



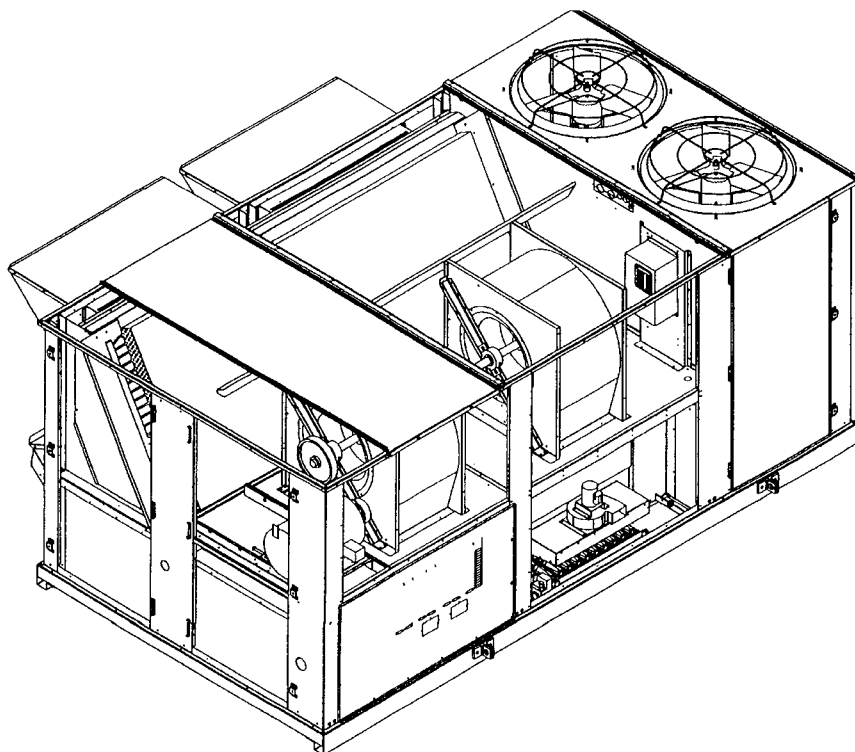
Product Data

48/50EJ,EK,EW,EY Single-Package Rooftop Gas Heating/Electric Cooling and Electric Cooling Units With Optional Electric Heat

20 to 45 Nominal Tons

Single-Package Rooftop Units with:

- dedicated vertical and horizontal discharge configurations.
- constant and variable volume controls
- efficiencies from 8.5 to 10.4
- meets ASHRAE Standard 62
- standard cooling operation at outdoor ambient temperatures as low as 35 F
- 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 condenser motors with permanently lubricated bearings
- Alumagard™ heat exchanger coating
- induced-draft fan for gas combustion system
- tubular heat exchangers
- pre-painted, galvanized steel cabinet
- commercial strength base rails (full perimeter, 14 gage)
- communicating DDC (Direct Digital Controls) unit controllers
- semi-hermetic compressors with service valves as standard
- dual independent refrigerant circuits with intertwined evaporator coils
- hinged access panels
- short cycle protection
- service diagnostics
- integrated economizer utilizing direct-drive actuators and opposed blade dampers
- IAQ (Indoor Air Quality) options
- VFD (variable frequency drives) on all VAV units



Features/Benefits



Design flexibility

Dedicated vertical supply/return units (EJ,EK) 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 (EW,EY) 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 (48/50EJ,EK,EY,EW units)

- heating/cooling operation
- fan cycling head pressure control
- integrated economizer
- remote start/stop for non-thermostat applications
- provide a power exhaust output
- LED 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

Unit features (48/50EJ,EW units only)

- heating/cooling via thermostat
- heating/cooling during unoccupied periods using accessory remote sensor
- support supply air offset using accessory remote sensor (T-56)
- control of two stages of power exhaust
- control of modulating power exhaust with field installed accessory
- two-steps of capacity control (up to 6 steps with accessory unloader packages)

Unit features (48/50EK,EY units only)

- 6 steps of capacity control
- supply air pressure via variable frequency drive

- control of heat interlock relay
- occupied heat
- nighttime heating/cooling
- morning warm-up

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 (48/50EJ,EK,EY,EW units)

- CCN protocol
- compatible with Building Supervisor, Service Tool, and ComfortWorks™ software, and accessory LID-2B
- 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

Unit features with computer access (48/50EK,EW units only)

- DAV (Digital Air Volume) interface linkage
- support supply air temperature reset
- occupied heat

Integrated gas unit controller (IGC) (gas heating units only)

The IGC also contains burner control logic for accurate and dependable gas ignition. The light-emitting diode (LED) fault notification system reduces service person troubleshooting time and minimizes service costs. The IGC also maximizes heating efficiency by controlling evaporator fan on and off delays.

The IGC control board provides built-in diagnostic capability. An LED simplifies troubleshooting by providing visual fault notification and system status confirmation.

The IGC also contains exclusive anticycle protection for gas heat operation. After 4 continuous cycles on the unit high temperature limit switch, the gas heat operation is disabled, and an error code is issued. This feature greatly improves reliability of the rooftop unit.

Quality and reliability

Dual serviceable, semi-hermetic compressors on intertwined evaporator coil ensures excellent full and part load efficiency. Dual refrigerant circuits, both electrically and mechanically independent, provide standby capability should one circuit require service. Reliable Carlyle 06D/E compressors are proven 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.

Variable frequency drive (VFD) and unit unloading

Variable air volume (VAV) units utilize state of the art variable frequency drive (VFD) to control airflow.

VAV units have up to 6 steps of unloading for low load operation. Constant volume units come equipped with 2 stages of capacity. Field installed accessory unloaders are available to increase this to up to 6 stages of operation. The unit operation will closely match the load and maintain comfort in the most energy-efficient manner.

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 inter-blade 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.

Exhaust air relief is available for all units:

- barometric relief (CV [constant volume] or VAV)
- power exhaust (CV)
- 100% modulating power exhaust (VAV)

Field-adjustable set points on 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.

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Model number nomenclature



48 EJ D 034 -- -- 6 0 1 E C

48 — Cooling Unit with Natural Gas Heat

EJ — CV Vertical
EK — VAV Vertical
EW — CV Horizontal
EY — VAV Horizontal

Heat Options

D — Low Gas Heat
E — High Gas Heat (EJ/EW Only)

Nominal Tons

024 — 20
028 — 25
030 — 27
034 — 30
038 — 35 (Not available for 575-v units)
044 — 40
048 — 45 (Not available for 575-v units)

Filter Option

-- — Std. 2-in. Throwaway

Coil Material

— — Al/Cu Condenser and Evaporator
C — Cu/Cu Condenser, Al/Cu Evaporator (without lances)
E — Al/Cu Condenser with Precoated Fins (without lances)

LEGEND

Al — Aluminum
Cu — Copper
CV — Constant Volume
VAV — Variable Air Volume

Economizer/Relief Options

A — Economizer Only (all)
B — Economizer with Non-Modulating Power Exhaust (EJ Only)
C — Economizer with Barometric Relief (EJ/EK Only)
D — Economizer with Modulating Power Exhaust (EK Only)

Motor Options

STD	HI EFF	HP	UNIT					
			024	028	030	034	038	044
A	L	5	X					
B	M	7.5		X				
C	N	10	X	X	X	X	X	
D	P	15	X	X	X	X	X	X
E	Q	20			X	X	X	X
F	R	25						X
G	S	30						X

NOTE VAV models (EK and EY) are equipped with variable frequency drive (VFD)

Packaging

1 — Domestic
3 — Export Crate

Design Series

0 — Original

Voltage

1 — 575-3-60
5 — 208/230-3-60
6 — 460-3-60

Quality Assurance



Certificate No FM 21837

Approvals:

ISO 9002
EN 29002
BS5750 PART 2
ANSI/ASQC Q92

50 EJ B 034 -- -- 6 0 1 E C

50 — Cooling Unit with
Optional Electric Heat

EJ — CV Vertical
EK — VAV Vertical
EW — CV Horizontal
EY — VAV Horizontal

Heat Options (kW)

	0 kW	B 36 kW	C 72 kW
024	O	O	X
028	O	O	X
030	O	O	X
034	O	O	X
038	O	X	X
044	O	O	X
048	O	X	X

X = Available CV only (EJ/EW)
O = Available CV and VAV Models

Nominal Tons

024 — 20
028 — 25
030 — 27
034 — 30
038 — 35 (Not available for 575-v units)
044 — 40
048 — 45 (Not available for 575-v units)

Filter Option

-- — Std. 2-in. Throwaway

Coil Material

-- — Al/Cu Condenser and Evaporator
C — Cu/Cu Condenser, Al/Cu Evaporator
E — Al/Cu Condenser with Precoated Fins

LEGEND

Al — Aluminum
Cu — Copper
CV — Constant Volume
VAV — Variable Air Volume

Economizer/Relief Options

A — Economizer Only (all)
B — Economizer with Non-Modulating Power
Exhaust (EJ Only)
C — Economizer with Barometric Relief
(EJ/EK Only)
D — Economizer with Modulating Power
Exhaust (EK Only)

Motor Options

STD	HI EFF	HP	UNIT						
			024	028	030	034	038	044	048
A	L	5	X						
B	M	7.5		X					
C	N	10	X	X	X	X	X		
D	P	15	X	X	X	X	X	X	
E	Q	20			X	X	X	X	X
F	R	25						X	X
G	S	30							X

NOTE: VAV models (EK and EY) are equipped with
variable frequency drive (VFD)

Packaging

1 — Domestic
3 — Export Crate

Design Series

0 — Original

Voltage

1 — 575-3-60
5 — 208/230-3-60
6 — 460-3-60

Quality Assurance



Certificate No FM 21837

Approvals:

ISO 9002
EN 29002
BS5750 PART 2
ANSI/ASQC Q92

Physical data (gas heating units)



UNIT 48EJ,EK,EW,EY	024D/E			028D/E			030D/E			034D/E		
NOMINAL CAPACITY (tons)	20			25			27			30		
OPERATING WEIGHT (lb)*												
Unit												
AI/AI† (Lo Heat/Hi Heat)	4176/4256			4262/4342			4262/4342			4262/4342		
AI/Cu† (Lo Heat/Hi Heat)	4396/4476			4482/4562			4482/4562			4482/4562		
Roof Curb (14-in curb)	365			365			365			365		
COMPRESSOR												
Type Ckt 1	06D328			06D328			06D537			06D537		
Ckt 2	06D818			06D328			06D328			06D537		
Number of Refrigerant Circuits	2			2			2			2		
Oil (oz) (Ckt 1, Ckt 2)	115, 88			115 ea.			115 ea.			115 ea.		
REFRIGERANT TYPE												
Operating Charge (lb-oz)												
Circuit 1**	25-0			25-0			25-0			25-0		
Circuit 2	31-0			25-0			25-0			25-0		
CONDENSER COIL												
Quantity	1			1			1			1		
Rows...Fins/in	4...15			4...15			4...15			4...15		
Total Face Area (sq ft)	33.3			33.3			33.3			33.3		
CONDENSER FAN												
Nominal Cfm	13,420			13,420			13,420			13,420		
Quantity Diameter (in.)	2 .30			2 .30			2 .30			2 .30		
Motor Hp (1075 Rpm)	1			1			1			1		
EVAPORATOR COIL												
Rows...Fins/in	4, 15			4, 15			4, 15			4, 15		
Total Face Area (sq ft)	31.7			31.7			31.7			31.7		
EVAPORATOR FAN												
Quantity Size (in.)	2 20x15			2 20x15			2 20x15			2 20x15		
Type Drive	Belt			Belt			Belt			Belt		
Nominal Cfm	8,000			10,000			11,000			12,000		
Motor Hp	5			7.5			10			10		
Motor Frame Size (Standard)	S184T			S213T			S215T			S215T		
(High Efficiency)	S184T			S213T			S215T			S215T		
Motor Bearing Type	Ball			Ball			Ball			Ball		
Maximum Allowable Rpm	1200			1200			1200			1200		
Motor Pulley Pitch Diameter	4.8			5.4			4.4			4.4		
Nominal Motor Shaft Diameter (in.)	1 1/8			1 1/8			1 1/8			1 1/8		
Fan Pulley Pitch Diameter (in.)	12.4			12.4			9.4			9.0		
Nominal Fan Shaft Diameter (in.)	1 1/8			1 1/8			1 1/8			1 1/8		
Belt, Quantity...Type	1 BX59			1 BX59			2 BX52			2 BX51		
Belt, Length (in.)	62			62			55			54		
Pulley Center Line Distance (in.)	16 0-18 7			15 6-18 4			15 6-18 4			15 6-18 4		
Factory Speed Setting (rpm)	717			773			848			884		
FURNACE SECTION												
Rollout Switch Cutout Temp (F)	225			225			225			225		
Burner Orifice Diameter (in. . .drill size)												
Natural Gas Std	111 34			111 34			111 34			111 34		
Liquid Propane Alt	089 43			089 43			089 43			089 43		
Thermostat Heat Anticipator Setting (amps)												
Stage 1	0 1			0 1			0 1			0 1		
Stage 2	0 1			0 1			0 1			0 1		
Gas Input (Btuh) Stage 1 Low	262,500			262,500			262,500			262,500		
High	394,000			394,000			394,000			394,000		
Stage 2 Low	350,000			350,000			350,000			350,000		
High	525,000			525,000			525,000			525,000		
Efficiency (Steady State) (%)	82			82			82			82		
Temperature Rise Range	15-45/35-65			15-45/35-65			15-45/35-65			15-45/35-65		
Manifold Pressure (in. wg)												
Natural Gas Std	3.5			3.5			3.5			3.5		
Liquid Propane Alt	3.5			3.5			3.5			3.5		
Gas Valve Quantity	2			2			2			2		
Field Gas Connection Size (in.-FPT)	1.5			1.5			1.5			1.5		
HIGH-PRESSURE SWITCH (psig)												
Cutout	426			426			426			426		
Reset (Auto.)	320			320			320			320		
LOW-PRESSURE SWITCH (psig)												
Cutout	7			7			7			7		
Reset (Auto.)	22			22			22			22		
RETURN-AIR FILTERS												
Quantity...Size (in.)	10 20 x 24 x 2			10 20 x 24 x 2			10...20 x 24 x 2			10 20 x 24 x 2		
OUTDOOR-AIR FILTERS												
Quantity . Size (in.)	8 16 x 25			8 16 x 25			8 16 x 25			8 16 x 25		
	4...20 x 25			4...20 x 25			4...20 x 25			4...20 x 25		
POWER EXHAUST												
Motor, Quantity...Hp												
Fan, Diameter Width (in.)												
Weight (lb)												

LEGEND
 AI — Aluminum
 Bhp — Brake Horsepower
 Cu — Copper

*Weight of unit does not include variable frequency drive (VFD) If a VFD is installed, add the VFD weight in the table at right

†Evaporator coil fin material/condenser coil fin material

**Sizes 024-034: Circuit 1 uses the lower portion of condenser coil, Circuit 2 uses the upper portion. Sizes 038-048: Circuit 1 uses the left condenser coil, Circuit 2 the right. All units have intertwined evaporator coils

††Motor and drive shown will deliver approximately 2.5 in. wg net external static

||Rollout switch is manual reset



UNIT 48EJ,EK,EW,EY	038D/E	044D/E	048D/E
NOMINAL CAPACITY (tons)	35	40	45
OPERATING WEIGHT (lb)* Unit			
Al/Alt (Lo Heat/Hi Heat)	4442/4602	4668/4828	4955/5115
Al/Cut (Lo Heat/Hi Heat)	4727/4887	4953/5113	5335/5495
Roof Curb (14-in. curb)	410	410	410
COMPRESSOR			
Type Ckt 1	06D537	06EA250	06EA265
Ckt 2	06D537	06EA250	06EA250
Number of Refrigerant Circuits	2	2	2
Oil (oz) (Ckt 1, Ckt 2)	115 ea.	224 ea	304, 224
REFRIGERANT TYPE		R-22	
Operating Charge (lb-oz)			
Circuit 1**	34-0	35-0	41-0
Circuit 2	34-0	35-0	41-0
CONDENSER COIL	Cross-Hatched 3/4" Copper Tubes, Aluminum Lanced, Aluminum Pre-Coated, or Copper Plate Fins		
Quantity	2	2	1
Rows.. Fins/in	3...15	3...15	4 15
Total Face Area (sq ft)	58.3	58.3	66.7
CONDENSER FAN		Propeller Type	
Nominal Cfm	27,064	27,064	27,064
Quantity Diameter (in)	4 .30	4 .30	4 .30
Motor Hp (1075 Rpm)	1	1	1
EVAPORATOR COIL	Cross-Hatched 3/4" Copper Tubes, Aluminum Plate Fins, Intertwined Circuits		
Rows.. Fins/in	3 .15	3 .15	4 .15
Total Face Area (sq ft)	34.7	34.7	34.7
EVAPORATOR FAN		Centrifugal Type	
Quantity.. Size (in)	2 20x15	2 20x15	2 20x15
Type Drive	Belt	Belt	Belt
Nominal Cfm	14,000	18,000	18,000
Motor Hp	15 1/2	20 1/2	25 1/2
Motor Frame Size (Standard)	S215T	D254T	S256T
(High Efficiency)	S215T	S254T	S256T
Motor Bearing Type	Ball	Ball	Ball
Maximum Allowable Rpm	1200	1200	1200
Motor Pulley Pitch Diameter	6.1	5.3	5.7
Nominal Motor Shaft Diameter (in)	1 3/8	1 1/8	1 1/8
Fan Pulley Pitch Diameter (in.)	13.7	9.5	9.5
Nominal Fan Shaft Diameter (in)	1 15/16	1 15/16	1 15/16
Belt, Quantity.. Type	1 5VX650	2 5VX530	2 5VX550
Belt, Length (in.)	65	53	55
Pulley Center Line Distance (in)	15 6-18 4	15 0-17 9	15 0-17 9
Factory Speed Setting (rpm)	779	976	1050
FURNACE SECTION			
Rollout Switch Cutout Temp (F)	225	225	225
Burner Orifice Diameter			
(in. ...drill size)			
Natural Gas Std	120 31	120 31	120 31
Liquid Propane Alt	096 41	096 41	096 41
Thermostat Heat Anticipator			
Setting (amps)			
Stage 1	0 1	0 1	0 1
Stage 2	0 1	0 1	0 1
Gas Input (Btuh) Stage 1 Low	300,000	300,000	300,000
High	600,000	600,000	600,000
Stage 2 Low	400,000	400,000	400,000
High	800,000	800,000	800,000
Efficiency (Steady State) (%)	82	82	82
Temperature Rise Range	10-40/30-60	10-40/30-60	10-40/30-60
Manifold Pressure (in. wg)			
Natural Gas Std	3.5	3.5	3.5
Liquid Propane Alt	3.5	3.5	3.5
Gas Valve Quantity	2	2	2
Field Gas Connection Size (in.-FPT)	1.5	1.5	1.5
HIGH-PRESSURE SWITCH (psig)			
Cutout	426	426	426
Reset (Auto)	320	320	320
LOW-PRESSURE SWITCH (psig)			
Cutout	7	7	7
Reset (Auto)	22	22	22
RETURN-AIR FILTERS			
Quantity...Size (in.)	10...20 x 24 x 2	10. 20 x 24 x 2	10. 20 x 24 x 2
OUTDOOR-AIR FILTERS			
Quantity...Size (in.)	8 16 x 25	8 16 x 25	8 16 x 25
	4...20 x 25	4...20 x 25	4...20 x 25
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	4 1
Fan, Diameter Width (in)	11 ...10	11 ...10	11 ...10
Weight (lb)	450	450	450

LEGEND

Al — Aluminum
Bhp — Brake Horsepower
Cu — Copper

*Weight of unit does not include variable frequency drive (VFD). If a VFD is installed, add the VFD weight in the table at right.

