24.2/22	— 23.6	— 4.16	—/— —/—	—/— —/—	124.1/121.9 147.7/145.5	150/150 175/175
											— 23.6	— 4.16	27/36 27/36	75.1/86.6 75.1/86.6	217.9/230.2 241.5/253.8	225/250 250/275
											— **23.6**	— **4.16**	**54/72** **54/72**	**150.1/173.2** **150.1/173.2**	**274.2/295.1** **297.8/318.7**	**300/300** **300/350**
									10	30.8/28	— 23.6	— 4.16	—/— —/—	—/— —/—	130.7/127.9 154.3/151.5	150/150 175/175
											— 23.6	— 4.16	27/36 27/36	75.1/86.6 75.1/86.6	224.5/236.2 239.9/259.8	225/250 250/275
											— **23.6**	— **4.16**	**54/72** **54/72**	**150.1/173.2** **150.1/173.2**	**280.8/301.1** **304.4/324.7**	**300/350** **350/350**
									15	46.2/42	— 23.6	— 4.16	—/— —/—	—/— —/—	146.1/141.9 169.7/165.5	175/175 200/200
											— 23.6	— 4.16	27/36 27/36	75.1/86.6 75.1/86.6	239.9/250.2 263.5/273.8	250/275 275/275
											— **23.6**	— **4.16**	**54/72** **54/72**	**150.1/173.2** **150.1/173.2**	**296.2/315.1** **319.8/338.7**	**300/350** **350/350**

See Legend on next page.

UNIT SIZE 50EJQ,EWQ	NOMINAL VOLTAGE (3 Ph 60 Hz)	VOLTAGE RANGE		COMPRESSORS		OFM			IFM		POWER EXHAUST		ELECTRIC HEAT*		POWER SUPPLY	
		MIN	MAX	RLA	LRA	Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	kW	FLA	MCA	MOCP†
028 (cont)	460	414	508	19.9	114	2	1	2.7	7.5	11	— 23.6	— 41.6	— —	— —	61.2 73.8	80 90
											— 23.6	— 41.6	36 36	43.3 43.3	115.3 127.9	125 150
											— 23.6	— 41.6	72 72	86.6 86.6	147.8 160.4	150 175
									10	14	— 23.6	— 41.6	— —	— —	64.2 76.8	80 90
											— 23.6	— 41.6	36 36	43.3 43.3	118.3 130.9	125 150
											— 23.6	— 41.6	72 72	86.6 86.6	150.8 163.4	175 175
									15	21	— 23.6	— 41.6	— —	— —	71.2 83.8	90 100
											— 23.6	— 41.6	36 36	43.3 43.3	125.3 137.9	150 150
											— 23.6	— 41.6	72 72	86.6 86.6	157.8 170.4	175 175

LEGEND

FLA — Full Load Amps
HACR — Heating, Air Conditioning and Refrigeration
IFM — Indoor Fan Motor
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection
NEC — National Electrical Code
OFM — Outdoor Fan Motor
RLA — Rated Load Amps

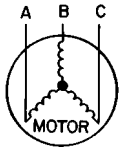
Boldface indicates electric heaters at specified kW rating are not available on 50EWQ units.

*Heater capacity (kW) is based on heater voltage of 208 v, 240 v, and 480 v. If power distribution voltage to unit varies from rated heater voltage, heater kW will vary accordingly.
†Fuse or HACR circuit breaker.

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 Canadian 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 percent 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

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

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.

3. MCA calculation for units with electric heaters over 50 kW = (1.25 x IFM amps) + (1.00 x heater FLA).

Operating sequence

Cooling, units with wall thermostat — When the room thermostat calls for cooling, the outdoor-air temperature (OAT) is above 65 F, and the SAT (supply-air temperature) and the OAT are not in alarm, compressor contactor no. 1 is energized. Then compressor no. 1 and outdoor-fan motor (OFM) no. 1 and 2 are started. The indoor-fan motor (IFM) is then energized, and the economizer damper moves to the minimum position. The OFM2 cycles on outdoor-air temperature. The fan motor is energized at 65 F and deenergized at 55 F.

Upon a further call for cooling, compressor contactor no. 2 will be energized, starting compressor no. 2.

After the thermostat is satisfied, the compressors and OFMs are turned off, and the damper moves to the fully closed position when using an auto. fan. If using continuous fan the damper will stay at the minimum position.

When the outdoor-air temperature is below 65 F, and the room thermostat calls for cooling, the economizer dampers move to the minimum position. If the supply-air temperature is above 55 F, the damper continues to open until it reaches the fully open position, or until the supply-air temperature drops below 55 F.

When the supply-air temperature is 55 F, the damper will remain at an intermediate open position. If the supply-air temperature falls below 55 F, the damper will modulate closed until it reaches the minimum position or until the supply-air temperature is above 55 F. When the room thermostat is satisfied, the damper will move to the fully closed position when using an auto. fan or to the minimum position when using a continuous fan.

If the outdoor air alone cannot satisfy the cooling requirements of the conditioned space, economizer cooling is integrated with mechanical cooling, providing second-stage cooling. When the thermostat calls for second-stage cooling, compressor no. 1 and condenser fan(s) will be energized and the position of the economizer damper will be determined by the supply-air temperature. If the supply-air temperature is above 55 F for more than 15 minutes, compressor no. 2 is energized.

When the second stage of cooling is satisfied, the last compressor energized and OFM(s), if appropriate, will be deenergized. The damper position will be determined by the supply-air temperature. When the first stage of cooling is satisfied, the remaining compressor (if any) and the IFM shuts off. If the thermostat fan selector switch is in the ON position, the IFM will run continuously and the dampers will remain in the minimum position.

Cooling, units with space sensor and CCN (Carrier Comfort Network) — When the indoor-fan motor (IFM) is energized and the outside-air temperature sensor is not in alarm, the software controls space temperature by maintaining the supply-air temperature at the value specified by the supply-air temperature set point through cycling the compressors. Both the supply-air temperature and set point temperature are used to adjust the cycling deadband to match the actual load. The control system provides cooling capacity control of up to 2 stages of cooling to maintain occupied space temperature to the occupied or unoccupied set point.