†Evaporator coil fin material/condenser coil fin material

**Sizes 024-034: Circuit 1 uses the lower portion of condenser coil, Circuit 2 uses the upper portion. Sizes 038-048: Circuit 1 uses the left condenser coil, Circuit 2 the right. All units have intertwined evaporator coils.

††Motor and drive shown will deliver approximately 2.5 in. wg net external static.

||Rollout switch is manual reset.

NOTE: High heat is for 48EJ,EW only

VFD (Hp)	VFD WEIGHTS (lb)		
	208/230 v	460 v	575 v
5	20	22	60
7.5	51	37	64
10	51	61	64
15	61	63	109
20	63	111	109
25	105	112	174
30	172	118	180

Physical data (electric heating units)



UNIT 50EJ,EK,EW,EY	024	028	030	034
NOMINAL CAPACITY (tons)	20	25	27	30
OPERATING WEIGHT (lb)* Unit				
Al/Al†	4016	4102	4102	4102
Al/Cu†	4236	4322	4322	4322
Roof Curb (14-in curb)	365	365	365	365
COMPRESSOR				
Type Ckt 1	06D328	06D328	06D537	06D537
Ckt 2	06D818	06D328	06D328	06D537
Number of Refrigerant Circuits	2	2	2	2
Oil (oz) (Ckt 1, Ckt 2)	115, 88	115 ea.	115 ea.	115 ea.
REFRIGERANT TYPE	R-22			
Operating Charge (lb-oz)				
Circuit 1**	25-0	25-0	25-0	25-0
Circuit 2	31-0	25-0	25-0	25-0
CONDENSER COIL	Cross Hatched 3/8" Copper Tubes, Aluminum Lanced, Aluminum Precoated or Copper Fins			
Quantity	1	1	1	1
Rows, Fins/in	4...15	4...15	4...15	4...15
Total Face Area (sq ft)	33.3	33.3	33.3	33.3
CONDENSER FAN	Propeller Type			
Nominal Cfm	13,420	13,420	13,420	13,420
Quantity, Diameter (in)	2...30	2...30	2...30	2...30
Motor Hp (1075 Rpm)	1	1	1	1
EVAPORATOR COIL	Cross Hatched 3/8" Copper Tubes, Aluminum or Copper Plate Fins, Intertwined Circuits			
Rows, Fins/in	4...15	4...15	4...15	4...15
Total Face Area (sq ft)	31.7	31.7	31.7	31.7
EVAPORATOR FAN	Centrifugal Type			
Quantity Size (in)	2 .20x15	2 .20x15	2 .20x15	2 .20x15
Type Drive	Belt	Belt	Belt	Belt
Nominal Cfm	8,000	10,000	11,000	12,000
Motor Hp	5	7.5	10	10
Motor Frame Size (Standard)	S184T	S213T	S215T	S215T
(High Efficiency)	S215T	S215T	D254T	D254T
Motor Bearing Type	S254T	S254T	S256T	S256T
Maximum Allowable Rpm	1200	1200	1200	1200
Motor Pulley Pitch Diameter	4.8	5.4	4.4	4.4
Nominal Motor Shaft Diameter (in)	1 1/8	1 1/8	1 1/8	1 1/8
Fan Pulley Pitch Diameter (in.)	12.4	12.4	9.4	9.0
Nominal Fan Shaft Diameter (in)	1 15/16	1 15/16	1 15/16	1 15/16
Belt, Quantity, Type	1 BX59	1 BX59	2 5VX500	2 5VX530
Belt, Length (in.)	62	62	50	53
Pulley Center Line Distance (in)	16 0-18 7	15 6-18 4	15 0-17 9	15 0-17 9
Factory Speed Setting (rpm)	717	773	1059	1187
HIGH-PRESSURE SWITCH (psig)				
Cutout	426	426	426	426
Reset (Auto)	320	320	320	320
LOW-PRESSURE SWITCH (psig)				
Cutout	7	7	7	7
Reset (Auto)	22	22	22	22
RETURN-AIR FILTERS				
Quantity Size (in)	10...20 x 24 x 2	10...20 x 24 x 2	10...20 x 24 x 2	10...20 x 24 x 2
OUTDOOR-AIR FILTERS				
Quantity...Size (in.)	8 16 x 25	8 16 x 25	8 16 x 25	8 16 x 25
	4...20 x 25	4...20 x 25	4...20 x 25	4...20 x 25
POWER EXHAUST	Direct Drive, 3-Speed, Single-Phase Motor (Factory-Wired for High Speed) and Forward Curved Fan			
Motor, Quantity, Hp	4 1			
Fan, Diameter Width (in)	11...10			
Weight (lb)	450			



UNIT 50EJ,EK,EW,EY	038	044	048
NOMINAL CAPACITY (tons)	35	40	45
OPERATING WEIGHT (lb)* Unit			
Al/Al†	4282	4508	4795
Al/Cu†	4567	4793	5175
Roof Curb (14-in curb)	410	410	410
COMPRESSOR			
Type Ckt 1	06D537	06EA250	06EA265
Type Ckt 2	06D537	06EA250	06EA250
Number of Refrigerant Circuits	2	2	2
Oil (oz) (Ckt 1, Ckt 2)	115 ea.	224 ea	304, 224
REFRIGERANT TYPE		R-22	
Operating Charge (lb-oz)			
Circuit 1**	34-0	35-0	41-0
Circuit 2	34-0	35-0	41-0
CONDENSER COIL	Cross Hatched ¾" Copper Tubes, Aluminum Lanced, Aluminum Precoated or Copper Fins		
Quantity	2	2	1
Rows.. Fins/in	3..15	3..15	4 15
Total Face Area (sq ft)	58.3	58.3	66.7
CONDENSER FAN		Propeller Type	
Nominal Cfm	27,064	27,064	27,064
Quantity .Diameter (in)	4 .30	4 .30	4 .30
Motor Hp (1075 Rpm)	1	1	1
EVAPORATOR COIL	Cross Hatched ¾" Copper Tubes, Aluminum or Copper Plate Fins, Intertwined Circuits		
Rows.. Fins/in	3..15	3..15	4..15
Total Face Area (sq ft)	34.7	34.7	34.7
EVAPORATOR FAN		Centrifugal Type	
Quantity.. Size (in)	2 .20x15	2 .20x15	2 .20x15
Type Drive	Belt	Belt	Belt
Nominal Cfm	14,000	16,000	18,000
Motor Hp	10	15	20
Motor Frame Size (Standard)	S215T	D254T	S256T
(High Efficiency)	S215T	S254T	S256T
Motor Bearing Type	Ball	Ball	Ball
Maximum Allowable Rpm	1200	1200	1200
Motor Pulley Pitch Diameter	6.1	5.3	5.7
Nominal Motor Shaft Diameter (in)	1 ½	1 ½	1 ½
Fan Pulley Pitch Diameter (in.)	13 7	9.5	9.5
Nominal Fan Shaft Diameter (in)	1 ½	1 ½	1 ½
Belt, Quantity.. Type	1 5VX650	2 5VX530	2 5VX550
Belt, Length (in.)	65	53	55
Pulley Center Line Distance (in)	15 6-18 4	15 0-17 9	15 0-17 9
Factory Speed Setting (rpm)	779	976	1050
HIGH-PRESSURE SWITCH (psig)			
Cutout	426	426	426
Reset (Auto.)	320	320	320
LOW-PRESSURE SWITCH (psig)			
Cutout	7	7	7
Reset (Auto.)	22	22	22
RETURN-AIR FILTERS			
Quantity..Size (in.)	10.. 20 x 24 x 2	10..20 x 24 x 2	10 20 x 24 x 2
OUTDOOR-AIR FILTERS			
Quantity..Size (in.)	8 16 x 25	8 16 x 25	8 16 x 25
	4 .20 x 25	4 .20 x 25	4...20 x 25
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	4 1
Fan, Diameter Width (in)	11 ..10	11 ..10	11 ..10
Weight (lb)	450	450	450

LEGEND

Al — Aluminum
Bhp — Brake Horsepower
Cu — Copper

*Weight of unit does not include variable frequency drive (VFD) If a VFD is installed, add the VFD weight in the table at right

†Evaporator coil fin material/condenser coil fin material

**Sizes 024-034: Circuit 1 uses the lower portion of condenser coil, Circuit 2 uses the upper portion. Sizes 038-048: Circuit 1 uses the left condenser coil, Circuit 2 the right. All units have intertwined evaporator coils

††Motor and drive shown will deliver approximately 2.5 in wg net external static

VFD (Hp)	VFD WEIGHTS (lb)		
	208/230 v	460 v	575 v
5	20	22	60
7.5	51	37	64
10	51	61	64
15	61	63	109
20	63	111	109
25	105	112	174
30	172	118	180

EER ratings and capacities



EER RATINGS (48EJ,EW)

UNIT 48EJ,EW	NOMINAL TONS	EER	IPLV
024	20	10.3	10.8
028	25	9.6	10.1
030	27.5	8.7	9.3
034	30	8.5	9.0
038	35	8.9	9.4
044	40	8.5	8.2
048	45	8.5	7.8

EER RATINGS (50EJ,EW)

UNIT 50EJ,EW	NOMINAL TONS	EER	IPLV
024	20	10.4	11.2
028	25	9.7	10.3
030	27.5	8.8	9.5
034	30	8.6	9.2
038	35	9.1	9.7
044	40	8.6	8.4
048	45	8.6	8.0

EER RATINGS (48EK,EY)

UNIT 48EK,EY	NOMINAL TONS	EER	IPLV
024	20	10.3	10.6
028	25	9.6	9.8
030	27.5	8.7	9.7
034	30	8.5	9.3
038	35	8.9	8.9
044	40	8.5	8.0
048	45	8.5	7.9

EER RATINGS (50EK,EY)

UNIT 50EK,EY	NOMINAL TONS	EER	IPLV
024	20	10.4	11.1
028	25	9.7	10.1
030	27.5	8.8	9.9
034	30	8.6	9.5
038	35	9.1	9.3
044	40	8.6	8.2
048	45	8.6	8.1

LEGEND

EER — Energy Efficiency Ratio
IPLV — Integrated Part-Load Values

HEATING CAPACITIES AND EFFICIENCIES

UNIT 48EJ,EK, EW,EY	HEATING INPUT (Btuh) Stage 2/Stage 1	OUTPUT CAPACITY (Btuh)	TEMPERATURE RISE	STEADY-STATE EFFICIENCY (%)	MINIMUM HEATING CFM
D024	350,000/262,500	283,500	15-45	82.0	5730
E024	525,000/394,000	425,250	35-65	82.0	5950
D028	350,000/262,500	283,500	15-45	82.0	5730
E028	525,000/394,000	425,250	35-65	82.0	5950
D030	350,000/262,500	283,500	15-45	82.0	5730
E030	525,000/394,000	425,250	35-65	82.0	5950
D034	350,000/262,500	283,500	15-45	82.0	5730
E034	525,000/394,000	425,250	35-65	82.0	5950
D038	400,000/300,000	324,000	10-40	82.0	7360
E038	800,000/600,000	648,000	30-60	82.0	9820
D044	400,000/300,000	324,000	10-40	82.0	7360
E044	800,000/600,000	648,000	30-60	82.0	9820
D048	400,000/300,000	324,000	10-40	82.0	7360
E048	800,000/600,000	648,000	30-60	82.0	9820

NOTES.

- Ratings are approved for altitudes to 2000 feet. At altitudes over 2000 ft, ratings are 4% less for each 1000 ft greater than 2000 ft above sea level.
- At altitudes up to 2000 ft, the following formula may be used to calculate air temperature rise:

$$\Delta t = \frac{\text{Output capacity}}{1.10 \times \text{air quantity}}$$

- At altitudes above 2000 ft, the following formula may be used:

$$\Delta t = \frac{\text{Output capacity}}{(24 \times \text{specific weight of air} \times 60) (\text{air quantity})}$$

- Minimum allowable temperature of mixed air entering the heat exchanger during half-rate (first stage) operation is 50 F. There is no minimum mixture temperature limitation during full-rate operation.
- Total unit design is listed by ETL Testing Laboratories Inc.
- The minimum heating cfm is typically lower than the minimum cooling cfm on constant volume units (see Cooling Performance tables). To operate at the lower cfm requires the addition of unloaders to the lead compressor. Without this modification, the unit may not be operated below the minimum cooling cfm.



VAV STAGING SEQUENCE

STAGES	0	1	2	3	4	5	6
COMP NO. 1	OFF	ON	ON	ON	ON	ON	ON
UNLOADER NO. 1	OFF	ON	ON	OFF	ON	ON	OFF
UNLOADER NO. 2	OFF	ON	OFF	OFF	ON	OFF	OFF
COMP NO. 2	OFF	OFF	OFF	OFF	ON	ON	ON
UNIT SIZE	UNIT CAPACITY						
024	0%	20%	40%	60%	60%	80%	100%
028	0%	17%	34%	50%	67%	84%	100%
030	0%	18%	37%	55%	63%	82%	100%
034	0%	17%	34%	50%	67%	84%	100%
038	0%	17%	34%	50%	67%	84%	100%
044	0%	25%	25%	50%	75%	75%	100%
048	0%	18%	37%	56%	63%	82%	100%

Indicates a 4-cylinder compressor; there is no unloading at this step

CV STAGING SEQUENCE

STAGES	0	1	2
COMP NO. 1	OFF	ON	ON
COMP NO. 2	OFF	OFF	ON
UNIT SIZE	UNIT CAPACITY		
024	0%	60%	100%
028	0%	50%	100%
030	0%	55%	100%
034	0%	50%	100%
038	0%	50%	100%
044	0%	50%	100%
048	0%	56%	100%

CV ONE UNLOADER STAGING SEQUENCE

STAGES	0	1	2	3
COMP NO. 1	OFF	ON	ON	ON
UNLOADER NO. 1	OFF	ON	OFF	OFF
COMP NO. 2	OFF	OFF	OFF	ON
UNIT SIZE	UNIT CAPACITY			
024	0%	40%	60%	100%
028	0%	34%	50%	100%
030	0%	37%	55%	100%
034	0%	34%	50%	100%
038	0%	34%	50%	100%
044	0%	34%	50%	100%
048	0%	37%	56%	100%

CV TWO UNLOADER STAGING SEQUENCE

STAGES	0	1	2	3	4
COMP NO. 1	OFF	ON	ON	ON	ON
UNLOADER NO. 1	OFF	ON	ON	OFF	OFF
UNLOADER NO. 2	OFF	ON	OFF	OFF	OFF
COMP NO. 2	OFF	OFF	OFF	OFF	ON
UNIT SIZE	UNIT CAPACITY				
024	0%	20%	40%	60%	100%
028	0%	17%	34%	50%	100%
030	0%	18%	37%	55%	100%
034	0%	17%	34%	50%	100%
038	0%	17%	34%	50%	100%
044	0%	25%	25%	50%	100%
048	0%	18%	37%	56%	100%

Indicates a 4-cylinder compressor; there is no unloading at this step

EER ratings and capacities (cont)



ALTITUDE COMPENSATION

ELEVATION (ft)	SMALL CHASSIS (024-034)		MEDIUM CHASSIS (038-048)	
	Natural Gas Orifice Drill Bit Size*	Liquid Propane Orifice Drill Bit Size*	Natural Gas Orifice Drill Bit Size*	Liquid Propane Orifice Drill Bit Size*
0-2,000	34	43	31	41
2,001- 3,000	3/64"	44	32	3/32"
3,001- 4,000	36	45	33	43
4,001- 5,000	37	45	33	43
5,001- 6,000	38	45	34	44
6,001- 7,000	39	47	36	44
7,001- 8,000	40	47	36	45
8,001- 9,000	41	48	37	45
9,001-10,000	3/32"	48	38	45
10,001-11,000	42	49	39	47
11,001-12,000	43	49	40	5/64"
12,001-13,000	43	50	41	48
13,001-14,000	44	50	3/32"	49

*Orifices available through your local Carrier distributor.

ELECTRIC RESISTANCE HEATER DATA — 50EJ, EK, EW, EY024-048

UNIT 50EJ,EK, EW,EY	HEATER kW				HEATER STAGES	% HEAT PER STAGE	MINIMUM CFM
	Unit Voltages						
	208	230	460	575			
024	29	36	36	36	1	100	6,000
	59	72	72	72	2	50/50	
028	29	36	36	36	1	100	7,500
	59	72	72	72	2	50/50	
030	29	36	36	36	1	100	8,250
	59	72	72	72	2	50/50	
034	29	36	36	36	1	100	9,000
	59	72	72	72	2	50/50	
038	29	36	36	36	1	100	10,500
	59	72	72	72	2	50/50	
044	29	36	36	36	1	100	12,000
	59	72	72	72	2	50/50	
048	29	36	36	36	1	100	13,500
	59	72	72	72	2	50/50	

NOTE Due to the open design of the electric heaters, the airside pressure drop is negligible

NOMINAL CFM RANGE (Gas Heat Units)

UNIT	DESIGN RANGE (Cfm)		
48EJ,EW024	6,000	TO	10,000
48EK,EY024	4,000	TO	10,000
48EJ,EW028	7,500	TO	12,500
48EK,EY028	5,000	TO	12,500
48EJ,EW030	8,250	TO	13,750
48EK,EY030	5,500	TO	13,750
48EJ,EW034	9,000	TO	15,000
48EK,EY034	6,000	TO	15,000
48EJ,EW038	10,500	TO	17,500
48EK,EY038	7,000	TO	17,500
48EJ,EW044	12,000	TO	20,000
48EK,EY044	8,000	TO	20,000
48EJ,EW048	13,500	TO	22,500
48EK,EY048	9,000	TO	22,500

NOMINAL CFM RANGE (Electric Heat Units)

UNIT	DESIGN RANGE (Cfm)		
50EJ,EW024	6,000	TO	10,000
50EK,EY024	4,000	TO	10,000
50EJ,EW028	7,500	TO	12,500
50EK,EY028	5,000	TO	12,500
50EJ,EW030	8,250	TO	13,750
50EK,EY030	5,500	TO	13,750
50EJ,EW034	9,000	TO	15,000
50EK,EY034	6,000	TO	15,000
50EJ,EW038	10,500	TO	17,500
50EK,EY038	7,000	TO	17,500
50EJ,EW044	12,000	TO	20,000
50EK,EY044	8,000	TO	20,000
50EJ,EW048	13,500	TO	22,500
50EK,EY048	9,000	TO	22,500

Options and accessories



ITEM	OPTION*	ACCESSORY†
Barometric Relief	X	X
Copper/Copper Condenser Coil	X	
Pre-Coated Aluminum Fin Condenser Coil	X	
Modulating Power Exhaust (VAV Only)**	X	
Non-Modulating Power Exhaust (CV Only)**	X	X
Power Exhaust Conversion, Non-Modulating to Modulating (CV and EY Only)**		X
Electric Heat (50EJ,EK,EW,EY Units Only)	X	X
Roof Curb		X
Motormaster® III Head Pressure Control		X
LP (Liquid Propane) Conversion Kit (48EJ,EK,EW,EY Units Only)		X
Condenser Coil Hail Guard Assembly		X
Thermostat and Subbase		X
Space Temperature Sensor (T-55)		X
Space Temperature Sensor with Offset (T-56) (CV Only)		X
IAQ (CO ₂) Sensor		X
Enthalpy Control for Integrated Economizer		X
Differential Enthalpy Sensor		X
Compressor Unloaders (CV Only)		X
Expansion Electronic Board (IAQ, Smoke Control, Demand Limit)		X
Roof Curb Retrofit Kit		X
LID-2B Interface Device		X

LEGEND

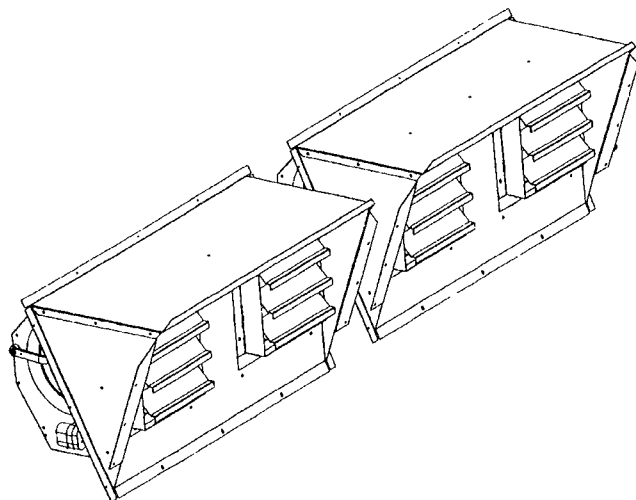
CV — Constant Volume
IAQ — Indoor Air Quality
VAV — Variable Air Volume

*Factory installed

†Field Installed

**Accessory must be installed in the ductwork on horizontal supply/return units
 Not available as a factory installed option on horizontal units

POWER EXHAUST FANS



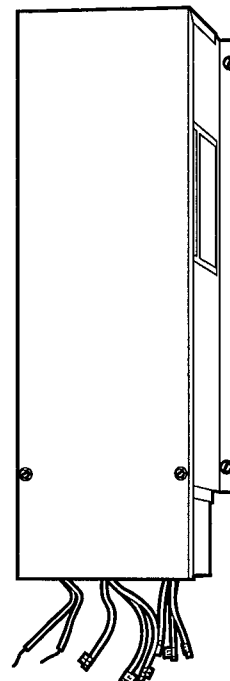
When combined with the economizer, the power exhaust can be used to exhaust the return air and eliminate over-pressurization of the building. The power exhaust utilizes multiple forward-curved fans, each driven by its own motor.

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.

NOTE. The factory mounted power exhaust/barometric relief is shipped tilted into the unit cabinet. Power exhaust/barometric relief is fully assembled and only needs to be rotated into operating position for start-up.

HEAD PRESSURE CONTROL

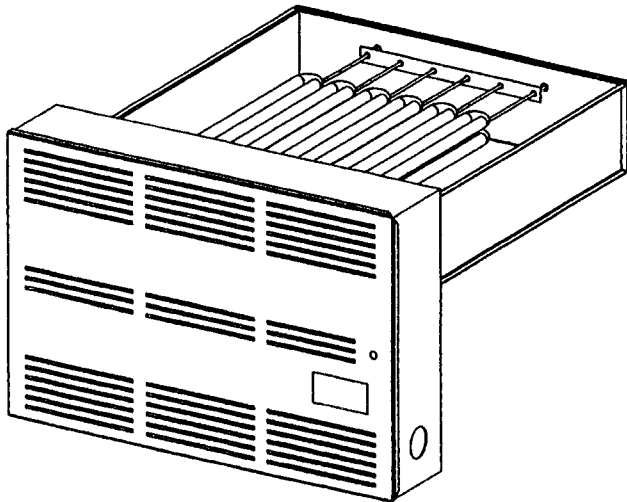


The standard units are designed to operate in cooling at outdoor temperatures down to 35 F. With accessory Motormaster III control (condenser fan speed modulation) units can operate at outdoor temperatures down to -20 F. The head pressure controls, which mount in the condenser section, control the condenser-fan 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.

Options and accessories (cont)

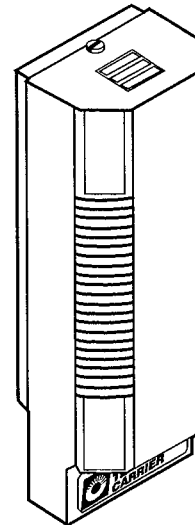


ELECTRIC HEATER



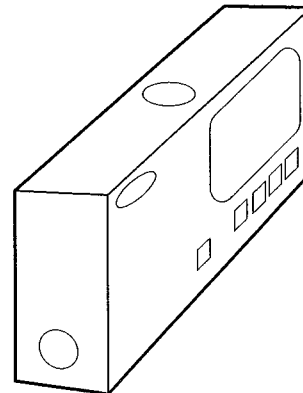
Electric heaters are available in a wide range of capacities for factory or field installation

CO₂ SENSOR



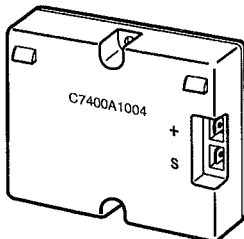
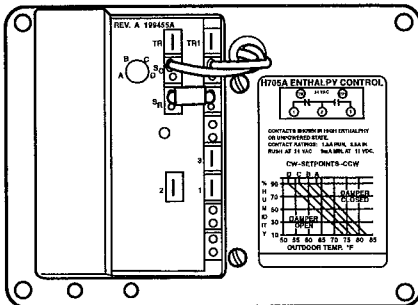
This sensor monitors building interior or return air carbon dioxide levels and automatically activates the outdoor fan and opens the economizer for rapid dilution of CO₂ levels above an adjustable set point.

LID-2B FIELD-INSTALLED INTERFACE DEVICE



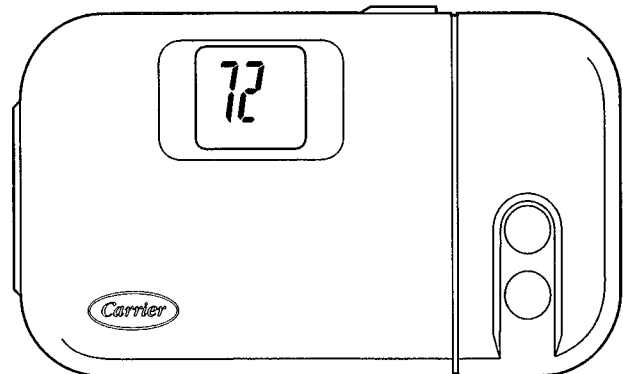
The LID-2B (30HX900007) enhanced display provides access to the unit software for specific application time schedules and control configurations. The LID-2B requires a separate dedicated 24-v power source.

ENTHALPY CONTROL FOR INTEGRATED ECONOMIZER



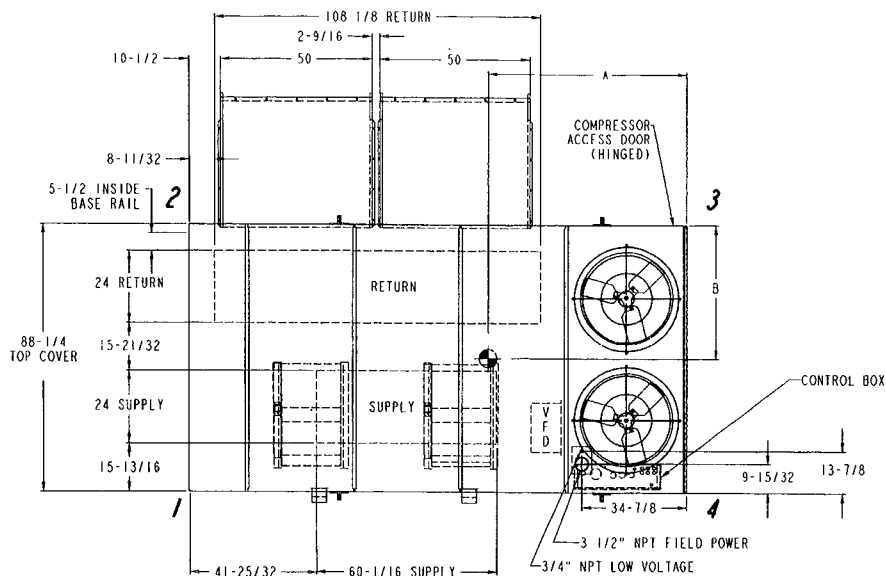
Enthalpy economizer controls help provide efficient, economical economizer operation. Solid-state enthalpy control includes the logic and one sensor to calculate both dry and wet bulb of the outdoor air to provide an accurate enthalpy reading. It then decides when to energize the economizer based on 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).

ELECTRONIC PROGRAMMABLE THERMOSTAT



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

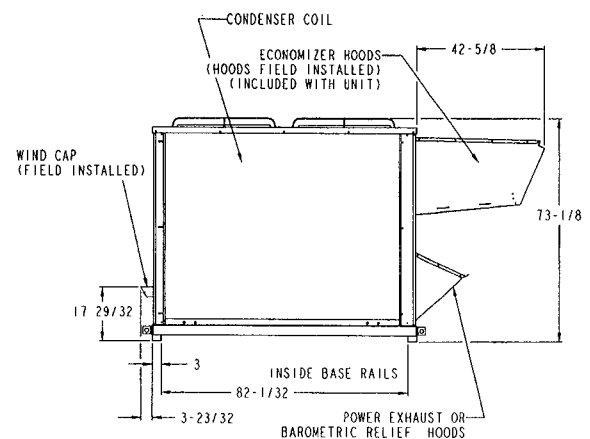
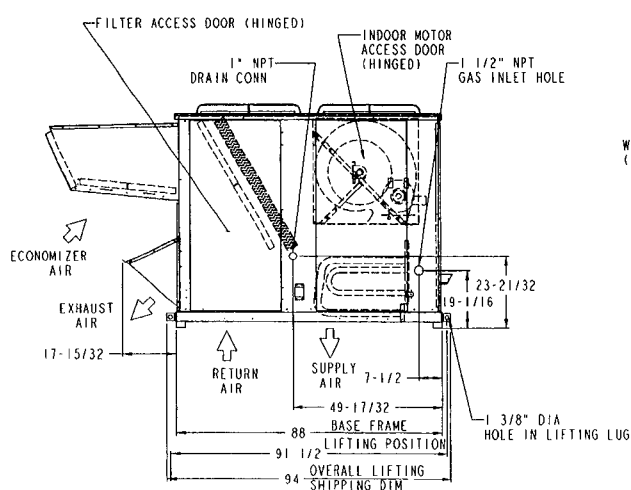
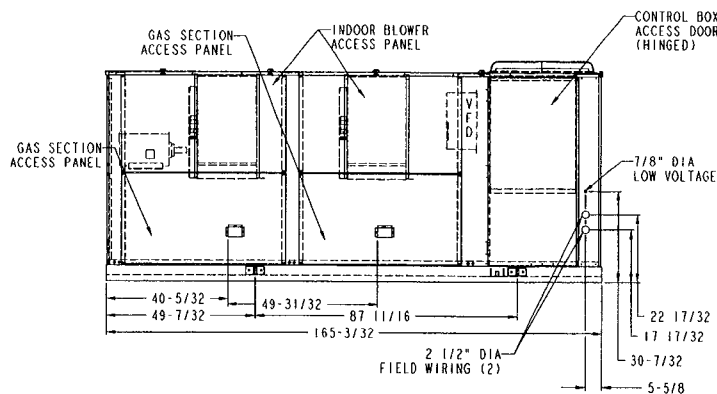
Base unit dimensions, 48EJ,EK024-034



VFD — Variable Frequency Drive

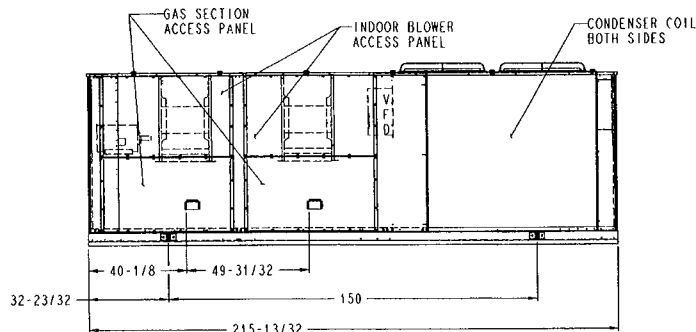
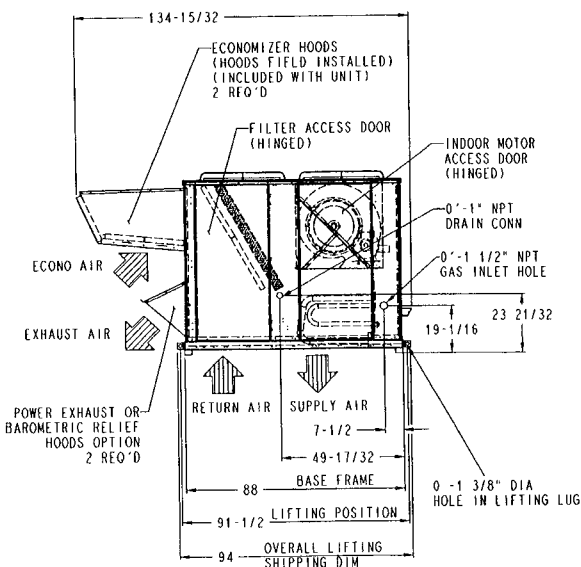
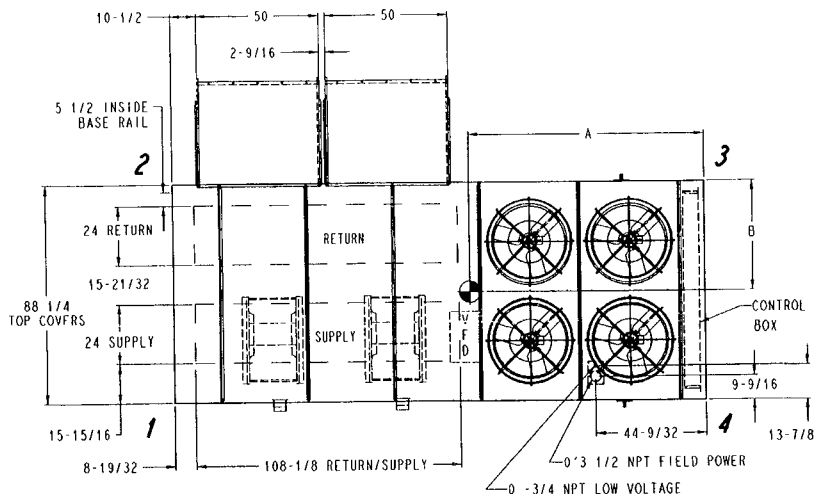
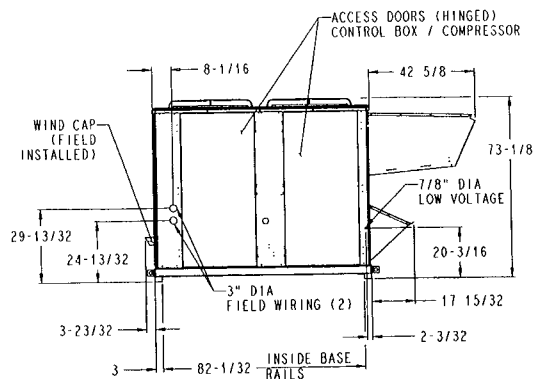
NOTES:

- Weights include economizer (STD)
- Center of gravity
- Do not locate adjacent units with flue discharge facing economizer inlet. Min clearances to be:
Adjacent Units: 15'-0"
Top of Units: No Overhang
Condenser Coil: 4'-0"
Economizer Side: 6'-0"
Gas Heat Side: 4'-0"
Filter Access Side: 10'-0" (For Removal of Evaporator Coil)
- For smaller service and operational clearances, contact Carrier Application Engineering department.
- 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.
- Dimensions are in inches



UNIT SIZE	OPERATING WEIGHT	A	B	CORNER WEIGHT (lb)			
	lb	ft-in.	ft-in.	1	2	3	4
48EJ/EKD024	4176	6- 0 ⁵ / ₈	3-6 ⁵ / ₈	879	954	1220	1124
48EJE024	4256	6- 1 ⁵ / ₁₆	3-6 ¹¹ / ₁₆	917	973	1218	1148
48EJ/EKD028	4262	5- 9 ⁵ / ₈	3-8	899	899	1232	1232
48EJE028	4342	5-10 ¹ / ₈	3-8 ⁵ / ₁₆	929	916	1240	1257
48EJ/EKD030	4262	5- 9 ⁵ / ₈	3-8	899	899	1232	1232
48EJE030	4342	5-10 ¹ / ₈	3-8 ⁵ / ₁₆	929	916	1240	1257
48EJ/EKD034	4262	5- 9 ⁵ / ₈	3-8	899	899	1232	1232
48EJE034	4342	5-10 ¹ / ₈	3-8 ⁵ / ₁₆	929	916	1240	1257