If nighttime free cooling is enabled via CCN, the indoor fan will be energized and dampers opened to pre-cool the space prior to the system entering the Occupied mode in the morning.

Heating — The control module is powered by 24 vac. If the unit is controlled with a room sensor, the fan will run continuously in the Occupied mode, with the outside-air damper in the minimum position. If the unit is controlled through a room thermostat (with FAN set to AUTO), upon a call for heat the first stage heat is energized, energizing reversing valve solenoids (RVS1 and 2) and compressor no. 1 and 2, indoor and outdoor fan motors start. Upon a call for additional heat the second stage of heat is energized. When the call for heat, is satisfied, the compressors, fan motors, and heaters will be deenergized and the outdoor-air damper will move to the closed position.

If the unit is controlled with a room sensor the fan will not run in the Unoccupied mode unless space temperature is below the unoccupied heat set point. Upon a call for heat, the first stage of heat is energized, energizing reversing valve solenoids (RVS1 and 2) and starting compressor no. 1 and 2. The indoor and outdoor fan motors start, and the outdoor air damper will move to the Unoccupied IAQ position (generally set to zero in the Unoccupied mode). The IAQ feature is enabled through system software. Upon a call for additional heat, the second stage of heat is energized. When the call for heat is satisfied, the compressors, fan motors, and heaters will be deenergized and the outdoor-air damper will move to the closed position.

Defrost cycle — When the temperature of the outdoor coil drops below 28 F as sensed by the defrost thermostat (DFT1 or 2) and the defrost timer is at the end of a timed period (adjustable at 30 to 90 minutes) the defrost cycle will begin. The control board will deenergize the reversing valve solenoids (RVS1 and 2), and energize the electric heat. Also, the outdoor-fan motor will stop.

The unit will continue to defrost until the coil temperature as measured by DFT1 and 2 reaches 65 F, or the defrost cycle completes its 10-minute cycle.

During the defrost mode, if a circuit defrosts first, the RVS will oscillate between heating and cooling modes until defrost mode is complete. This will keep the head pressure on that circuit from getting to high.

At the end of the defrost cycle, the electric heaters will be deenergized, the reversing valve solenoids will be energized, and the outdoor fan will start.

Power exhaust operation — The optional power exhaust packages are factory- or field-installed with vertical units and optionally installed in the return air ductwork for horizontal applications. The standard and modulating power exhaust (offered on units with non-modulating to modulating accessory conversion kit) are the 2 packages available. The modulating power exhaust package is equipped with a field-adjustable static pressure controller which will control up to 4 power exhaust stages to maintain a building static pressure. The blue sequencer located in the control box below the control board can be adjusted by removing the covers and adjusting the set point dial to the desired building pressure. The standard power exhaust package controls

up to 2 stages of power exhaust to maintain building pressure. These power exhaust stages are staged according to a percentage of the economizer damper position. The default values are 25% for Stage 1 and 75% for Stage 2. This package has set points that are adjustable through software (such as Service Tool, Building Supervisor, or ComfortWorks™ software).

Smoke detector — A smoke detector can be used to initiate fire shutdown. This can be accomplished by a set of normally closed pilot relay contacts which will interrupt power from the 24-v transformer secondary ''B'' terminal to the control circuit breaker (CB4). The wire that connects these two points is white and labeled. ''W78.''

The smoke detector may be mounted in the return air duct or the supply duct. Carrier does not make recommendations as to specific smoke detector location due to liability considerations.

Smoke control modes — The 50EJQ,EWQ units with an optional expansion board and power exhaust perform fire and smoke control modes. The expansion board provides 4 modes which can be used to control smoke within the conditioned area. The modes of operation are fire shutdown, pressurization, evacuation, and smoke purge.

Control options

The control options that the units can provide are based on the following parameters: stand-alone unit with field-supplied sensors installed; as a system via the Carrier Comfort System (TEMP); optional electronic expansion board installed; linked to the Carrier Comfort Network; and availability of a computer and software (Comfort Works™, Building Supervisor, and Service Tool) or accessory LID-2B device to access the base control board.

NOTE: Access to the base control board allows unit occupancy schedules, unit timeclock, and various set points to be changed from their factory-defined default settings.

The units, as shipped, are operable as stand-alone units, using either a standard (mechanical or electronic) 2-stage heat, 2-stage cool thermostat, or with an electronic room sensor and a timeclock to establish unit start and stop times.

With a standard thermostat (programmable is optional), heating and cooling operation is set by space temperature.

With a space sensor and timeclock, the machine will operate at default values unless they are changed using appropriate input devices. The space sensor senses space temperature and may be equipped with a timed override feature, which allows unit operation during unoccupied periods.

The space sensors may be used in multiples to achieve space temperature averaging. The use of a space sensor also allows the unit to be turned on and off from a remote signal.

Features with thermostat control of unit

- two-stage heating (if installed)
- two-stage cooling
- control of unit using Y1, Y2, W1, W2, and G thermostat inputs
- control of the indoor fan
- outdoor-air temperature / supply-air temperature monitoring
- control of an outdoor-air fan based on outdoor-air temperature
- control of modulating economizer damper to provide free cooling when outdoor conditions are suitable, using supply-air temperature as a control point
- control of the economizer damper and indoor fan to obtain unoccupied free cooling
- provide power exhaust output to an external power exhaust controller
- support a field test for field checkout
- control of 2 stages of non-modulated power exhaust
- compressor Time Guard® override (power up and minimum off and on times)
- compressor lockout during low supply air temperature

Additional features are provided by accessing the standard unit control board via software with a computer. These features are:

- electronic expansion board features (if installed)
- control board diagnostics
- ability to change supply air set point (economizer control)
- ability to change high outdoor air temperature lockout set point (economizer control)
- ability to change power exhaust set points

NOTE: A unit without a thermostat requires a field-supplied sensor for operation.