Base unit dimensions, 48EJ,EK038-048



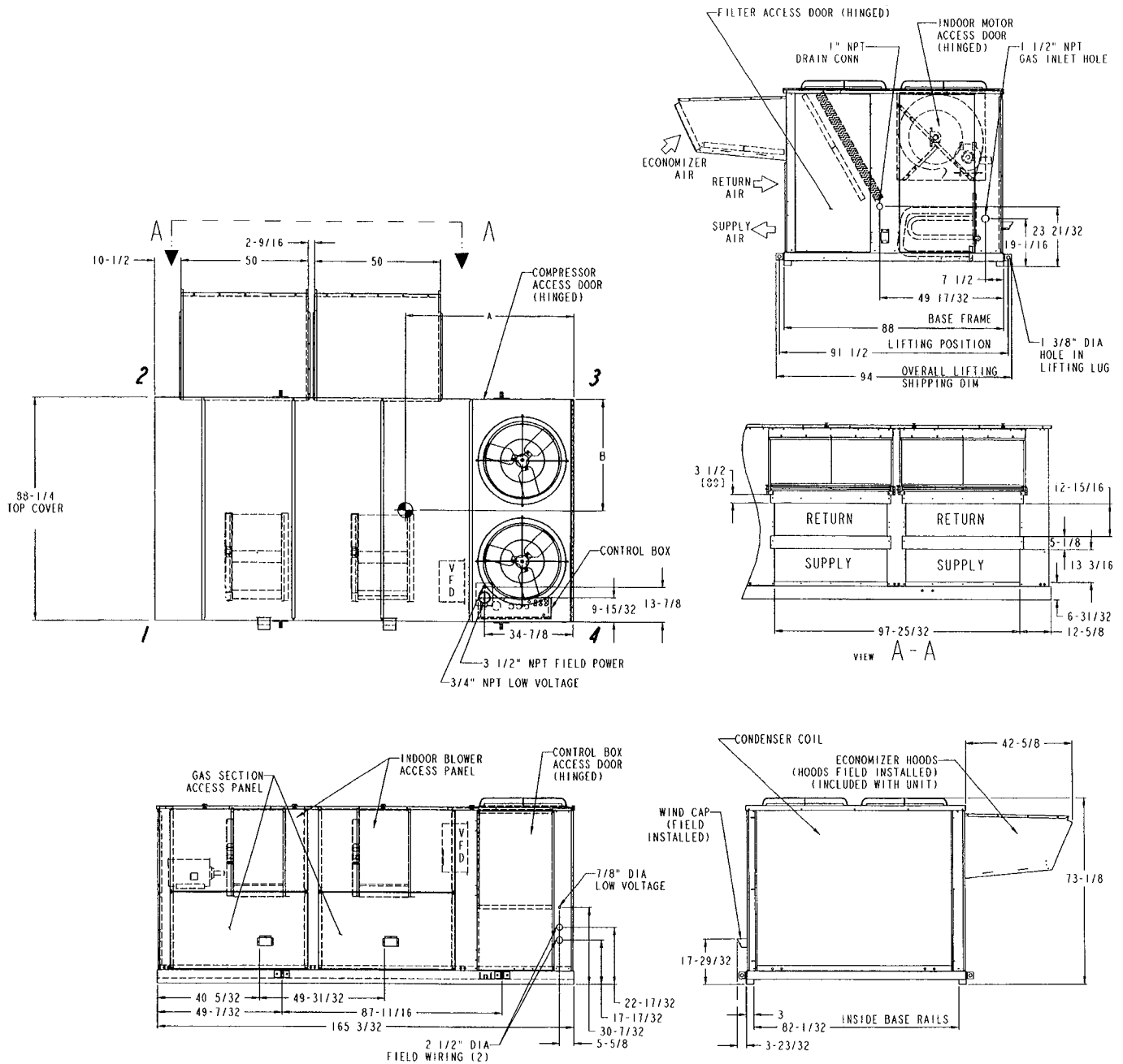
VFD — Variable Frequency Drive

NOTES

- Weights include economizer (std)
- Center of gravity
- Do not locate adjacent units with flue discharge facing economizer inlet. Min. clearances to be:
Adjacent Units: 15'-0"
Top of Units: No Overhang
Condenser Coil: 4'-0"
Economizer Side: 6'-0"
Gas Heat Side: 4'-0"
Filter Access Side: 10'-0" (For Removal of Evaporator Coil)
- For smaller service and operational clearances, contact Carrier Application Engineering department
- 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
- Dimensions are in inches

UNIT SIZE	OPERATING WEIGHT	A	B	CORNER WEIGHT (lb)			
	lb	ft-in.	ft-in.	1	2	3	4
48EJ/EKD038	4442	7- 8 ¹¹ / ₁₆	3-10 ⁷ / ₈	1021	894	1180	1347
48EJE038	4602	7-10 ¹ / ₈	3-11 ³ / ₁₆	1080	934	1200	1388
48EJ/EKD044	4668	7- 5 ⁵ / ₁₆	3-10 ⁷ / ₈	1033	906	1275	1455
48EJE044	4828	7- 6 ¹³ / ₁₆	3-11 ³ / ₁₆	1094	945	1293	1496
48EJ/EKD048	4955	7- 3 ¹¹ / ₁₆	3-10 ¹ / ₂	1068	953	1384	1550
48EJE048	5115	7- 5 ³ / ₁₆	3-10 ¹³ / ₁₆	1129	994	1401	1592

Base unit dimensions, 48EW,EY024-034



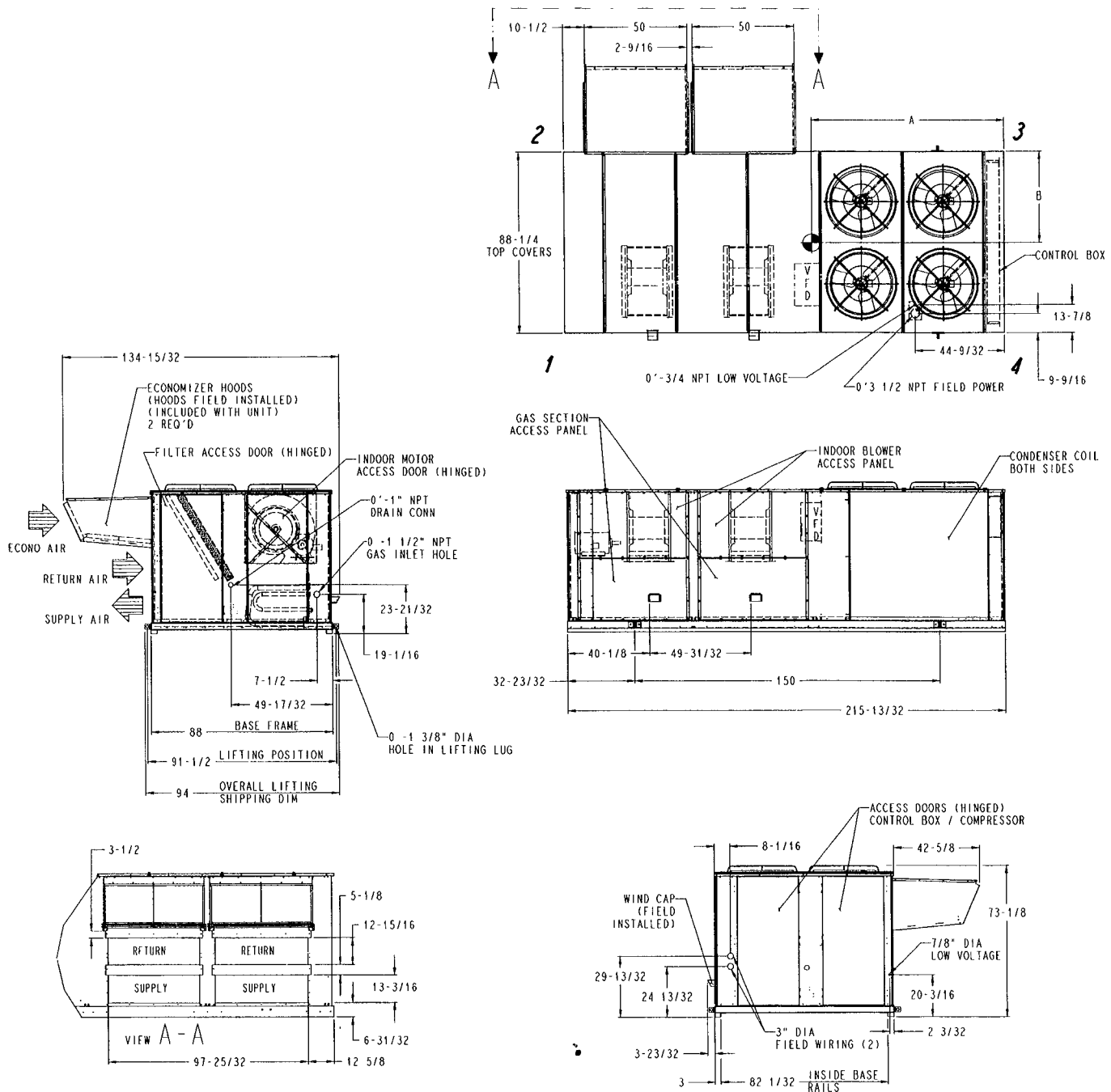
VFD — Variable Frequency Drive

NOTES

- Weights include economizer (std)
- Center of gravity
- Do not locate adjacent units with flue discharge facing economizer inlet. Min clearances to be:
 Adjacent Units: 15'-0"
 Top of Units: No Overhang
 Condenser Coil: 4'-0"
 Economizer Side: 6'-0"
 Gas Heat Side: 4'-0"
 Filter Access Side: 10'-0" (For Removal of Evaporator Coil)
- For smaller service and operational clearances, contact Carrier Application Engineering department
- Dimensions are in inches
- For side-supply/return applications, a single return and supply ductwork connection is recommended for covering both return and both supply openings

UNIT SIZE	OPERATING WEIGHT	A		B		CORNER WEIGHT (lb)			
	lb	ft-in.	ft-in.	ft-in.	ft-in.	1	2	3	4
48EW/EYD024	4176	6- 0 3/8	3-6 3/8	879	954	1220	1124		
48EWE024	4256	6- 1 1/16	3-6 1/16	917	973	1218	1148		
48EW/EYD028	4262	5- 9 9/8	3-8	899	899	1232	1232		
48EWE028	4342	5-10 1/8	3-8 1/16	929	916	1240	1257		
48EW/EYD030	4262	5- 9 9/8	3-8	899	899	1232	1232		
48EWE030	4342	5-10 1/8	3-8 1/16	929	916	1240	1257		
48EW/EYD034	4262	5- 9 9/8	3-8	899	899	1232	1232		
48EWE034	4342	5-10 1/8	3-8 1/16	929	916	1240	1257		

Base unit dimensions, 48EW,EY038-048



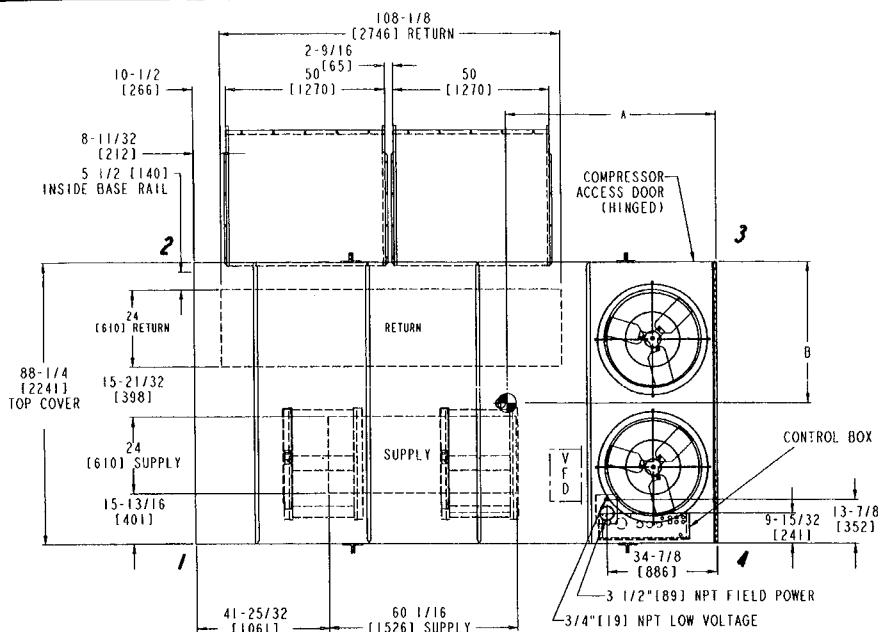
VFD — Variable Frequency Drive

NOTES:

- Weights include economizer (std)
- Center of gravity
- Do not locate adjacent units with flue discharge facing economizer inlet. Min clearances to be:
Adjacent Units: 15'-0"
Top of Units: No Overhang
Condenser Coil: 4'-0"
Economizer Side: 6'-0"
Gas Heat Side: 4'-0"
Filter Access Side: 10'-0" (For Removal of Evaporator Coil)
- For smaller service and operational clearances, contact Carrier Application Engineering department
- Dimensions are in inches
- For side-supply/return applications, a single return and supply ductwork connection is recommended for covering both return and both supply openings

UNIT SIZE	OPERATING WEIGHT	A	B	CORNER WEIGHT (lb)			
	lb	ft-in.	ft-in.	1	2	3	4
48EW/EYD038	4442	7'-8 1/16"	3'-10 7/8"	1021	894	1180	1347
48WE038	4602	7'-10 1/8"	3'-11 3/16"	1080	934	1200	1388
48EW/EYD044	4668	7'-5 5/16"	3'-10 7/8"	1033	906	1275	1455
48WE044	4828	7'-6 13/16"	3'-11 3/16"	1094	945	1293	1496
48EW/EYD048	4955	7'-3 1/16"	3'-10 1/2"	1068	953	1384	1550
48WE048	5115	7'-5 3/16"	3'-10 13/16"	1129	994	1401	1592

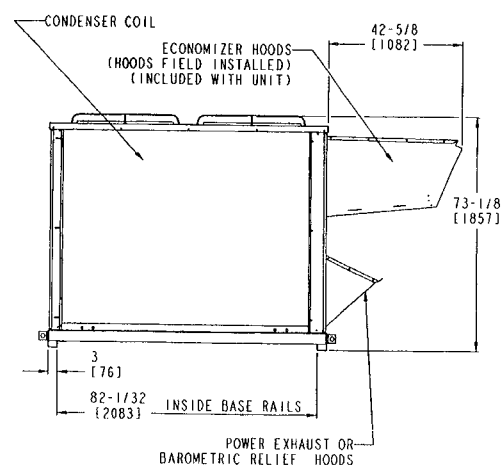
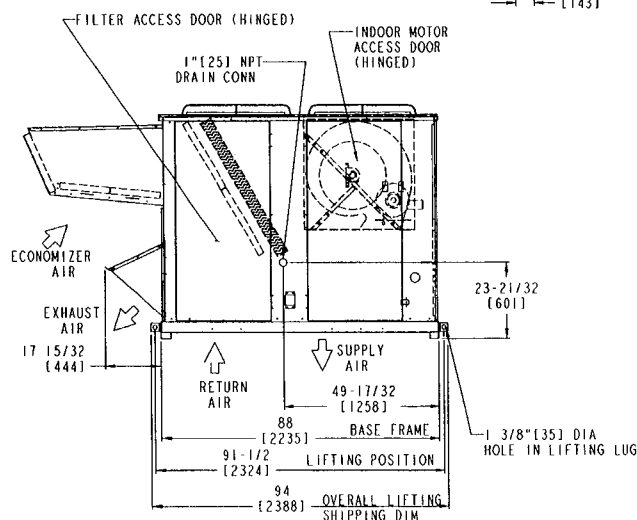
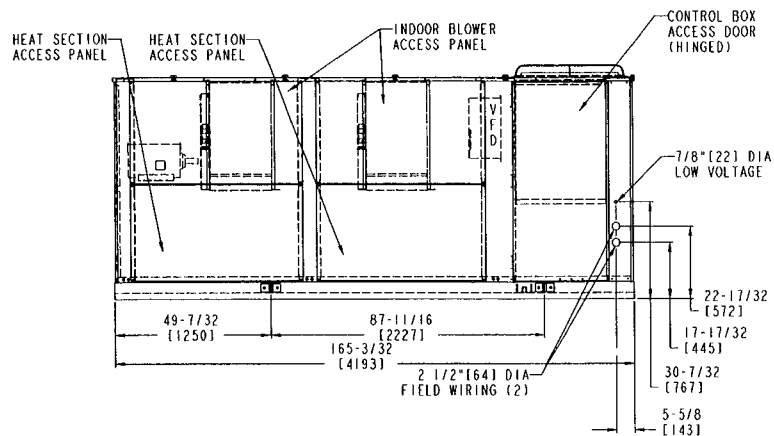
Base unit dimensions, 50EJ,EK024-034



LEGEND
VFD — Variable Frequency Drive

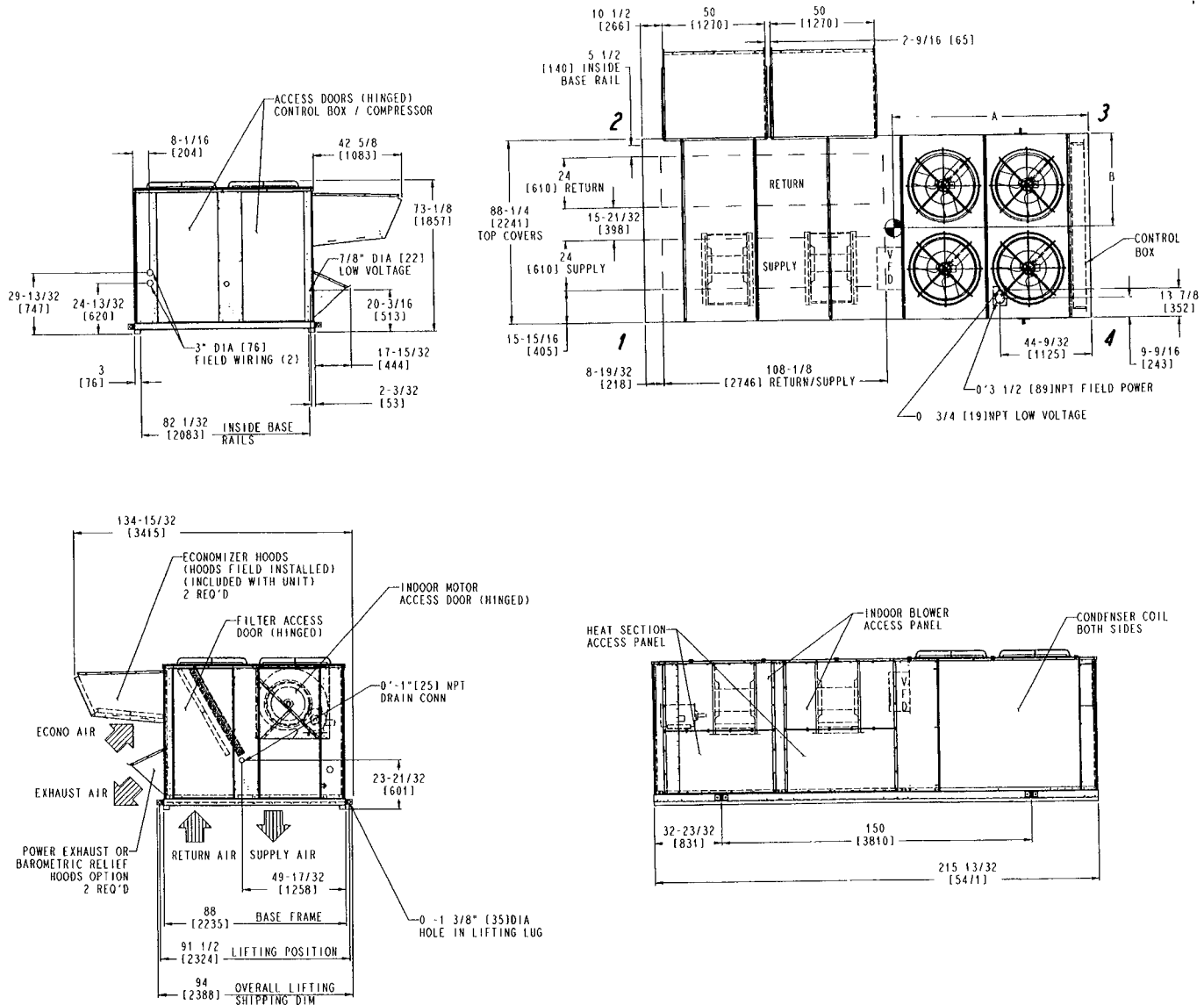
NOTES:

- Weights include economizer (Std)
- Center of gravity.
- 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)
- For smaller service and operational clearances, contact Carrier Application Engineering department
- 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
- Dimensions are in inches. Dimensions in [] are in millimeters
- For units with electric heat, a field-supplied 90° elbow must be installed in the supply ductwork below the unit discharge