SMOKE CONTROL MODES

DEVICE	PRESSURIZATION	SMOKE PURGE	EVACUATION	FIRE SHUTDOWN
Economizer	100%	100%	100%	0%
Indoor Fan	ON	ON	OFF	OFF
Power Exhaust (all outputs)	OFF	ON	ON	OFF
Heat Stages	OFF	OFF	OFF	OFF

Controls (cont)

Features with sensor control of unit (stand-alone applications) — Unit control is limited to unoccupied default set points, 90 F for cooling, 55 F for heating. There are 2 sensor options available:

- T-55 sensor will monitor room temperature and provide unoccupied override capability (1 hour)
- T-56 sensor will monitor room temperature, provide unoccupied override capability (1 hour), and provide a temperature offset of 5° F)

Standard features are:

- support of remote occupied/unoccupied input to start and stop the unit
- cooling capacity control of 3 stages using economizer and 2 compressors to maintain space temperature to an occupied or unoccupied set point
- enable heating (if installed) or cooling during unoccupied periods as required to maintain space temperature within the unoccupied set points
- adjustment of space temperature set points of ± 5° F when using a T-56 sensor

Features with sensor control of unit are:

- 365-day timeclock with backup (supports minute, hour, day of week, date, month, and year)
- daylight savings time function
- occupancy control with 8 periods for unit operation
- holiday table containing up to 18 holiday schedules
- ability to initiate timed override from T-55 or T-56 sensors
- ability to use multiple space temperature sensors to average the space temperature
- supply-air temperature reset for the supply-air temperature set point
- temperature compensated start to calculate early start times before occupancy
- access to the Display, Maintenance, Configuration, Service, and Set Point data table through network software

When the unit is equipped with a field-supplied space temperature sensor and a remote contact closure (remote start/stop) on the base control board, the occupied default set points will monitor unit operation. The occupied default set points are 78 F cooling and 68 F heating.

NOTE: For units (with a field-supplied space temperature sensor) which have not had the base unit control board accessed via software to set an occupancy schedule, the remote start/stop closure will allow the unit to operate in the pre-configured occupied default set points (based on space temperature) of 78 F cooling and 68 F heating. Without this feature, the unit will control to the unoccupied default set points of 90 F cooling and 55 F heating.

An electronic expansion board may be field-installed to provide the following features:

- control of modulating economizer damper to maintain indoor air quality (IAQ) when outdoor conditions are suitable
- provide discrete inputs for fan status, filter status, field-applied status, and demand limit
- provide an output for the external alarm light indicator

When the unit is connected to the CCN, the following expansion board features can be utilized:

- perform Demand Limit functions based on CCN load-shed commands or the state of the discrete input
- alarm monitoring of all key parameters
- CCN protocol
- provides power exhaust fire outputs for direct control of modulated power exhaust stages during fire or smoke modes
- smoke control modes including evacuation, smoke purge, pressurization, and fire shutdown (modulating power exhaust required)
- provides CCN IAQ participation

See Carrier TEMP literature for complete TEMP (single zone) application information.

Features with sensor control of unit (network applications) — The base control board provides, as standard, a connection for use with a Carrier TEMP system and can also be integrated into a Carrier Comfort Network.

When the unit is accessed via a PC equipped with ComfortWorks™, Building Supervisor, or Service Tool software, the following features can be accessed:

- on-board timeclock can be programmed
- occupancy schedules can be programmed
- unit set points can be changed
- alarms can be monitored

This access is available on the base control board via a RJ-11 phone jack or a 3-wire connection to the communication bus. The timeclock has a 10-hour minimum backup time to provide for unit power off for servicing unit or during unexpected power outages. For complete Carrier Comfort System (CCS) and Carrier Comfort Network (CCN) features and benefits, refer to the CCN product literature.

I/O CHANNEL DESIGNATIONS BASE MODULE

TERMINAL NO.	ASSIGNMENT	TERMINAL NO.	ASSIGNMENT
T1-2	SPT (CCN) — 10KΩ Thermistor	**T23-25**	Compressor 2 Safety — DI (24 vac)
T3-4	STO (CCN) — 10KΩ Thermistor	**T24-25**	Outside Air Enthalpy — DI (24 vac)
T5-6	OAT — 5KΩ Thermistor	**T26-27**	Economizer Pos. — AO (4-20 mA)
T7-8	SAT — 5KΩ Thermistor	**T28-29**	Heat 1 Relay — DO (24 vac)
T9-10	—	**T30-29**	Heat 2 Relay — DO (24 vac)
T11-12	SAT Reset — AI (4 to 20 mA)	**T31-32**	CV Power Exhaust 1/Modulating Power Exhaust — DO (115 vac)
T13-14	—	**T33-32**	CV Power Exhaust 2 — DO (115 vac)
T15-16	—	**T34-35**	Condenser Fan — DO (115 vac)
T17-25	Y1 or Remote Start/Stop — DI (24 vac)	**T36-35**	OFC2 — DO (115 vac)
T18-25	Y2 — DI (24 vac)	**T37-38**	—
T19-25	W1 — DI (24 vac)	**T39-38**	—
T20-25	W2 — DI (24 vac)	**K1**	Indoor Fan Relay — DO (LV)
T21-25	G — DI (24 vac)	**K2**	Compr. 1 — DO (HV)
T22-25	Compressor 1 Safety — DI (24 vac)	**K3**	Compr. 2 — DO (HV)

I/O CHANNEL DESIGNATIONS EXPANSION MODULE (Field-Installed)

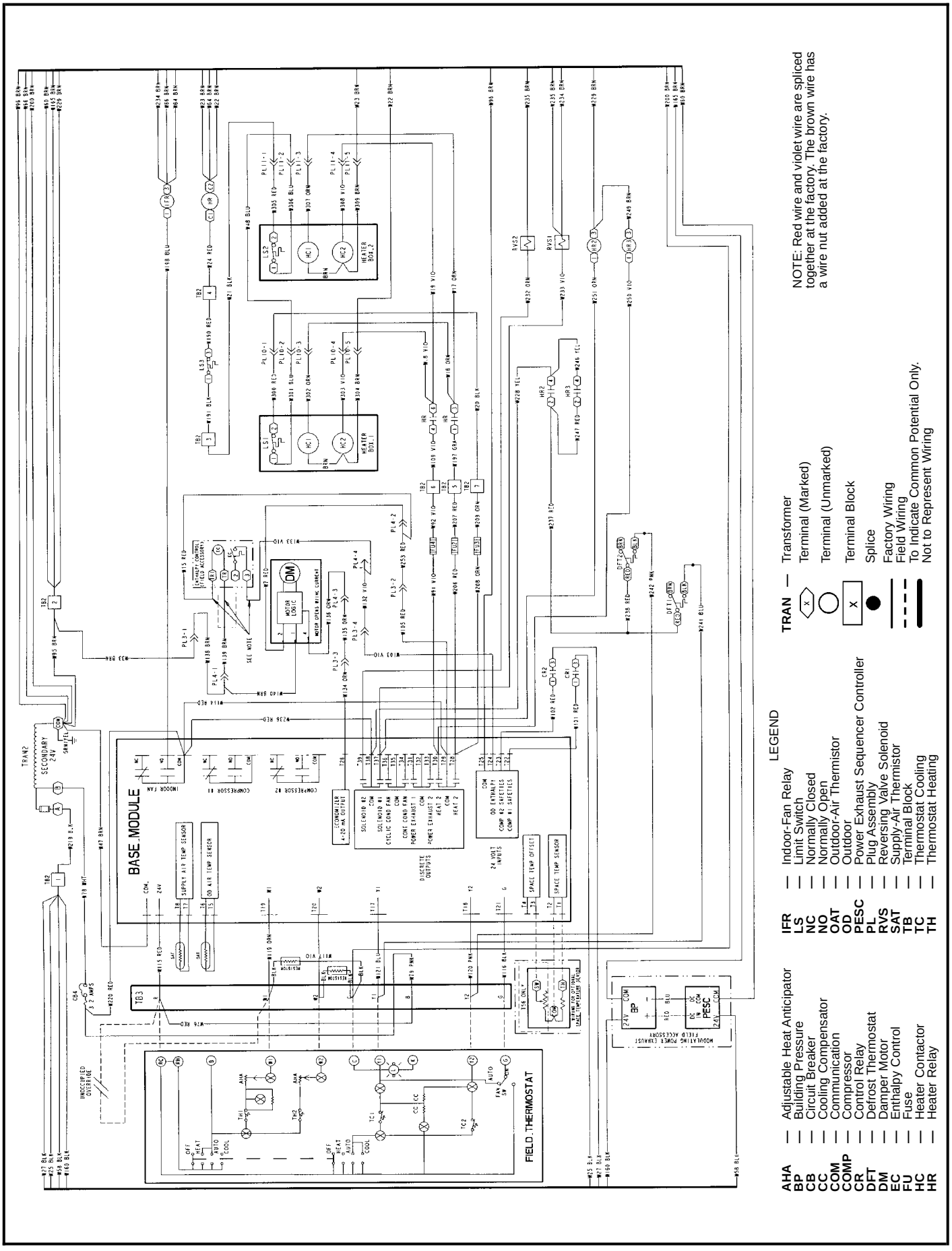
TERMINAL NO.	ASSIGNMENT	TERMINAL NO.	ASSIGNMENT
T1-2	—	**T23-25**	Fire — Evacuation — DI (24 vac)
T3-4	—	**T24-25**	Fire — Smoke Purge — DI (24 vac)
T5-6	—	**T26-27**	—
T7-8	—	**T28-29**	—
T9-10	—	**T30-29**	Alarm Light Indicator — DO (24 vac)
T11-12	IAQ Indoor — AI (4 to 20 mA)	**T31-32**	Power Exhaust Fire No. 1 — DO (115 vac)
T13-14	IAQ Outdoor — AI (4 to 20 mA)	**T33-32**	Power Exhaust Fire No. 2 — DO (115 vac)
T15-16	—	**T34-35**	Power Exhaust Fire No. 3 — DO (115 vac)
T17-25	Fan Status — DI (24 vac)	**T36-35**	Power Exhaust Fire No. 4 — DO (115 vac)
T18-25	Filter Status − DI (24 vac)	**T37-38**	—
T19-25	Field Applied Status — DI (24 vac)	**T39-38**	—
T20-25	Demand Limit — DI (24 vac)	**K1**	—
T21-25	Fire — Unit Shutdown — DI (24 vac)	**K2**	—
T22-25	Fire — Pressurization — DI (24 vac)	**K3**	—

LEGEND

AI — Analog Input
AO — Analog Output
CCN — Carrier Comfort Network
CV — Constant Volume
DI — Direct Input
DO — Direct Output
HV — High Voltage
IAQ — Indoor Air Quality
KΩ — Kilo-Ohms
LV — Low Voltage
OAT — Outdoor-Air Temperature
OFC — Outdoor Fan Contactor
SAT — Supply-Air Temperature
SPT — Space Temperature
STO — Space Temperature Offset
T — Terminal

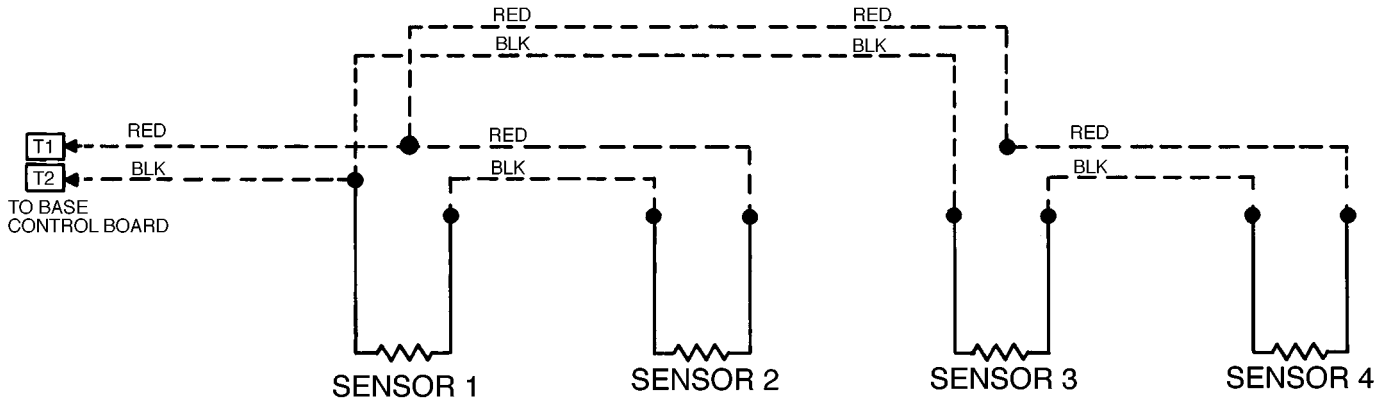
NOTE: All even numbered terminals are negative (−) polarity and all odd numbered terminals are positive (+) polarity.