UNIT SIZE 50EJ,EK	OPERATING WEIGHT	A	B	CORNER WEIGHT (lb)			
	lb	ft-in.	ft-in.	1	2	3	4
024	4016	5-11 ³ / ₈	3-5 ¹¹ / ₁₆	823	914	1199	1080
028	4102	5- 8 ¹ / ₂	3-7 ⁵ / ₈	844	859	1210	1189
030	4102	5- 8 ¹ / ₂	3-7 ⁵ / ₈	844	859	1210	1189
034	4102	5- 8 ¹ / ₂	3-7 ⁵ / ₈	844	859	1210	1189

Base unit dimensions, 50EJ,EK038-048



LEGEND

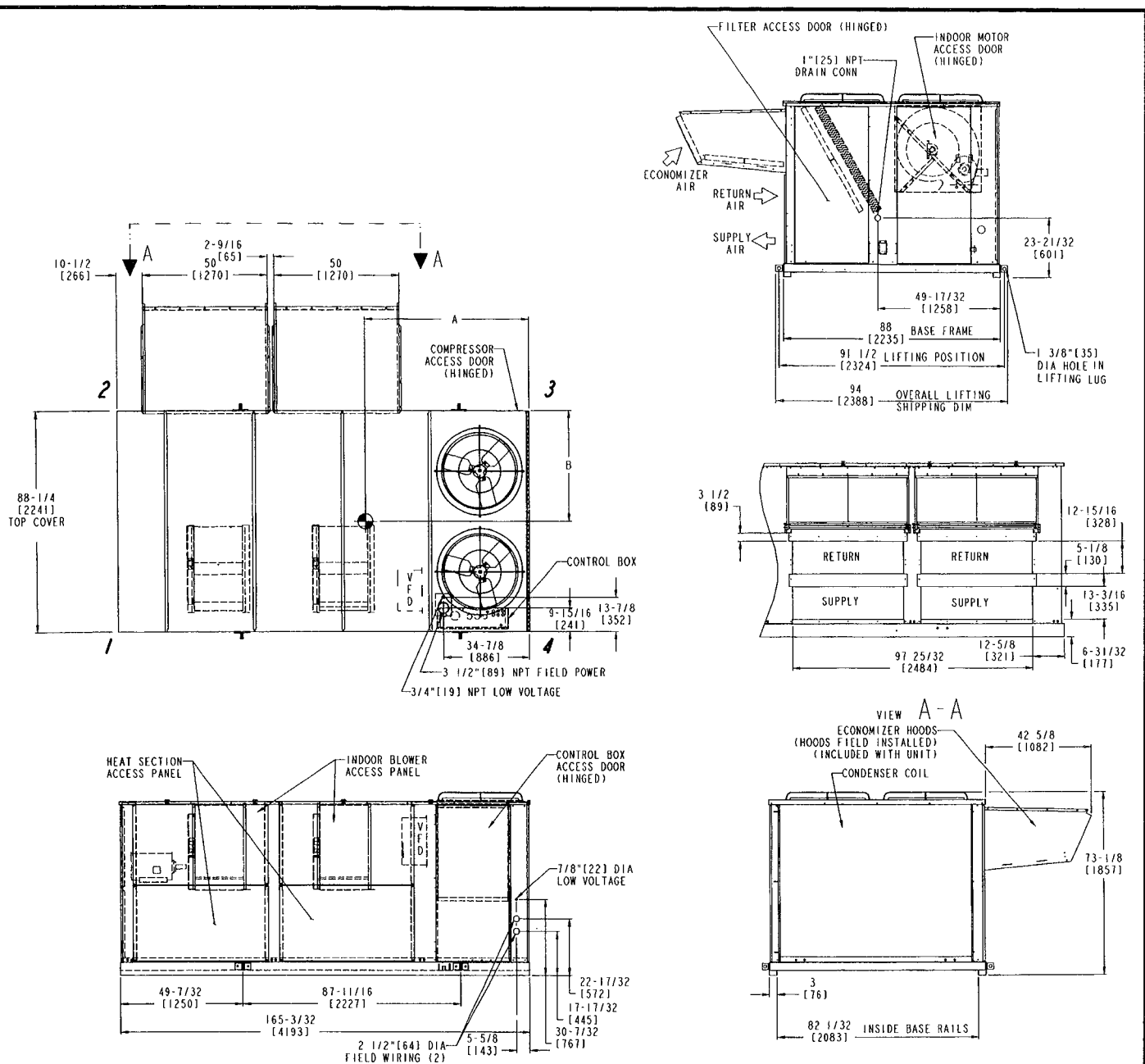
VFD — Variable Frequency Drive

NOTES:

- Weights include economizer (Std)
- Center of gravity
- 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)
- For smaller service and operational clearances, contact Carrier Application Engineering department
- 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
- Dimensions are in inches
- For units with electric heat, a field-supplied 90° elbow must be installed in the supply ductwork below the unit discharge

UNIT SIZE 50EJ,EK	OPERATING WEIGHT lb	CORNER WEIGHT (lb)					
		A	B	1	2	3	4
038	4282	7-7 ⁵ / ₁₆	3-10 ¹ / ₂	961	858	1162	1302
044	4508	7-3 ¹³ / ₁₆	3-11 ¹ / ₂	973	868	1258	1409
048	4795	7-2 ⁹ / ₁₆	3-10 ³ / ₃₂	1007	915	1368	1505

Base unit dimensions, 50EW,EY024-034



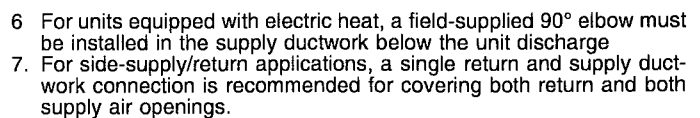
LEGEND

VFD — Variable Frequency Drive

NOTES:

- Weights include economizer (Std)
- Center of gravity
- 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)
- For smaller service and operational clearances, contact Carrier Application Engineering department
- Dimensions are in inches. Dimensions in [] are in millimeters
- For units equipped with electric heat, a field-supplied 90° elbow must be installed in the supply ductwork below the unit discharge
- For side-supply/return applications, a single return and supply ductwork connection is recommended for covering both return and both supply openings.

UNIT SIZE 50EW,EY	OPERATING WEIGHT	A	B	CORNER WEIGHT (lb)			
	lb	ft-in.	ft-in.	1	2	3	4
024	4016	5-11 ³ / ₈	3-5 ¹ / ₁₆	823	914	1199	1080
028	4102	5- 8 ¹ / ₂	3-7 ⁵ / ₈	844	859	1210	1189
030	4102	5- 8 ¹ / ₂	3-7 ⁵ / ₈	844	859	1210	1189
034	4102	5- 8 ¹ / ₂	3-7 ⁵ / ₈	844	859	1210	1189



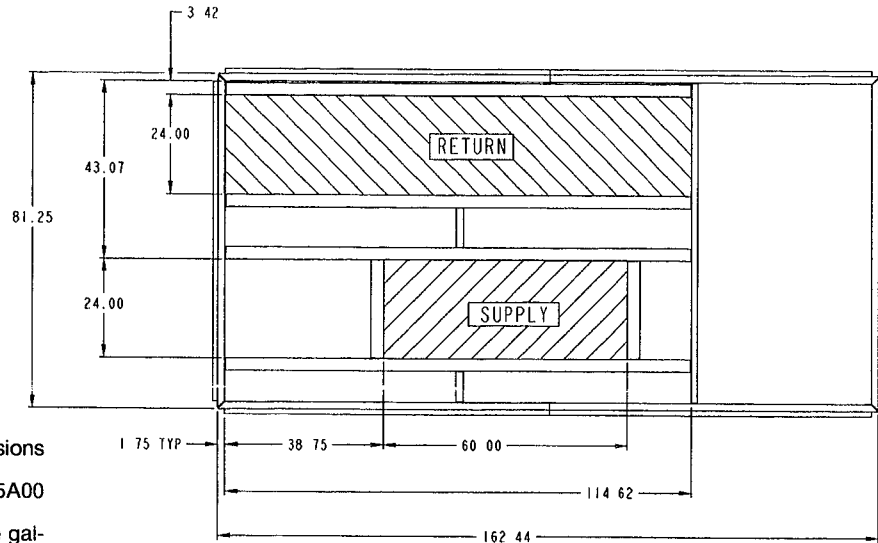
5 Dimensions are in inches. Dimensions in [] are in millimeters.

22

Accessory dimensions

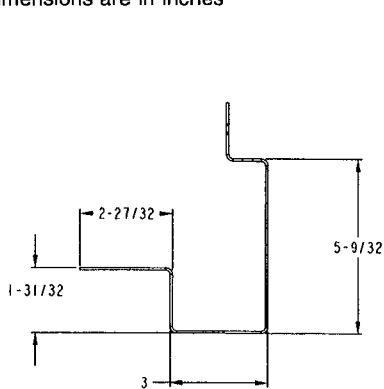


ROOF CURB (SIZES 024-034)

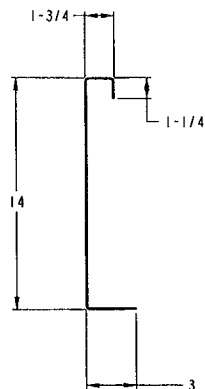


NOTES:

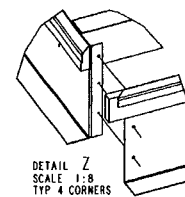
1. Unless otherwise specified, all dimensions are to outside of part.
2. Roof curb accessory CRRFCURB005A00 is shipped disassembled.
3. All roof curb parts are to be 14 gage galvanized steel.
4. Dimensions are in inches



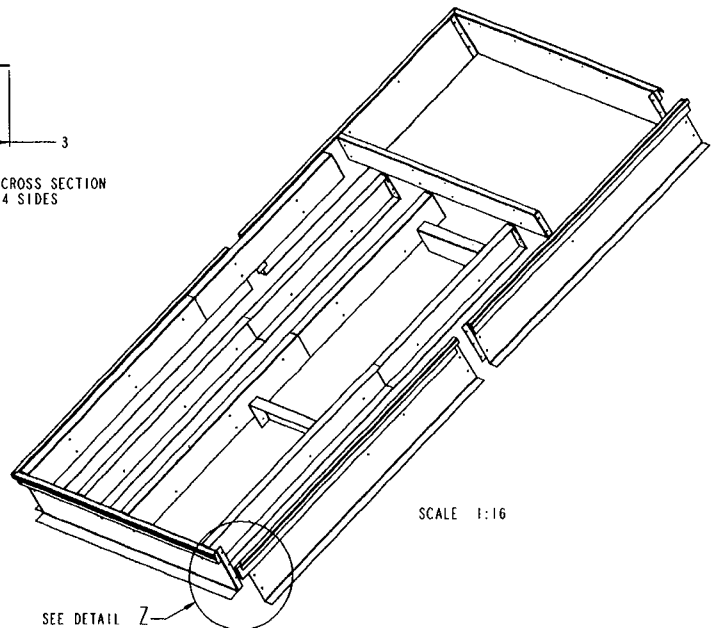
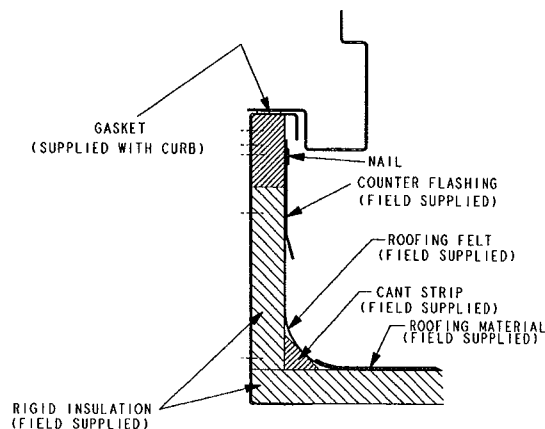
BASE RAIL CROSS SECTION
TYP 2 SIDES



ROOF CURB CROSS SECTION
TYP 4 SIDES



DETAIL Z
SCALE 1:8
TYP 4 CORNERS



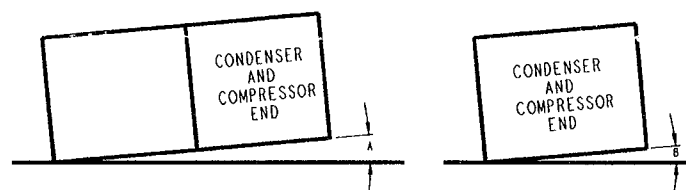
SCALE 1:16

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

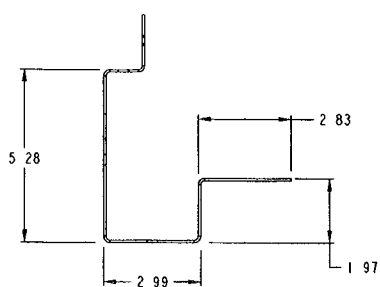
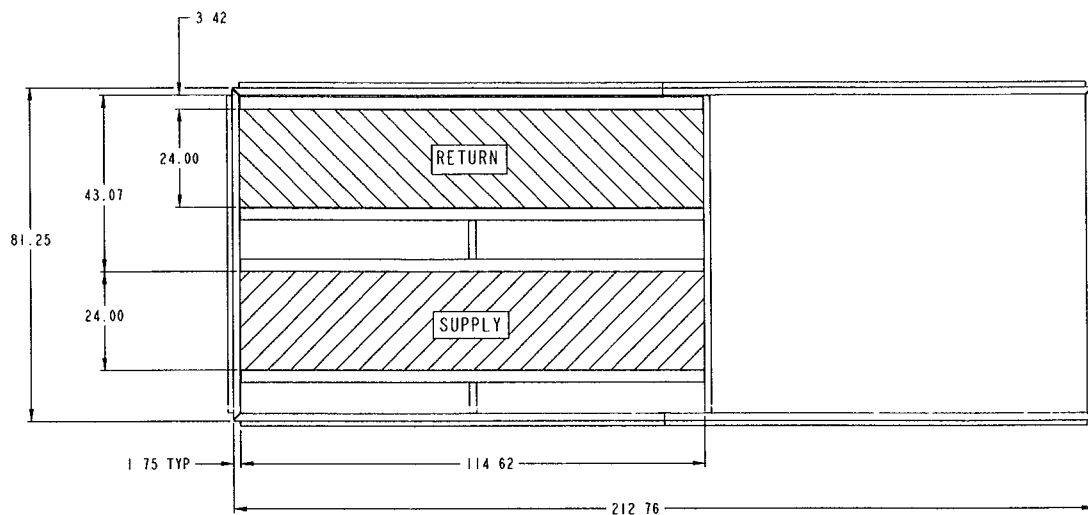


NOTE To prevent standing water in the drain pan of the indoor section and the heat exchangers, **UNIT CAN ONLY BE PITCHED AS SHOWN.**

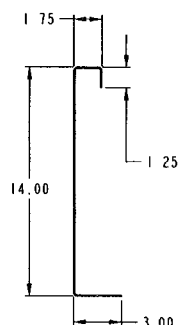
Accessory dimensions (cont)



ROOF CURB (SIZES 038-048)



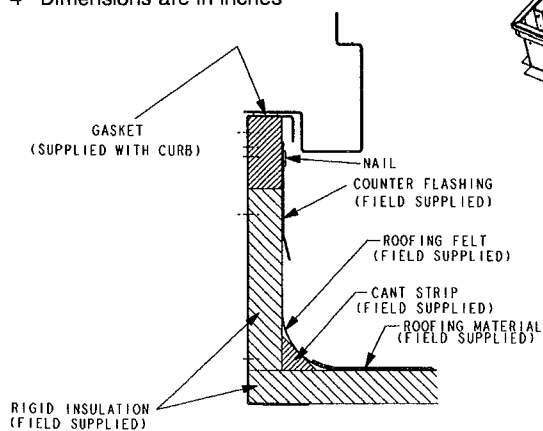
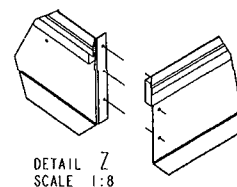
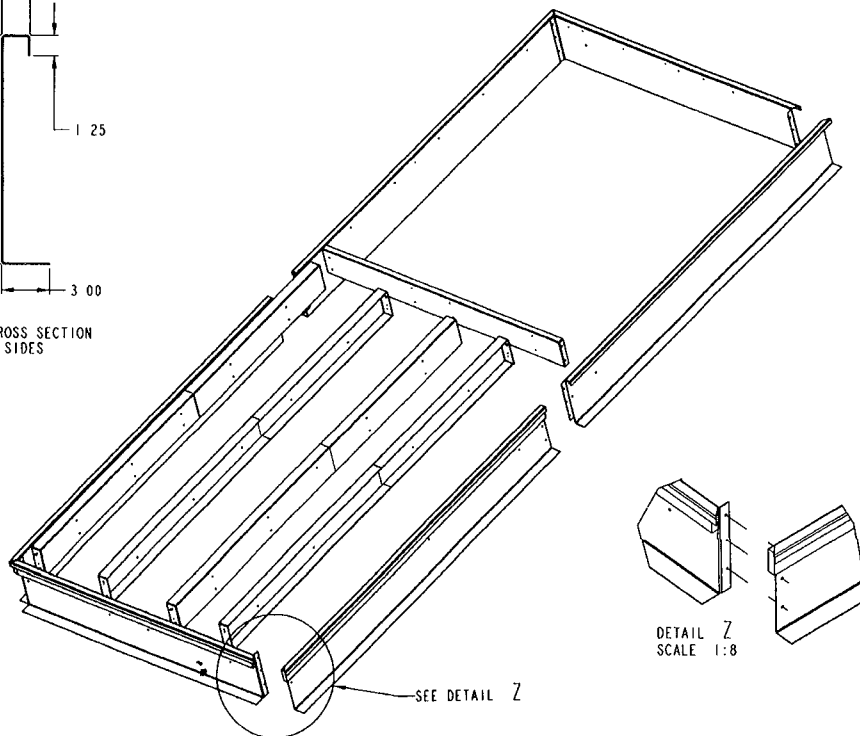
BASE RAIL CROSS SECTION
TYP (2) SIDES



ROOF CURB CROSS SECTION
TYP 4 SIDES

NOTES:

- 1 Unless otherwise specified, all dimensions are to outside of part
- 2 Roof curb accessory CRRFCURB006A00 is shipped disassembled
- 3 All roof curb parts are to be 14 gage galvanized steel
- 4 Dimensions are in inches

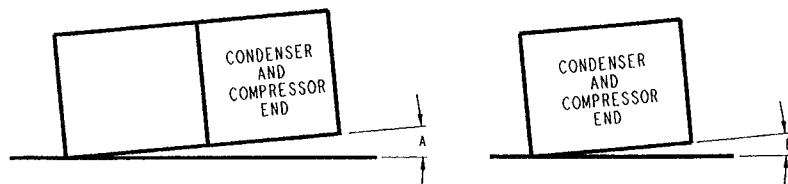


DIMENSIONS*
(degrees and inches)

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

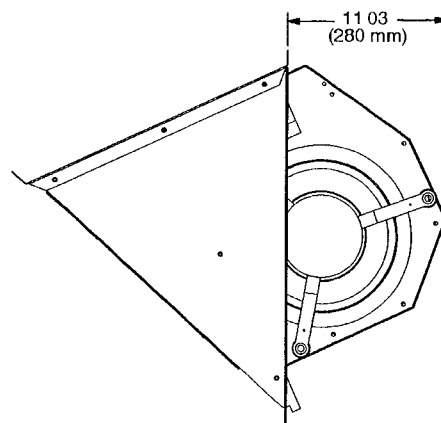
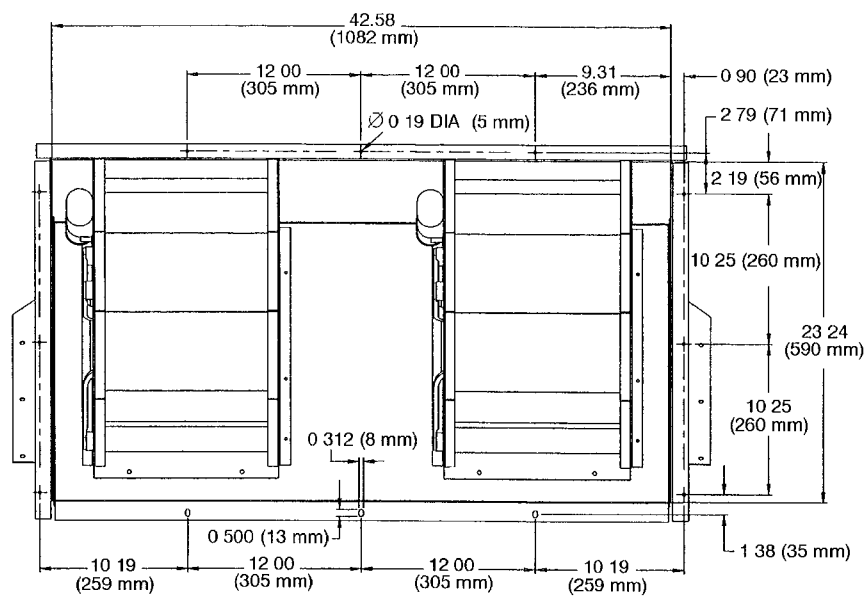
UNIT LEVELING TOLERANCES

*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:

- NOTES
- 1 Unless otherwise specified, all dimensions are to outside of part.
 - 2 Dimensions are in inches.
 - 3 There are 2 assemblies per unit
 - 4 For 48/50EW,EY units, the accessory power exhaust or barometric relief must be mounted in the field-supplied return ductwork

Selection procedure (with example)



I Determine cooling and heating requirements at design conditions.