Typical wiring schematic

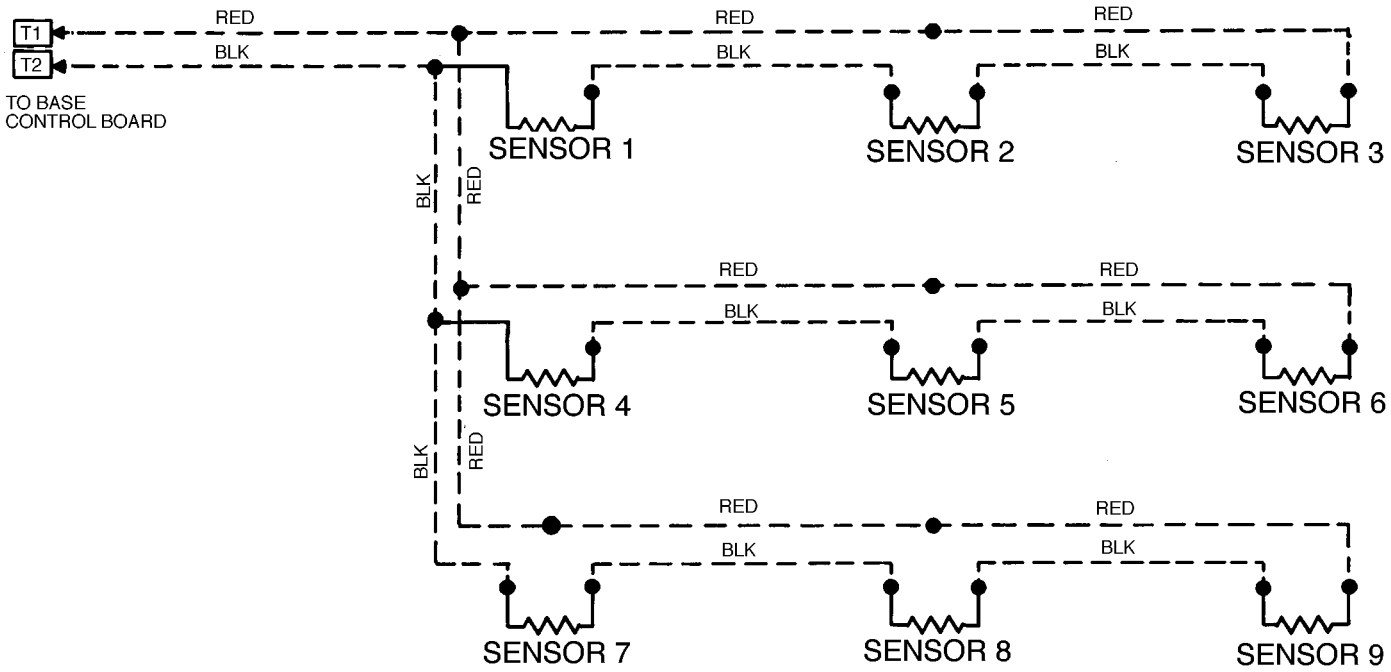


Control wiring

SPACE TEMPERATURE AVERAGING WIRING



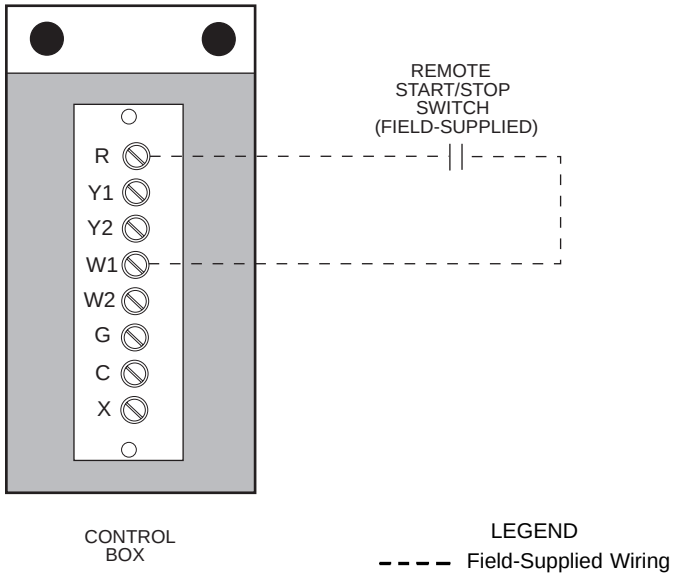
SPACE TEMPERATURE AVERAGING — 4 SENSOR APPLICATION



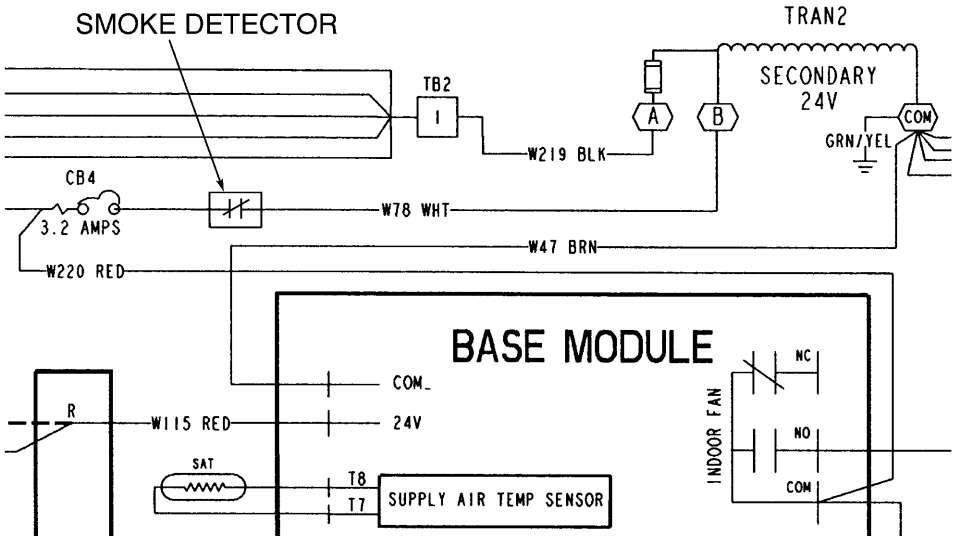
SPACE TEMPERATURE AVERAGING — 9 SENSOR APPLICATION

Control wiring (cont)

FIELD CONTROL REMOTE START/STOP WIRING



SMOKE DETECTOR WIRING



Application data

Ductwork — Secure vertical discharge ductwork to roof curb. Interior installation may proceed before unit is set in place on roof. For horizontal discharge applications, attach ductwork to unit, or field-supplied flanges can be attached to horizontal discharge openings and all ductwork attached to flanges.

Thru-the-curb service connections — Roof curb connections allow field power wires and control wires to enter through the roof curb opening.

Thermostat — Use of a thermistor type room sensor is recommended on all CCN installations. A thermistor type room sensor or a 2-stage heating/cooling thermostat may be used for all other units.

Heating-to-cooling changeover — All units are automatic changeover from heating to cooling when automatic changeover thermostat and subbase or a thermistor type room sensor are used.

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

Maximum airflow — To minimize the possibility of condensate blow-off from evaporator, airflow through units should not exceed 500 cfm/ton.

Minimum airflow — The minimum airflow for cooling is 300 cfm/ton. Refer to 50EJQ,EWQ Nominal CFM Range table on page 5 for minimum airflow cfm for heating.

Existing roof curbs (48/50DD,DF,DL024-054 units) — The 50EJQ,EWQ units will install on existing 48/50DD,DF,DL vertical supply and return roof curb applications. This minimizes installation expenses due to the use of the existing curb. No additional roof penetrations or transition curbs are required.

The existing building ductwork on 48/50DD,DF,DL units is **connected to the unit** (not the roof curb). The ductwork must be disconnected from the existing unit prior to its removal. The ductwork must then be cut back below the roof curb to allow for installation of field-supplied ductwork. The field-supplied ductwork will transition from the existing building ductwork to the newly installed accessory roof curb adapter package. The accessory roof curb adapter package provides sheet metal duct connections to be installed in the existing roof curb. No connections exist in the original roof curb since the ductwork is connected to the unit, not the curb.

NOTE: Each installation should be evaluated to determine if the application will accommodate the accessory roof curb adapter package. Call Carrier Application Engineering for more information concerning individual applications.

Minimum ambient cooling operation temperature — All units equipped with factory economizers to allow free cooling at any outdoor ambient. If mechanical cooling is required, the units are designed to operate at outdoor temperatures down to 35 F at full load conditions. With accessory Motormaster® III control units can operate at outdoor temperatures down to −20 F. Outdoor-fan motor no. 1 changeout is required for Motormaster III applications.

Maximum operating outdoor-air temperature — The maximum operating outdoor-air temperature is 115 F.

Minimum heating operation outdoor-air temperature — The minimum heating operation outdoor-air temperature is −20 F.

Internal unit design — Due to Carrier's internal unit design (draw-thru over the motor), air path, and specially designed motors, the full horsepower listed in the Physical Data table and motor limitations table can be utilized with extreme confidence.

Using Carrier motors with the values listed in the Physical Data and Motor Limitations tables *will not* result in nuisance tripping or premature motor failure. The unit warranty will not be affected.

Electric heat — A field-supplied 90° elbow must be installed in the supply ductwork below the unit discharge connection.

Guide specifications

Packaged Rooftop Heat Pump — Constant Volume Application

HVAC Guide Specifications — Section 50EJQ,EWQ

Size Range: **20 and 25 Tons, Nominal**
Carrier Model Number: **50EJQ, 50EWQ**

Part 1 — General

1.01 SYSTEM DESCRIPTION

Outdoor roof curb or slab mounted, electronically controlled heating and cooling unit utilizing semi-hermetic reciprocating type compressors for cooling and heating duty and optional electric heat for second stage heating duty. Units shall discharge supply air vertically or horizontally as shown on contract drawings.

1.02 QUALITY ASSURANCE

A. Unit shall be rated in accordance with ARI Standard 340 and designed in accordance with UL Standard 1995.

B. Unit shall be designed to conform to ANSI/ASHRAE 15 and 62 (latest edition) and NEC.

C. Unit shall be tested and certified by ETL in accordance with ANSI Z21.47 Standards as a total package.

D. Roof curb shall be NRCA approved.

E. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation. Insulation shall contain an EPA-registered immobilized antimicrobial agent to effectively resist the growth of bacteria and fungi as proven by tests in accordance with ASTM Standards G21 and 22.

F. Unit shall be manufactured in a facility registered to the ISO 9001:2000 manufacturing quality standard.

1.03 DELIVERY, STORAGE AND HANDLING

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

Part 2 — Products

2.01 EQUIPMENT

A. Factory-assembled, single-piece heating and cooling unit. Contained within the unit enclosure shall be all factory wiring, piping, refrigerant charge (R-22), operating oil charge, dual refrigerant circuits, microprocessor based control system and associated hardware, and all special features required prior to field start-up.