Given:

Required Cooling Capacity (TC) 458,000 Btuh
Sensible Heat Capacity (SHC) 338,000 Btuh
Required Heating Capacity 640,000 Btuh
Condenser Entering Air Temperature 95 F
Indoor Air Temperature 80 F ewb, 67 F ewb
Evaporator Air Quantity 16,000 cfm
External Static Pressure 1.4 in. wg
Electrical Characteristics (V-Ph-Hz) 460-3-60
Unit Type Gas Heating, Vertical Discharge

II Select unit based on required cooling capacity.

Enter Cooling Capacities table at condenser entering temperature of 95 F. Unit 48EJ044 at 16,000 cfm and 67 F ewb will provide a total capacity of 462,000 Btuh and a SHC of 342,000 Btuh. Calculate SHC correction, if required, using notes under cooling capacities tables.

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

In the Heating Capacities and Efficiencies table, page 10, note that unit 48EJE044 will provide 648,000 Btuh with an input of 800,000 Btuh.

IV Determine fan speed and power requirements at design conditions.

Tabulated fan performance includes 2-in. throwaway filters, wet evaporator coil, economizer, cabinet losses, and roof curb. Find fan rpm and bhp at 1.4 in. wg and 16,000 cfm on 48EJE044 Fan Performance table for vertical applications. Find that the fan speed is 1025 rpm and the power required is 18.11 bhp. Refer to the Motor Limitations table on page 40. The 20 hp motor is required.

V Select unit that corresponds to power source available.

The Electrical Data table shows that a 460-3-60 unit is available.

Performance data



COOLING CAPACITIES

48/50EJ,EK,EW,EY024 (20 TONS)													
Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF											
		4,000 / 0.06			5,000 / 0.075			6,000 / 0.085			7,000 / 0.105		
		Evaporator Air — Ewb (F)											
		62	67	72	62	67	72	62	67	72	62	67	72
75	TC	216	238	261	228	250	275	241	264	289	248	272	296
	SHC	166	146	125	185	160	133	204	173	142	220	186	150
	kW	14.4	14.8	15.3	14.7	15.1	15.5	15.0	15.4	15.8	15.1	15.5	16.0
85	TC	207	228	251	219	240	264	230	253	277	237	260	283
	SHC	161	141	120	180	155	129	199	169	138	214	181	145
	kW	15.8	16.4	16.9	16.2	16.7	17.3	16.5	17.0	17.6	16.7	17.2	17.8
95	TC	199	219	240	209	230	252	220	242	263	226	248	271
	SHC	157	136	116	175	150	124	194	164	133	207	176	140
	kW	17.2	17.9	18.6	17.6	18.3	19.0	18.0	18.7	19.4	18.3	18.9	19.5
105	TC	190	209	230	199	219	240	209	230	251	15	236	256
	SHC	152	132	111	170	145	119	188	159	128	201	171	135
	kW	18.6	19.4	20.2	19.0	19.9	20.6	19.5	20.3	21.0	19.7	20.5	21.2
115	TC	181	198	219	189	209	229	198	218	238	204	222	242
	SHC	148	127	106	165	141	114	182	154	123	195	166	130
	kW	20.0	20.9	21.8	20.5	21.4	22.3	20.9	21.8	22.7	21.2	22.1	22.9
125	TC	170	189	208	179	197	217	187	205	224	193	210	228
	SHC	143	122	102	159	136	110	176	149	118	187	160	124
	kW	21.3	22.3	23.3	21.8	22.8	23.8	22.2	23.3	24.2	22.6	23.6	24.5

48/50EJ,EK,EW,EY024 (20 TONS) (cont)										
Temp (F) Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF								
		8,000 / 0.125			9,000 / 0.16			10,000 / 0.19		
		Evaporator Air — Ewb (F)								
		62	67	72	62	67	72	62	67	72
75	TC	256	279	305	261	284	309	267	289	314
	SHC	236	198	158	248	210	164	260	221	170
	kW	15.3	15.6	16.1	15.4	15.8	16.2	15.5	15.9	16.2
85	TC	244	267	290	250	271	294	255	274	299
	SHC	229	193	152	240	205	159	252	215	165
	kW	16.9	17.4	17.9	17.0	17.5	18.0	17.1	17.6	18.1
95	TC	232	254	277	238	258	280	244	261	284
	SHC	222	188	147	233	198	154	243	210	160
	kW	18.4	19.1	19.8	18.7	19.2	19.9	18.9	19.4	20.0
105	TC	221	240	262	227	244	266	233	248	269
	SHC	214	183	142	224	193	148	233	204	155
	kW	20.0	20.7	21.5	20.3	20.8	21.6	20.4	21.0	21.7
115	TC	210	228	248	215	231	251	222	234	254
	SHC	207	177	137	214	188	143	222	198	150
	kW	21.5	22.3	23.1	21.8	22.5	23.3	22.1	22.6	23.5
125	TC	199	215	233	205	217	235	210	219	238
	SHC	199	172	131	204	182	137	210	192	143
	kW	22.9	23.7	24.7	23.3	24.0	24.8	23.6	24.1	25.0

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 evaporator coil (h_{lwb})

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

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

3. SHC is based on 80 F edb temperature of air entering evaporator coil.

Below 80 F edb, subtract (corr factor x cfm) from SHC.
Above 80 F edb, add (corr factor x cfm) to SHC.

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 = $1.10 \times (1 - BF) \times (edb - 80)$

- 4 Cooling capacities are gross and do not include deduction for indoor fan motor heat.
- 5 Variable Air Volume units will operate down to 70 cfm/ton. Performance at 70 cfm/ton is limited to unloaded operation and may be additionally limited by edb and ewb conditions.

Performance data (cont)



COOLING CAPACITIES (cont)

48/50EJ,EK,EW,EY028 (25 TONS)													
Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF											
		5,000 / 0.05			6,250 / 0.065			7,500 / 0.08			8,750 / 0.1		
		Evaporator Air — Ewb (F)											
		62	67	72	62	67	72	62	67	72	62	67	72
75	TC	270	296	323	280	306	334	290	317	346	298	326	355
	SHC	208	179	152	229	195	162	250	212	172	270	226	181
	kW	18.9	19.5	20.1	19.1	19.8	20.4	19.4	20.1	20.7	19.6	20.3	20.9
85	TC	258	284	310	267	293	320	277	303	331	285	311	339
	SHC	203	174	146	223	190	156	244	206	166	262	220	175
	kW	20.7	21.5	22.2	21.0	21.8	22.5	21.3	22.0	22.8	21.5	22.3	23.0
95	TC	247	272	296	255	281	306	264	290	315	271	297	324
	SHC	197	168	140	217	184	150	237	199	160	255	214	169
	kW	22.5	23.4	24.4	22.8	23.7	24.7	23.1	24.0	25.0	23.4	24.3	25.2
105	TC	234	259	283	242	267	291	250	275	300	258	281	307
	SHC	194	163	134	213	178	144	231	194	154	247	208	163
	kW	24.1	25.2	26.2	24.5	25.5	26.7	24.9	26.0	27.0	25.3	26.2	27.2
115	TC	222	246	269	229	253	277	238	260	285	245	266	291
	SHC	192	157	129	208	172	138	225	187	148	239	202	158
	kW	25.7	27.0	28.2	26.2	27.5	28.7	26.7	27.8	29.0	27.1	28.2	29.3
125	TC	208	233	256	216	240	262	224	246	269	232	251	274
	SHC	188	152	124	203	167	133	218	182	143	230	196	152
	kW	27.3	28.8	30.1	27.8	29.3	30.5	28.3	29.6	31.0	28.8	30.0	31.2

48/50EJ,EK,EW,EY028 (25 TONS) (cont)											
Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF									
		10,000 / 0.12			11,250 / 0.15			12,500 / 0.195			
		Evaporator Air — Ewb (F)									
		62	67	72	62	67	72	62	67	72	
75	TC SHC kW	305	333	363	311	339	369	319	343	374	
		289	241	190	305	256	199	316	269	207	
		19.8	20.4	21.0	19.9	20.5	21.2	20.1	20.7	21.3	
85	TC SHC kW	291	318	346	298	323	352	305	327	356	
		281	234	184	294	249	193	304	262	201	
		21.7	22.5	23.2	21.9	22.7	23.4	22.2	22.7	23.5	
95	TC SHC kW	278	302	330	284	307	335	292	311	338	
		272	228	178	284	242	187	292	256	195	
		23.7	24.6	25.4	24.0	24.7	25.6	24.2	24.9	25.8	
105	TC SHC kW	265	286	312	272	291	317	278	294	320	
		261	222	173	272	236	181	278	249	189	
		25.6	26.5	27.5	25.9	26.7	27.7	26.2	26.8	27.8	
115	TC SHC kW	252	272	296	260	275	300	266	278	302	
		251	217	167	260	230	175	266	243	183	
		27.5	28.4	29.6	27.9	28.6	29.8	28.2	28.8	29.9	
125	TC SHC kW	240	256	278	246	259	282	253	262	284	
		239	210	161	246	223	169	253	235	177	
		29.4	30.2	31.6	29.8	30.5	31.8	30.2	30.6	31.8	

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

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

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

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

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

3. SHC is based on 80 F edb temperature of air entering evaporator coil

Below 80 F edb, subtract (corr factor x cfm) from SHC
 Above 80 F edb, add (corr factor x cfm) to SHC

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.

$$\text{Correction factor} = 1.10 \times (1 - \text{BF}) \times (\text{edb} - 80)$$

- 4 Cooling capacities are gross and do not include deduction for indoor fan motor heat.
- 5 Variable Air Volume units will operate down to 70 cfm/ton. Performance at 70 cfm/ton is limited to unloaded operation and may be additionally limited by edb and ewb conditions.

COOLING CAPACITIES (cont)

48/50EJ,EK,EW,EY030 (27.5 TONS)													
Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF											
		5,500 / 0.06			6,875 / 0.07			8,250 / 0.09			9,625 / 0.11		
		Evaporator Air — Ewb (F)											
		62	67	72	62	67	72	62	67	72	62	67	72
75	TC	299	326	357	311	340	371	323	353	384	333	363	395
	SHC	229	198	168	252	215	179	276	233	190	298	249	201
	kW	23.4	24.3	25.3	23.7	24.8	25.8	24.2	25.1	26.1	24.5	25.5	26.5
85	TC	287	313	342	298	326	356	309	338	367	318	347	377
	SHC	223	192	162	246	209	173	269	227	184	289	243	194
	kW	25.4	26.5	27.7	25.9	27.0	28.1	26.4	27.4	28.6	26.8	27.8	29.0
95	TC	275	301	329	285	313	340	296	322	352	303	330	360
	SHC	217	186	156	240	204	167	262	220	177	281	237	187
	kW	27.4	28.7	30.0	28.0	29.2	30.6	28.5	29.8	31.1	28.9	30.2	31.5
105	TC	262	288	314	272	298	325	281	307	335	290	315	343
	SHC	210	180	150	232	198	161	254	214	171	273	230	181
	kW	29.4	30.9	32.3	29.9	31.5	32.9	30.5	32.0	33.4	31.0	32.4	33.8
115	TC	251	274	299	258	284	310	267	292	319	275	298	325
	SHC	204	174	145	226	192	155	247	208	165	264	224	175
	kW	31.3	33.0	34.5	32.0	33.6	35.2	32.6	34.1	35.7	33.1	34.6	36.2

48/50EJ,EK,EW,EY030 (27.5 TONS) (cont)											
Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF									
		11,000 / 0.13			12,375 / 0.17			13,750 / 0.205			
		Evaporator Air — Ewb (F)									
		62	67	72	62	67	72	62	67	72	
75	TC	341	371	404	348	377	409	355	382	415	
	SHC	319	266	211	334	281	219	349	296	228	
	kW	24.8	25.8	26.8	25.1	26.1	27.0	25.3	26.2	27.1	
85	TC	326	354	385	333	360	391	340	365	396	
	SHC	310	259	204	323	274	213	337	288	221	
	kW	27.1	28.1	29.3	27.4	28.4	29.5	27.6	28.6	29.7	
95	TC	311	337	367	318	342	372	325	347	377	
	SHC	300	253	197.8	314	267	206	325	282	215	
	kW	29.3	30.5	31.8	29.6	30.8	32.1	30.0	31.0	32.2	
105	TC	296	320	348	304	325	353	311	329	358	
	SHC	289	246	191	301	261	200	311	275	208	
	kW	31.4	32.8	34.2	31.8	33.0	34.4	32.3	33.2	34.7	
115	TC	282	303	331	290	308	334	297	311	339	
	SHC	279	238	184	290	253	194	297	267	202	
	kW	33.6	34.9	36.6	34.1	35.2	36.9	34.6	35.5	37.0	

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

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

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

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

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

- 3 SHC is based on 80 F edb temperature of air entering evaporator coil
Below 80 F edb, subtract (corr factor x cfm) from SHC
Above 80 F edb, add (corr factor x cfm) to SHC

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 = $1.10 \times (1 - BF) \times (edb - 80)$

- 4 Cooling capacities are gross and do not include deduction for indoor fan motor heat
- 5 Variable Air Volume units will operate down to 70 cfm/ton. Performance at 70 cfm/ton is limited to unloaded operation and may be additionally limited by edb and ewb conditions.

Performance data (cont)



COOLING CAPACITIES (cont)

48/50EJ,EK,EW,EY034 (30 TONS)													
Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF											
		6000 / 0.07			7,500 / 0.085			9,000 / 0.1			10,500 / 0.11		
		Evaporator Air — Ewb (F)											
		62	67	72	62	67	72	62	67	72	62	67	72
75	TC	334	363	397	345	376	410	357	389	423	369	401	435
	SHC	251	218	185	277	236	197	302	256	208	327	274	220
	kW	28.0	29.2	30.6	28.6	29.8	31.2	29.0	30.4	31.6	29.6	30.8	32.2
85	TC	320	349	381	331	361	393	343	373	405	353	383	417
	SHC	246	212	179	270	230	190	294	248	202	318	266	212
	kW	30.4	31.8	33.3	31.0	32.4	33.8	31.5	33.0	34.4	32.0	33.4	35.0
95	TC	307	335	366	317	346	377	327	357	389	337	367	398
	SHC	240	205	173	264	224	184	287	242	195	310	260	206
	kW	32.7	34.2	36.0	33.3	35.0	36.6	34.0	35.6	37.2	34.4	36.2	37.8
105	TC	294	321	350	303	331	361	312	341	371	321	349	379
	SHC	233	199	166	257	216	177	280	234	188	302	252	199
	kW	35.0	36.8	38.6	35.6	37.4	39.2	36.2	38.0	39.8	36.8	38.6	40.4
115	TC	280	307	335	289	316	343	297	324	353	305	331	361
	SHC	227	193	160	249	210	171	272	228	181	294	245	192
	kW	37.2	39.2	41.1	37.8	39.8	41.8	38.4	40.5	42.5	39.2	41.1	43.1

48/50EJ,EK,EW,EY034 (30 TONS) (cont)										
Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF								
		12,000 / 0.135			13,500 / 0.155			15,000 / 0.18		
		Evaporator Air — Ewb (F)								
		62	67	72	62	67	72	62	67	72
75	TC	377	410	445	383	417	451	390	423	459
	SHC	350	291	230	369	307	240	389	323	251
	kW	30.0	31.2	32.6	30.2	31.5	32.8	30.5	31.8	33.1
85	TC	361	391	425	367	397	431	374	403	437
	SHC	340	284	224	358	300	233	374	316	243
	kW	32.4	33.9	35.4	32.8	34.2	35.7	33.1	34.5	36.0
95	TC	344	373	406	351	379	411	357	385	417
	SHC	332	276	216	347	292	226	357	309	234
	kW	35.0	36.6	38.2	35.4	36.9	38.6	35.8	37.2	38.9
105	TC	328	355	386	336	361	391	343	365	396
	SHC	322	269	210	334	285	219	343	301	228
	kW	37.3	39.0	40.9	37.8	39.4	41.2	38.4	39.8	41.5
115	TC	312	337	366	320	342	371	330	347	375
	SHC	312	261	203	320	277	212	330	293	222
	kW	39.7	41.6	43.5	40.4	41.9	43.9	41.1	42.3	44.2

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

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

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

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

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

- 3 SHC is based on 80 F edb temperature of air entering evaporator coil.
Below 80 F edb, subtract (corr factor x cfm) from SHC
Above 80 F edb, add (corr factor x cfm) to SHC.

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.

$$\text{Correction factor} = 1.10 \times (1 - \text{BF}) \times (\text{edb} - 80)$$

- 4 Cooling capacities are gross and do not include deduction for indoor fan motor heat.
- 5 Variable Air Volume units will operate down to 70 cfm/ton. Performance at 70 cfm/ton is limited to unloaded operation and may be additionally limited by edb and ewb conditions

COOLING CAPACITIES (cont)

48/50EJ,EK,EW,EY038 (35 TONS)													
Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF											
		7,000 / 0.115			8,750 / 0.135			10,500 / 0.155			12,250 / 0.17		
		Evaporator Air — Ewb (F)											
		62	67	72	62	67	72	62	67	72	62	67	72
75	TC	349	385	426	364	402	444	378	416	458	388	428	471
	SHC	273	236	200	301	257	213	329	278	226	354	299	239
	kW	24.0	25.0	25.6	24.4	25.4	26.0	24.8	25.6	26.4	25.1	25.9	26.9
85	TC	336	371	410	351	387	428	362	400	441	374	412	453
	SHC	268	230	193	295	251	207	321	272	220	346	291	233
	kW	26.2	27.2	28.2	26.6	27.7	28.6	27.0	28.0	29.0	27.3	28.3	29.3
95	TC	324	357	396	337	372	411	348	384	424	358	394	435
	SHC	262	224	187	289	245	200	314	266	213	338	285	225
	kW	28.2	29.4	30.6	28.7	29.9	31.1	29.2	30.3	31.5	29.5	30.6	31.9
105	TC	311	343	380	323	357	394	333	367	406	343	377	415
	SHC	256	217	181	282	238	194	306	258	207	328	278	219
	kW	30.3	31.5	33.0	30.8	32.1	33.6	31.3	32.6	34.0	31.7	33	34.3
115	TC	297	329	364	309	341	376	318	350	387	327	359	396
	SHC	249	211	175	274	232	188	297	252	200	319	272	212
	kW	32.4	33.9	35.4	32.9	34.5	35.9	33.4	35	36.4	33.9	35.4	36.8
125	TC	—	—	—	—	—	—	302	333	367	311	340	376
	SHC	—	—	—	—	—	—	288	245	191	308	264	206
	kW	—	—	—	—	—	—	35.5	37.2	38.8	36.0	37.6	39.2

48/50EJ,EK,EW,EY038 (35 TONS) (cont)										
Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF								
		14,000 / 0.19			15,750 / 0.20			17,500 / 0.21		
		Evaporator Air — Ewb (F)								
		62	67	72	62	67	72	62	67	72
75	TC	396	437	480	403	442	487	412	448	493
	SHC	378	318	251	398	338	266	411	356	277
	kW	25.3	26.1	27.1	25.5	26.3	27.2	25.7	26.3	27.3
85	TC	381	420	462	389	425	469	398	431	475
	SHC	369	311	244	386	330	256	397	347	267
	kW	27.5	28.5	29.5	27.8	28.7	29.7	28.0	28.9	29.9
95	TC	365	402	443	374	408	449	385	412	455
	SHC	358	304	237	373	322	249	384	339	260
	kW	29.8	30.9	32.1	30.1	31.1	32.3	30.5	31.3	32.5
105	TC	350	384	423	360	389	429	370	393	434
	SHC	346	297	231	360	314	242	370	331	252
	kW	32.0	33.3	34.7	32.5	33.6	34.8	32.7	33.7	35.1
115	TC	335	365	403	346	370	409	356	374	413
	SHC	334	289	224	346	307	235	355	323	246
	kW	34.3	35.6	37.1	34.8	35.8	37.4	35.3	36.0	37.6
125	TC	321	346	382	331	350	387	339	354	391
	SHC	321	282	217	331	299	230	339	314	239
	kW	36.5	37.8	39.5	37.1	38.2	39.8	37.5	38.4	39.9

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

- Direct interpolation is permissible. Do not extrapolate
- The following formulas may be used.

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

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

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

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

- SHC is based on 80 F edb temperature of air entering evaporator coil
Below 80 F edb, subtract (corr factor x cfm) from SHC
Above 80 F edb, add (corr factor x cfm) to SHC.

		ENTERING AIR DRY-BULB TEMP (F)					
BF		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 = $1.10 \times (1 - \text{BF}) \times (\text{edb} - 80)$

- Cooling capacities are gross and do not include deduction for indoor fan motor heat.
- Variable Air Volume units will operate down to 70 cfm/ton. Performance at 70 cfm/ton is limited to unloaded operation and may be additionally limited by edb and ewb conditions

Performance data (cont)



COOLING CAPACITIES (cont)

48/50EJ,EK,EW,EY044 (40 TONS)													
Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF											
		8000 / 0.14			10,000 / 0.16			12,000 / 0.18			14,000 / 0.20		
		Evaporator Air — Ewb (F)											
		62	67	72	62	67	72	62	67	72	62	67	72
75	TC	396	437	484	418	461	508	436	478	528	449	492	545
	SHC	306	267	226	341	293	243	373	315	257	400	336	271
	kW	30.8	32.3	33.9	31.7	33.1	34.6	32.3	33.7	35.2	32.7	34.2	35.8
85	TC	378	419	464	400	443	491	417	461	508	429	473	522
	SHC	298	259	218	333	285	235	364	307	250	390	333	263
	kW	32.9	34.6	36.3	33.9	35.5	37.3	34.6	36.3	38.0	35.1	36.7	38.5
95	TC	363	400	445	383	424	470	398	439	487	409	452	499
	SHC	290	251	211	324	277	227	354	298	241	379	320	255
	kW	35.2	37.0	38.9	36.2	38.0	39.9	36.9	38.7	40.6	37.4	39.3	41.2
105	TC	345	381	425	363	403	447	377	419	464	388	429	474
	SHC	281	242	202.8	314	266	218	343	290	233	368	312	246
	kW	37.3	39.2	41.4	38.3	40.2	42.4	39.0	41.1	43.3	39.6	41.6	43.8
115	TC	328	364	403	344	382	424	357	395	439	368	406	448
	SHC	272	234	194.7	304	256	211	332	280	222	355	302	240
	kW	39.3	41.4	43.7	40.4	42.5	44.9	41.2	43.3	45.7	41.8	44.0	46.2
125	TC	310	344	383	324	359	399	335	370	410	346	379	419
	SHC	263	226	186	293	249	202	319	272	216	341	293	230
	kW	41.2	43.6	46.0	42.3	44.5	47.1	43.1	45.3	47.8	43.8	45.9	48.3

48/50EJ,EK,EW,EY044 (40 TONS) (cont)										
Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF								
		16,000 / 0.22			18,000 / 0.23			20,000 / 0.24		
		Evaporator Air — Ewb (F)								
		62	67	72	62	67	72	62	67	72
75	TC	457	503	555	467	514	563	475	520	571
	SHC	426	358	284	449	379	300	468	400	308
	kW	33.1	34.5	36.1	33.5	34.9	36.3	33.7	35.2	36.6
85	TC	438	485	533	446	496	539	458	498	545
	SHC	416	353	276	437	371	284	452	389	301
	kW	35.5	37.2	38.8	35.8	37.6	39.1	36.3	37.8	39.3
95	TC	419	462	509	426	469	516	438	475	517
	SHC	403	342	268	422	361	277	435	380	294
	kW	37.9	39.7	41.6	38.3	40.0	41.9	38.8	40.4	41.9
105	TC	395	439	484	407	445	489	417	450	493
	SHC	389	333	259	406	352	276	417	370	282
	kW	40.1	42.2	44.2	40.7	42.4	44.5	41.2	42.8	44.6
115	TC	376	416	458	388	423	464	396	424	466
	SHC	374	322	249	388	342	262	396	359	276
	kW	42.3	44.6	46.7	43.0	45.0	47.1	43.6	45.1	47.2
125	TC	356	385	429	369	392	433	379	398	438
	SHC	356	313	241	368	331	256	378	348	267
	kW	44.6	46.4	49.0	45.4	46.8	49.2	46.1	47.3	49.5

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

- Direct interpolation is permissible. Do not extrapolate.
- The following formulas may be used:

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

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

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

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

- SHC is based on 80 F edb temperature of air entering evaporator coil.
Below 80 F edb, subtract (corr factor x cfm) from SHC.
Above 80 F edb, add (corr factor x cfm) to SHC.

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.

$$\text{Correction factor} = 1.10 \times (1 - \text{BF}) \times (\text{edb} - 80)$$

- Cooling capacities are gross and do not include deduction for indoor fan motor heat.
- Variable Air Volume units will operate down to 70 cfm/ton. Performance at 70 cfm/ton is limited to unloaded operation and may be additionally limited by edb and ewb conditions.

COOLING CAPACITIES (cont)

48EJ,EK,EW,EY048 (45 TONS)													
Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF											
		9,000 / 0.08			11,250 / 0.095			13,500 / 0.115			15,750 / 0.13		
		Evaporator Air — Ewb (F)											
		62	67	72	62	67	72	62	67	72	62	67	72
75	TC	465	512	564	492	540	595	512	563	619	527	579	635
	SHC	362	316	267	405	347	288	444	376	305	479	403	322
	kW	36.6	38.4	40.3	37.6	39.5	41.3	38.5	40.3	42.1	39.1	40.9	42.7
85	TC	447	492	545	472	521	574	492	540	593	505	555	609
	SHC	352	307	259	395	338	279	433	367	296	468	394	313
	kW	39.2	41.1	43.3	40.3	42.4	44.4	41.2	43.1	45.2	41.7	43.7	45.8
95	TC	428	473	522	452	498	550	469	516	569	482	529	583
	SHC	343	298	250	385	328	270	423	357	287	455	383	304
	kW	41.7	43.9	46.1	42.9	45.1	47.4	43.8	45.9	48.2	44.5	46.6	48.9
105	TC	408	450	497	431	476	526	447	491	542	459	504	556
	SHC	334	288	248	375	319	260	411	347	278	443	372	294
	kW	44.2	46.4	48.9	45.4	47.9	50.3	46.4	48.8	51.2	47.1	49.4	51.8
115	TC	389	431	477	409	452	500	424	467	515	436	479	527
	SHC	324	279	232	365	309	251	399	337	268	427	363	285
	kW	46.6	49.2	51.8	47.9	50.5	53.2	48.9	51.4	54.1	49.7	52.1	54.8

48EJ,EK,EW,EY048 (45 TONS) (cont)										
Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF								
		18,000 / 0.14			20,250 / 0.16			22,500 / 0.16		
		Evaporator Air — Ewb (F)								
		62	67	72	62	67	72	62	67	72
75	TC	537	589	648	549	599	658	561	606	666
	SHC	512	430	339	537	457	355	558	480	374
	kW	39.4	41.2	43.2	39.8	41.5	43.5	40.3	41.8	43.8
85	TC	515	565	622	528	575	631	540	581	639
	SHC	498	420	329	522	446	345	540	468	361
	kW	42.2	44.2	46.3	42.8	44.5	46.7	43.3	44.8	47.0
95	TC	494	541	594	506	548	604	520	555	611
	SHC	483	409	320	504	436	336	519	458	345
	kW	45.0	47.1	49.3	45.6	47.5	49.8	46.3	47.8	50.2
105	TC	471	514	566	485	521	575	499	527	581
	SHC	465	400	311	485	423	326	497	447	341
	kW	47.8	49.9	52.4	48.6	50.3	52.9	49.3	50.7	53.2
115	TC	450	487	536	464	494	545	477	499	551
	SHC	449	388	300	464	413	317	476	436	331
	kW	50.5	52.7	55.3	51.5	53.0	55.8	52.2	53.4	56.2

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:

- Direct interpolation is permissible. Do not extrapolate.
- The following formulas may be used:

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

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

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

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

- SHC is based on 80 F edb temperature of air entering evaporator coil.
Below 80 F edb, subtract (corr factor x cfm) from SHC.
Above 80 F edb, add (corr factor x cfm) to SHC.

ENTERING AIR DRY-BULB TEMP (F)						
BF	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 = $1.10 \times (1 - BF) \times (edb - 80)$

- Cooling capacities are gross and do not include deduction for indoor fan motor heat.
- Variable Air Volume units will operate down to 70 cfm/ton. Performance at 70 cfm/ton is limited to unloaded operation and may be additionally limited by edb and ewb conditions.

Performance data (cont)



FAN PERFORMANCE — VERTICAL DISCHARGE UNITS

For EW,EY units, reduce net available external static pressure by 0.3 in. wg.

48EJ,EK024-034 (20 THRU 30 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
4,000	340	0.83	416	1.17	480	1.52	537	1.90	588	2.29	635	2.69	679	3.11	720	3.53
5,000	384	1.25	453	1.61	513	1.99	566	2.39	615	2.79	660	3.21	703	3.64	742	4.08
6,000	432	1.79	495	2.19	550	2.59	600	3.01	647	3.43	690	3.87	730	4.31	769	4.77
7,000	483	2.48	540	2.91	591	3.33	638	3.77	682	4.22	723	4.67	762	5.14	799	5.61
8,000	536	3.33	588	3.78	635	4.23	679	4.69	720	5.16	759	5.64	797	6.12	832	6.61
8,250	549	3.57	600	4.02	646	4.48	690	4.95	730	5.42	769	5.90	806	6.39	841	6.88
9,000	590	4.34	637	4.82	681	5.30	722	5.78	762	6.27	799	6.77	834	7.27	868	7.77
10,000	645	5.54	689	6.04	729	6.54	768	7.04	805	7.56	840	8.07	874	8.59	906	9.12
11,000	701	6.92	741	7.44	779	7.96	816	8.49	850	9.03	884	9.56	916	10.10	947	10.65
12,000	757	8.49	795	9.04	830	9.59	865	10.14	898	10.69	929	11.25	960	11.81	990	12.37
12,500	786	9.36	822	9.92	856	10.47	890	11.03	922	11.60	953	12.16	983	12.73	1012	13.31
13,000	814	10.28	849	10.84	883	11.41	915	11.98	946	12.56	976	13.13	1006	13.71	1034	14.30
13,750	857	11.75	890	12.34	922	12.92	953	13.51	983	14.10	1012	14.69	1041	15.28	1068	15.88
14,000	871	12.27	904	12.86	936	13.45	966	14.05	996	14.64	1025	15.23	1053	15.83	1080	16.43
15,000	929	14.50	960	15.10	990	15.71	1019	16.33	1047	16.94	1074	17.55	1101	18.17	1127	18.79

48EJ,EK024-034 (20 THRU 30 TONS) (cont)

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
4,000	759	3.97	796	4.42	831	4.87	865	5.34	897	5.81	929	6.30	959	6.79	988	7.28
5,000	780	4.53	816	4.99	851	5.45	884	5.93	916	6.41	946	6.90	976	7.40	1005	7.91
6,000	805	5.23	840	5.70	874	6.18	906	6.67	937	7.16	968	7.66	997	8.17	1025	8.69
7,000	834	6.09	868	6.57	901	7.07	932	7.56	962	8.07	992	8.58	1020	9.10	1048	9.63
8,000	866	7.10	899	7.60	930	8.11	961	8.62	990	9.14	1019	9.67	1047	10.20	1074	10.74
8,250	874	7.38	907	7.89	938	8.40	968	8.92	998	9.44	1026	9.97	1054	10.50	1081	11.04
9,000	901	8.29	932	8.80	963	9.33	992	9.86	1021	10.39	1049	10.93	1076	11.48	1102	12.03
10,000	938	9.65	968	10.18	997	10.72	1026	11.27	1054	11.82	1081	12.37	1107	12.93	1133	13.49
11,000	977	11.19	1006	11.75	1035	12.30	1062	12.87	1089	13.43	1115	14.00	1141	14.57	1166	15.15
12,000	1019	12.94	1047	13.51	1074	14.08	1100	14.66	1126	15.24	1152	15.83	1177	16.42	1201	17.01
12,500	1040	13.88	1067	14.46	1094	15.05	1120	15.63	1146	16.22	1171	16.82	1195	17.41	—	—
13,000	1062	14.88	1089	15.47	1115	16.06	1140	16.66	1166	17.25	1190	17.86	—	—	—	—
13,750	1095	16.48	1121	17.08	1147	17.68	1172	18.29	1196	18.90	—	—	—	—	—	—
14,000	1106	17.04	1132	17.64	1157	18.25	1182	18.86	—	—	—	—	—	—	—	—
15,000	1152	19.41	1177	20.04	1200	20.66	—	—	—	—	—	—	—	—	—	—

48EJ,EK024-034 (20 THRU 30 TONS) (cont)

Airflow (Cfm)	Available External Static Pressure (in. wg)					
	3.4		3.6		3.8	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4,000	1017	7.79	1045	8.30	1072	8.82
5,000	1033	8.42	1061	8.94	1087	9.46
6,000	1053	9.21	1080	9.73	1106	10.27
7,000	1075	10.16	1102	10.69	1127	11.24
8,000	1100	11.28	1126	11.83	1151	12.38
8,250	1107	11.59	1133	12.14	1158	12.69
9,000	1128	12.58	1153	13.14	1178	13.70
10,000	1158	14.06	1183	14.63	—	—
11,000	1190	15.74	—	—	—	—
12,000	—	—	—	—	—	—
12,500	—	—	—	—	—	—
13,000	—	—	—	—	—	—
13,750	—	—	—	—	—	—
14,000	—	—	—	—	—	—
15,000	—	—	—	—	—	—

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

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

3 Variable Air Volume units will operate down to 70 cfm/ton. Performance at 70 cfm/ton is limited to unloaded operation and may be additionally limited by edb and ewb conditions



FAN PERFORMANCE — VERTICAL DISCHARGE UNITS (cont)

For EW,EY units, reduce net available external static pressure by 0.5 in. wg.

48EJ,EK038,044 (35 AND 40 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
7,000	429	1 70	484	2 40	536	2 70	584	3 10	630	3 50	674	3 90	716	4 30	756	4 80
8,000	475	2 36	525	3 09	571	3 49	616	3 90	658	4 31	699	4 74	738	5 17	776	5 61
9,000	523	3 11	567	3 97	610	4.39	651	4.82	690	5.26	728	5 71	765	6.16	801	6 62
10,000	571	4 00	612	5 01	651	5.46	689	5 91	725	6.37	761	6 84	795	7.31	829	7 79
11,000	620	5 04	658	6 22	694	6 69	729	7 17	763	7 65	796	8 14	829	8.64	860	9 14
12,000	670	6 24	705	7 61	738	8 10	771	8.60	803	9 11	834	9 62	865	10.13	894	10.65
13,000	720	7.61	752	9 19	784	9 70	814	10.23	844	10.75	874	11 29	902	11 82	931	12 36
14,000	771	9 15	801	10 97	830	11.51	859	12.05	887	12.60	915	13 15	942	13 71	969	14 27
15,000	822	10 88	850	12.95	877	13 52	904	14 08	931	14 65	957	15 22	983	15 80	1008	16 38
16,000	873	12 80	899	15.16	925	15 74	951	16 33	976	16 92	1001	17 51	1025	18.11	1049	18 71
17,000	924	14 91	949	17 59	974	18 20	998	18 80	1022	19 41	1045	20 03	1069	20 64	1092	21 26
18,000	976	17 24	999	20.26	1023	20 88	1046	21 51	1068	22 14	1091	22.77	1113	23 41	1135	24 05
19,000	1027	19 77	1050	23 17	1072	23 82	1094	24.46	1115	25 11	1137	25 76	1158	26 42	1179	27 07
20,000	1079	22 53	1100	26.33	1122	27.00	1142	27 66	1163	28 33	1183	29 00	—	—	—	—

48EJ,EK038,044 (35 AND 40 TONS) (cont)																
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
7,000	794	5 20	832	5 62	868	6 06	903	6 52	937	6 98	971	7.44	1003	7 92	1035	8 40
8,000	813	6 06	848	6 52	883	6 98	916	7 45	949	7 92	981	8 40	1012	8.89	1042	9.38
9,000	835	7 09	869	7 56	902	8 04	934	8 53	965	9 02	995	9 52	1025	10 02	1054	10.53
10,000	862	8 28	893	8 77	925	9 27	955	9.77	985	10.28	1014	10 79	1043	11 31	1071	11.84
11,000	891	9.64	921	10.15	951	10 67	980	11 19	1008	11 71	1036	12 24	1064	12 78	1090	13.32
12,000	924	11 18	952	11 71	980	12 24	1008	12 78	1035	13.32	1062	13.87	1088	14 42	1114	14.98
13,000	958	12.91	986	13 45	1012	14 01	1039	14.56	1064	15 13	1090	15 69	1115	16 26	1140	16.83
14,000	995	14 83	1021	15 40	1046	15 97	1071	16.55	1096	17 13	1120	17.71	1144	18 29	1168	18 89
15,000	1033	16 96	1058	17 55	1082	18 14	1106	18 73	1130	19.33	1153	19 93	1176	20 54	1199	21.14
16,000	1073	19 31	1097	19 92	1120	20.52	1143	21 14	1165	21 75	1188	22 37	—	—	—	—
17,000	1114	21 88	1137	22 51	1159	23 13	1181	23 76	—	—	—	—	—	—	—	—
18,000	1156	24.69	1178	25 33	1199	25 98	—	—	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

48EJ,EK038,044 (35 AND 40 TONS) (cont)						
Airflow (Cfm)	Available External Static Pressure (in. wg)					
	3.4		3.6		3.8	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
7,000	1066	8 88	1096	9 38	1125	9 88
8,000	1072	9 88	1101	10 39	1130	10 90
9,000	1083	11 04	1111	11 56	1139	12 08
10,000	1098	12 37	1125	12.90	1152	13 44
11,000	1117	13 86	1143	14 41	1169	14.96
12,000	1139	15 54	1164	16 11	1189	16 68
13,000	1164	17 41	1188	17 99	—	—
14,000	1191	19 48	—	—	—	—
15,000	—	—	—	—	—	—
16,000	—	—	—	—	—	—
17,000	—	—	—	—	—	—
18,000	—	—	—	—	—	—
19,000	—	—	—	—	—	—
20,000	—	—	—	—	—	—

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:

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

3. Variable Air Volume units will operate down to 70 cfm/ton. Performance at 70 cfm/ton is limited to unloaded operation and may be additionally limited by edb and ewb conditions

Performance data (cont)



FAN PERFORMANCE — VERTICAL DISCHARGE UNITS (cont)

For EW,EY units, reduce net available external static pressure by 0.5 in. wg.