B. Unit Cabinet:

1. Constructed of galvanized steel, bonderized and precoated with a baked enamel finish.
   a. Top cover shall be 18-gage sheet metal, 0.75-in. thick.
   b. Access panels and doors shall be 20-gage sheet metal, 0.5-in. thick.
   c. Corner and center posts shall be 16-gage galvanized steel.
   d. Basepans in the heating and return air sections shall be 16-gage galvanized steel.
   e. Basepans in the outdoor section shall be 12-gage galvanized steel.
   f. Compressor rail shall be 12-gage galvanized steel.
   g. Condensate pan shall be 16-gage aluminized steel.
   h. Air baffles shall be 18-gage galvanized steel, 0.5-in. thick.
   i. Base rail shall be 14-gage galvanized steel.
   j. Fan deck (indoor and outdoor section) shall be 16-gage galvanized steel.
2. Unit casing shall be capable of withstanding Federal test method Standard No. 141 (Method 6061) 500-hour salt spray test.
3. Sides shall have person-sized insulated hinged access doors for easy access to the control box and other areas requiring servicing. Each door shall seal against a rubber gasket to prevent air and water leakage and be equipped to permit ease and safety during servicing.
4. Interior cabinet surfaces shall be sheet metal lined or insulated with minimum ½-in. thick flexible fire-retardant material, coated on the air side and containing an EPA-registered immobilized antimicrobial agent to effectively resist the growth of bacteria and fungi as proven by tests in accordance with ASTM standards G21 and 22.
5. Unit shall have a factory-installed condensate drain connection and an aluminized steel, sloped condensate drain pan to prevent standing water from accumulating.
6. Equipped with lifting lugs to facilitate overhead rigging.
7. Filters shall be accessible through a hinged access panel without requiring any special tools.

C. Fans:

1. Indoor Fans:
   a. Double-width/double-inlet, centrifugal, belt driven, forward-curved type with single outlet discharge.
   b. Fan shaft bearings shall be of the pillow-block type with positive locking collar and lubrication provisions.
   c. Statically and dynamically balanced.
   d. Indoor fan shaft bearings shall have a life of 200,000 hours at design operating conditions in accordance with ANSI B3.15.
   e. Solid fan shaft construction.
2. Outdoor Fans:
   a. Direct-driven propeller type only, with corrosion-resistant blades riveted to corrosion-resistant steel supports.
   b. Discharge air vertically upward and protected by PVC coated steel wire safety guards.
   c. Statically and dynamically balanced.

D. Compressors:
   1. Reciprocating, semi-hermetic type only and located for easy servicing.
   2. Mounted on spring vibration isolators with an isolation efficiency of no less than 95%.
   3. Each equipped with an automatically reversible oil pump, operating oil charge, insert-type crankcase heater to prevent refrigerant migration to the compressor, and suction and discharge service valves.
   4. Maximum operating speed of 1800 rpm (30 rps).
   5. Each on independent refrigerant and electrical circuits.

E. Coils:
   1. Indoor Coil:
      a. Face-split circuited, constructed of aluminum fins mechanically bonded to seamless internally grooved copper tubes.
      b. Coils shall be leak tested at 150 psig and pressure tested at 450 psig.
   2. Outdoor Coil:
      a. Constructed of aluminum fins mechanically bonded to seamless internally grooved copper tubes.
      b. Air-cooled outdoor coils shall be leak tested at 150 psig and pressure tested at 450 psig.
   3. All coils shall be same manufacturer as unit.

F. Heating Section:

   Optional Electric Heat:

   Electric resistance heaters shall be factory-installed, open wire, nichrome element type, insulated with ceramic bushings, and include operating and safety controls.

G. Refrigerant Components:

   Unit shall be equipped with dual refrigerant circuits each containing:
   1. Solid core filter drier.
   2. Fusible plug.
   3. Fixed expansion device for indoor/outdoor coils.
   4. Accumulator.
   5. Reversing valve.

H. Filter Section:

   Filter section shall consist of 2-in. thick, disposable fiberglass filters or commercially available sizes.

I. Controls and Safeties:
   1. Controls:
      a. Unit shall be complete with self-contained, demand-oriented microprocessor based, solid-state control system.
      b. Unit shall be compatible with either a room sensor or room thermostat with no accessory interface required.
      c. Unit staging shall be minimum 2-cool, 2-heat.
      d. Unit shall perform in response to a variable space temperature signal. Control system shall determine control sequences through monitoring the following operational variables:
         1) Indoor coil leaving-air temperature.
         2) Economizer position.
         3) Minimum economizer set point.
         4) Outdoor-air temperature.
      e. In the event of a power failure, unit control system shall sequence the unit to re-start beginning with the first stage of cooling or heating.
      f. Thermostats shall be of the dual set point type for heating and cooling.
      g. Set points must have adjustable deadband between heat and cool.
      h. Unit shall be capable of performing night-time free cooling (software access required).
      i. Control boards shall be equipped with flashing LED(s) for diagnostics.
      j. Minimum heat on-time of 1 minute.
      k. Unit shall incorporate an outdoor coil defrost system to prevent excessive frost accumulation during heating duty, and shall be controlled as follows:
         1) Defrost shall be initiated on the basis of time and coil temperature.
         2) A field-settable (30, 50, or 90-minute) timer shall activate defrost cycle only if coil temperature is low enough to indicate a heavy frost condition.
         3) Defrost cycle shall terminate when defrost thermostat is satisfied and shall have a positive termination time of 10 minutes.
   2. Safeties:

      Unit components shall be equipped with the following protections:
      a. Compressors:
         1) Overtemperature (shuts down individual compressor).
         2) Overcurrent (shuts down individual compressor).
         3) Crankcase heaters.
         4) High-pressure switch (shuts down individual compressor, automatic reset type).
         5) Loss-of-charge switch (shuts down individual compressor, automatic reset type).
         6) Compressor shall be prevented from restarting for a minimum of 5 minutes after shutdown. Compressor shall run a minimum of 10 seconds after starting.
      b. Electric Heat:
         1) Automatic reset high-temperature limit switches.
         2) Heat limiters (fusible links).
         3) Overcurrent protection short-circuit fuses.
         4) Branch circuit protection.

Guide specifications (cont)

J. Operating Characteristics:
   1. Unit shall be capable of starting and running at 115 F ambient outdoor temperature per maximum load criteria of ARI Standard 340.
   2. Unit shall be capable of mechanical cooling operation down to 35 F ambient outdoor temperature.
   3. Provides multi-stage mechanical cooling capability.
   4. Unit provided with fan time delay to prevent cold starts.
   5. Compressor shall be capable of operation in heating duty down to −20 F ambient outdoor-air temperature.
   6. Unit shall be capable of simultaneous heating duty and defrost cycle operation when using electric heaters indicated in Section O, Special Features.

K. Motors:
   1. Compressor motors shall be cooled by suction gas passing over motor windings and shall have line break thermal and current overload protection.
   2. Outdoor-fan motors shall be totally enclosed, 3-phase type with permanently lubricated ball bearings and internal, automatic-reset thermal overload protection.
   3. Outdoor-fan motor no. 2 controlled to cycle off at 55 F and on at 65 F.
   4. Indoor blower motor shall be of the 3-phase ball bearing type.

L. Electrical Requirements:

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

M. Integrated Economizer:

   Consists of gear driven dampers, direct-drive motor in conjunction with microprocessor control system to provide primary cooling using outdoor air, temperature permitting, supplemented with mechanical cooling when necessary.
   1. Dampers shall be low leakage type, not to exceed 20 cfm per sq ft leakage at 1 in. wg pressure differential when fully closed.
   2. Motor shall have a spring return feature which shuts dampers upon a power interruption or unit shutdown.
   3. Equipped with solid-state control that sets the economizer cut-in point at an economical level.
   4. Capable of introducing up to 100% outdoor air.

N. Space Temperature Control:
   1. Two-Stage Thermostat with Integral Sensor:
      a. Thermostat shall be capable of automatic heating and cooling changeover without system switches.
      b. Each thermostat or transmitter shall provide the following features:
         1) Separate locking heating and cooling set point adjustments concealed under a locking cover.
         2) An adjustable (3 to 30 F) deadband between heating and cooling set points.
         3) Two LEDs concealed under locking cover to provide remote checkout of control system.
         4) Load reactive time delays to ensure stable system performance.
   2. Thermistor Type Room Sensor
      a. Sensor shall be capable of setback override.
      b. Set point adjustment may be made at sensor.
      c. Allows access to CCN.

O. Special Features:

   Certain standard features are not applicable when the features designated * are specified. For assistance in amending the specifications, your local Carrier Sales Office should be contacted.

* 1. Optional Outdoor Coil Materials:
      a. Unit shall be factory equipped with an outdoor coil made from copper tubes and copper fins.
      b. Unit shall be factory equipped with an outdoor coil made from corrosion resistant precoated aluminum fins.

* 2. Roof Curb:

   Formed 14-gage galvanized steel with wood nailer strip. Supports full perimeter of unit.

* 3. Constant Volume Power Exhaust:

   Package shall include 4 double-width, double inlet direct drives, forward-curved power exhaust fans with non-modulating dampers at the discharge.
      a. Fans shall be statically and dynamically balanced.
      b. Exhaust hood and eliminators shall prevent objects from entering unit through the relief dampers.

* 4. Non-Modulating to Modulating Power Exhaust Conversion Package:

   Package shall include modulating devices to maintain a field adjustable interior space pressure set point.

5. Barometric Relief Damper Package:
   a. Package shall relieve excess internal pressure and consist of damper assembly, hoods, damper screen, seal strip, and required hardware.
   b. Damper assembly shall close due to gravity upon unit shutoff.
   c. Unit mounted on vertical supply/return units only; can be duct mounted on horizontal applications.
6. Modulating Head Pressure Control:

   Package shall consist of an accessory outdoor-air package and a solid-state control with outdoor coil temperature sensor capable of modulating outdoor-fan motor no. 1 speed to maintain condensing temperature between 90 F and 100 F at outdoor ambient temperature down to −20 F.
7. Outdoor Coil Hail Guard:

   Hood with welded wire grille complete with support retainers and fasteners shall be provided for protection of outdoor coil.
8. Electric Heat Package:

   Shall be fully-assembled for installation. The 208/230-v and 460-v units are designed in accordance with UL standards and all units feature a single point connection.

* 9. Space Temperature Sensor:

   This space temperature sensor shall determine the actual temperature in the conditioned space.

* 10. Space Temperature Sensor with Offset (T-56):

   This space temperature sensor shall determine the actual temperature in the conditioned space. In addition, this accessory device shall provide a space temperature offset ± 5° F.

* 11. Enthalpy Control:
   a. For use with economizer only.
   b. Capable of measuring temperature of outdoor air and controlling economizer cut-in point at a more economical level.

12. Enthalpy Sensor:

   For use with enthalpy control to provide differential enthalpy unit control.

* 13. Thermostat and Subbase Assembly:

   To provide staged heating and cooling in addition to automatic (or manual) changeover and fan control.

14. Indoor Air Quality (CO_2) Sensor (Electronic Expansion Board Required):
   a. Shall have the ability to provide demand ventilation IAQ control though the economizer with an indoor air quality sensor.
   b. The IAQ sensor shall be available in duct mount, wall mount, and wall mount with LED display of CO_2 in parts per million. The set point shall have adjustment capability.
   c. Sensor shall be adjustable between voltage (0 to 10 vdc) and amperage (4 to 20 mA) output.

      NOTE: A 4 to 20 mA output is required for 50EJQ,EWQ units.
15. Electronic Expansion Board:

   Shall provide the following:
   a. Control of modulating economizer damper to maintain indoor air quality when outdoor conditions are suitable.
   b. Discrete inputs for fan status, filter status, field-applied status, and demand limit.
   c. Shall perform demand limit functions based on the state of the discrete input.
   d. An output for the external alarm light indicator.
   e. Smoke control modes including evacuation, smoke purge, pressurization, and shutdown (power exhaust required).
   f. Pre-occupancy purge shall be available.
16. Roof Curb Retrofit Kit:

   Shall provide sheet metal hardware to retrofit unit to an existing 48/50DD/DF/DL roof curb.

   NOTE: Duct transition to new unit duct configuration from existing ductwork design will be required below the existing roof curb.
17. LID-2B Interface Device:

   Shall provide access to unit software with enhanced display for access to application time schedules and control configurations. Shall have a dedicated 24-v power source.

* 18. Electronic Programmable Thermostat:

   Capable of using deluxe full-featured electronic thermostat. Shall use built-in compressor cycle delay control for both heating and cooling duty. Capable of working with Carrier direct digital controls.