48EJ,EK048 (45 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
9,000	528	3.20	572	4.00	615	4.40	656	4.90	695	5.30	733	5.80	769	6.20	805	6.70
10,000	577	4.10	617	5.10	657	5.50	694	6.00	731	6.40	766	6.90	801	7.40	834	7.90
11,000	627	5.10	664	6.30	700	6.80	735	7.30	769	7.70	802	8.20	835	8.70	866	9.20
12,000	677	6.30	711	7.70	745	8.20	778	8.70	809	9.20	841	9.70	871	10.20	901	10.80
13,000	728	7.71	760	9.31	791	9.83	822	10.35	851	10.88	881	11.42	909	11.95	938	12.50
14,000	779	9.28	809	11.11	838	11.65	867	12.20	895	12.75	923	13.31	950	13.87	976	14.43
15,000	830	11.03	858	13.13	886	13.69	913	14.26	939	14.83	966	15.41	991	15.99	1017	16.57
16,000	882	12.97	908	15.36	934	15.95	960	16.54	985	17.13	1010	17.73	1034	18.33	1058	18.93
17,000	934	15.12	959	17.83	983	18.44	1008	19.05	1031	19.66	1055	20.28	1078	20.89	1101	21.52
18,000	986	17.47	1010	20.53	1033	21.16	1056	21.79	1078	22.42	1101	23.06	1123	23.70	1145	24.34
19,000	1038	20.05	1061	23.49	1083	24.13	1105	24.78	1126	25.44	1147	26.09	1169	26.75	1190	27.41
20,000	1091	22.84	1112	26.69	1133	27.36	1154	28.03	1174	28.70	1195	29.37	—	—	—	—

48EJ,EK048 (45 TONS) (cont)

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
9,000	839	7.10	873	7.62	905	8.10	937	8.59	968	9.08	999	9.57	1028	10.08	1057	10.58
10,000	866	8.40	898	8.85	929	9.34	959	9.85	989	10.36	1018	10.87	1047	11.39	1075	11.91
11,000	897	9.70	927	10.24	956	10.76	985	11.28	1013	11.81	1041	12.34	1068	12.87	1095	13.41
12,000	930	11.30	958	11.82	986	12.36	1014	12.90	1041	13.44	1067	13.99	1093	14.54	1119	15.10
13,000	965	13.04	992	13.59	1019	14.15	1045	14.71	1071	15.27	1096	15.84	1121	16.41	1146	16.98
14,000	1002	14.99	1028	15.56	1054	16.14	1079	16.71	1103	17.30	1127	17.88	1151	18.47	1175	19.06
15,000	1041	17.15	1066	17.74	1090	18.34	1114	18.93	1138	19.53	1161	20.13	1184	20.74	—	—
16,000	1082	19.52	1105	20.14	1128	20.75	1151	21.37	1174	21.99	1196	22.61	—	—	—	—
17,000	1124	22.14	1146	22.77	1168	23.40	1190	24.03	—	—	—	—	—	—	—	—
18,000	1166	24.98	1188	25.63	—	—	—	—	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

48EJ,EK048 (45 TONS) (cont)

Airflow (Cfm)	Available External Static Pressure (in. wg)					
	3.4		3.6		3.8	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
9,000	1086	11.10	1114	11.61	1141	12.14
10,000	1102	12.44	1129	12.97	1155	13.51
11,000	1122	13.96	1147	14.51	1173	15.06
12,000	1144	15.66	1169	16.23	1194	16.80
13,000	1170	17.56	1194	18.14	—	—
14,000	1198	19.66	—	—	—	—
15,000	—	—	—	—	—	—
16,000	—	—	—	—	—	—
17,000	—	—	—	—	—	—
18,000	—	—	—	—	—	—
19,000	—	—	—	—	—	—
20,000	—	—	—	—	—	—

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:

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

3. Variable Air Volume units will operate down to 70 cfm/ton. Performance at 70 cfm/ton is limited to unloaded operation and may be additionally limited by edb and ewb conditions



FAN PERFORMANCE — VERTICAL DISCHARGE UNITS (cont)

For EW,EY units, reduce net available external static pressure by 0.3 in. wg.

50EJ,EK024-034 (20 THRU 30 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
4,000	322	0.77	401	1.09	466	1.43	523	1.78	575	2.13	622	2.50	666	2.87	707	3.25
5,000	361	1.14	433	1.50	494	1.86	548	2.23	598	2.62	643	3.00	686	3.40	726	3.80
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
13,000	744	9.03	781	9.62	817	10.20	851	10.78	884	11.36	915	11.93	946	12.51	975	13.09
13,750	783	10.32	818	10.92	852	11.52	885	12.12	917	12.71	947	13.31	977	13.90	1005	14.50
14,000	795	10.77	831	11.38	864	11.98	896	12.59	928	13.19	958	13.79	987	14.39	1015	14.99
15,000	847	12.71	880	13.34	912	13.96	943	14.59	972	15.21	1001	15.83	1029	16.45	1056	17.08

50EJ,EK024-034 (20 THRU 30 TONS) (cont)																
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
4,000	746	3.64	783	4.03	818	4.44	852	4.85	884	5.26	916	5.68	946	6.11	975	6.54
5,000	764	4.21	800	4.62	834	5.04	868	5.46	900	5.89	930	6.33	960	6.77	989	7.22
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
13,000	1004	13.67	1032	14.25	1059	14.83	1086	15.42	1111	16.00	1137	16.59	1161	17.17	1185	17.76
13,750	1033	15.09	1060	15.69	1087	16.29	1112	16.88	1138	17.48	1162	18.08	1186	18.68	—	—
14,000	1043	15.59	1070	16.19	1096	16.79	1122	17.40	1147	18.00	1171	18.60	1195	19.21	—	—
15,000	1083	17.70	1109	18.32	1134	18.94	1159	19.56	1183	20.19	—	—	—	—	—	—

50EJ,EK024-034 (20 THRU 30 TONS) (cont)						
Airflow (Cfm)	Available External Static Pressure (in. wg)					
	3.4		3.6		3.8	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4,000	1004	6.97	1032	7.41	1059	7.86
5,000	1017	7.67	1045	8.12	1072	8.58
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	—	—	—	—
13,000	—	—	—	—	—	—
13,750	—	—	—	—	—	—
14,000	—	—	—	—	—	—
15,000	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:

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

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

- Variable Air Volume units will operate down to 70 cfm/ton. Performance at 70 cfm/ton is limited to unloaded operation and may be additionally limited by edb and ewb conditions

Performance data (cont)



FAN PERFORMANCE — VERTICAL DISCHARGE UNITS (cont)

For EW, EY units, reduce net available external static pressure by 0.5 in. wg.

50EJ, EK038,044 (35 AND 40 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
7,000	406	1.60	461	2.20	512	2.60	560	2.90	605	3.30	648	3.70	690	4.10	729	4.50
8,000	448	2.18	498	2.87	544	3.25	589	3.64	631	4.04	671	4.44	710	4.86	747	5.27
9,000	492	2.87	537	3.68	580	4.09	621	4.50	660	4.92	698	5.35	734	5.78	769	6.22
10,000	537	3.69	578	4.63	617	5.07	655	5.50	692	5.95	727	6.39	761	6.85	795	7.30
11,000	582	4.65	620	5.75	657	6.20	692	6.66	726	7.13	759	7.60	792	8.07	823	8.55
12,000	629	5.75	664	7.02	698	7.50	730	7.98	763	8.47	794	8.96	824	9.45	854	9.95
13,000	675	7.00	708	8.48	739	8.98	770	9.48	800	9.99	830	10.50	859	11.01	887	11.53
14,000	722	8.42	753	10.11	782	10.63	811	11.16	840	11.69	868	12.22	895	12.75	922	13.29
15,000	770	10.00	798	11.94	826	12.48	853	13.03	880	13.57	907	14.13	932	14.68	958	15.24
16,000	817	11.76	844	13.96	870	14.53	896	15.09	922	15.66	947	16.23	971	16.81	995	17.38
17,000	865	13.70	890	16.19	915	16.78	940	17.37	964	17.95	988	18.54	1011	19.14	1034	19.73
18,000	913	15.83	937	18.64	961	19.25	984	19.85	1007	20.46	1030	21.07	1052	21.68	1074	22.30
19,000	961	18.16	984	21.32	1006	21.94	1029	22.56	1050	23.19	1072	23.82	1093	24.45	1115	25.08
20,000	1009	20.69	1031	24.22	1052	24.86	1074	25.50	1095	26.15	1115	26.80	1136	27.45	1156	28.10

50EJ, EK038,044 (35 AND 40 TONS) (cont)

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
7,000	767	4.90	803	5.28	839	5.70	873	6.13	906	6.56	939	6.99	970	7.43	1001	7.88
8,000	783	5.70	818	6.13	852	6.56	884	7.00	916	7.45	947	7.90	978	8.36	1007	8.82
9,000	803	6.66	836	7.11	869	7.56	900	8.02	930	8.48	960	8.95	989	9.42	1018	9.90
10,000	827	7.77	858	8.23	889	8.70	919	9.18	948	9.66	977	10.15	1005	10.64	1032	11.13
11,000	854	9.03	884	9.51	913	10.00	941	10.50	969	11.00	997	11.50	1024	12.01	1050	12.52
12,000	883	10.45	911	10.96	939	11.47	967	11.98	993	12.50	1020	13.02	1046	13.54	1071	14.07
13,000	914	12.05	942	12.57	968	13.10	994	13.63	1020	14.17	1045	14.71	1070	15.25	1094	15.79
14,000	948	13.83	974	14.37	999	14.92	1024	15.47	1049	16.02	1073	16.58	1096	17.14	1120	17.70
15,000	983	15.80	1007	16.36	1032	16.92	1056	17.49	1079	18.06	1102	18.64	1125	19.21	1148	19.79
16,000	1019	17.96	1043	18.54	1066	19.13	1089	19.71	1111	20.30	1134	20.89	1156	21.49	1177	22.08
17,000	1057	20.33	1079	20.93	1102	21.53	1124	22.14	1145	22.75	1167	23.35	1188	23.97	—	—
18,000	1096	22.91	1117	23.53	1138	24.15	1160	24.78	1180	25.40	—	—	—	—	—	—
19,000	1135	25.72	1156	26.36	1176	26.99	1197	27.63	—	—	—	—	—	—	—	—
20,000	1176	28.75	1196	29.41	—	—	—	—	—	—	—	—	—	—	—	—

50EJ, EK038,044 (35 AND 40 TONS) (cont)

Airflow (Cfm)	Available External Static Pressure (in. wg)					
	3.4		3.6		3.8	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
7,000	1031	8.34	1060	8.79	1089	9.26
8,000	1036	9.29	1065	9.76	1092	10.24
9,000	1046	10.38	1073	10.87	1100	11.36
10,000	1059	11.63	1086	12.13	1112	12.64
11,000	1076	13.03	1102	13.55	1127	14.07
12,000	1096	14.60	1121	15.13	1145	15.67
13,000	1118	16.34	1142	16.89	1165	17.45
14,000	1143	18.26	1166	18.83	1188	19.40
15,000	1170	20.37	1192	20.96	—	—
16,000	1199	22.68	—	—	—	—
17,000	—	—	—	—	—	—
18,000	—	—	—	—	—	—
19,000	—	—	—	—	—	—
20,000	—	—	—	—	—	—

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:

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

3. Variable Air Volume units will operate down to 70 cfm/ton. Performance at 70 cfm/ton is limited to unloaded operation and may be additionally limited by edb and ewb conditions.



FAN PERFORMANCE — VERTICAL DISCHARGE UNITS (cont)
For EW,EY units, reduce net available external static pressure by 0.5 in. wg.

50EJ,EK048 (45 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
9,000	497	2.90	542	3.70	585	4.10	625	4.60	664	5.00	702	5.40	738	5.80	773	6.30
10,000	542	3.70	583	4.70	623	5.10	661	5.60	697	6.00	732	6.50	766	6.90	800	7.40
11,000	589	4.70	626	5.80	663	6.30	698	6.70	732	7.20	765	7.70	797	8.20	829	8.60
12,000	635	5.80	670	7.10	704	7.60	737	8.10	769	8.60	800	9.10	830	9.60	860	10.10
13,000	683	7.10	715	8.59	747	9.09	777	9.60	808	10.11	837	10.62	866	11.14	894	11.66
14,000	730	8.53	761	10.25	790	10.77	819	11.30	847	11.83	875	12.36	902	12.90	929	13.44
15,000	778	10.14	807	12.10	834	12.65	862	13.19	888	13.75	915	14.30	941	14.86	966	15.42
16,000	826	11.93	853	14.15	879	14.72	905	15.29	931	15.86	955	16.44	980	17.01	1004	17.59
17,000	875	13.90	900	16.42	925	17.01	949	17.60	973	18.19	997	18.78	1020	19.38	1043	19.98
18,000	923	16.06	947	18.90	971	19.51	994	20.12	1017	20.73	1039	21.34	1062	21.96	1084	22.58
19,000	972	18.42	995	21.61	1017	22.24	1039	22.87	1061	23.50	1083	24.13	1104	24.76	1125	25.40
20,000	1021	20.98	1042	24.55	1064	25.20	1085	25.85	1106	26.50	1126	27.15	1147	27.80	1167	28.46

50EJ,EK048 (45 TONS) (cont)																
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
9,000	807	6.70	840	7.16	872	7.61	904	8.07	934	8.54	964	9.00	993	9.48	1021	9.95
10,000	832	7.80	863	8.30	894	8.78	923	9.25	953	9.73	981	10.22	1009	10.71	1036	11.20
11,000	859	9.10	889	9.60	918	10.09	947	10.59	974	11.09	1002	11.59	1029	12.10	1055	12.61
12,000	889	10.60	917	11.07	945	11.58	972	12.09	999	12.61	1025	13.13	1051	13.65	1076	14.18
13,000	921	12.18	948	12.71	975	13.24	1001	13.77	1026	14.30	1051	14.84	1076	15.39	1100	15.93
14,000	955	13.98	981	14.53	1006	15.08	1031	15.63	1056	16.18	1080	16.74	1103	17.30	1127	17.86
15,000	991	15.98	1015	16.54	1040	17.11	1063	17.68	1087	18.25	1110	18.83	1133	19.41	1155	19.99
16,000	1028	18.17	1051	18.76	1074	19.34	1097	19.93	1120	20.52	1142	21.12	1164	21.71	1185	22.31
17,000	1066	20.58	1089	21.18	1111	21.78	1133	22.39	1154	23.00	1175	23.61	1197	24.23	—	—
18,000	1106	23.19	1127	23.82	1148	24.44	1169	25.07	1190	25.69	—	—	—	—	—	—
19,000	1146	26.04	1166	26.68	1187	27.32	—	—	—	—	—	—	—	—	—	—
20,000	1187	29.11	—	—	—	—	—	—	—	—	—	—	—	—	—	—

50EJ,EK048 (45 TONS) (cont)						
Airflow (Cfm)	Available External Static Pressure (in. wg)					
	3.4		3.6		3.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
9,000	1049	10.44	1076	10.92	1103	11.41
10,000	1063	11.70	1090	12.20	1116	12.71
11,000	1081	13.12	1106	13.64	1131	14.16
12,000	1101	14.71	1126	15.25	1150	15.79
13,000	1124	16.48	1148	17.03	1171	17.59
14,000	1150	18.43	1173	19.00	1195	19.57
15,000	1177	20.57	1199	21.16	—	—
16,000	—	—	—	—	—	—
17,000	—	—	—	—	—	—
18,000	—	—	—	—	—	—
19,000	—	—	—	—	—	—
20,000	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:

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

$$\text{Watts} = \frac{\text{Bhp} \times 746}{\text{Motor efficiency}}$$
- Variable Air Volume units will operate down to 70 cfm/ton. Performance at 70 cfm/ton is limited to unloaded operation and may be additionally limited by edb and ewb conditions

Performance data (cont)



MOTOR LIMITATIONS

STANDARD EFFICIENCY MOTORS

Nominal Hp	Maximum Bhp	Maximum Amps			Maximum Watts	Motor Efficiency
		230	460	575		
5	5.9	14.6	—	—	5,030	87.5
	5.9	—	7.9	6.0	5,030	87.5
7.5	8.7	22.0	—	—	7,334	88.5
	9.5	—	12.0	10.0	8,008	88.5
10	10.2	28.0	—	—	8,502	89.5
	11.8	—	14.6	12.0	9,836	89.5
15	15.3	43.8	—	—	12,543	91.0
	18.0	—	21.9	19.0	14,756	91.0
20	22.4	62.0	—	—	18,363	91.0
	23.4	—	28.7	23.0	19,183	91.0
25	28.9	72.0	—	—	23,511	91.7
	29.4	—	37.4	31.0	23,918	91.7
30	35.6	95.0	—	—	28,742	92.4
	34.7	—	48.0	47.0	28,015	92.4

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
20	22.4	58.2	—	17,853	93.6
	23.4	—	28.7	18,650	93.6
25	28.9	73.0	—	23,034	93.6
	29.4	—	36.3	23,432	93.6
30	35.6	82.6	—	28,374	93.6
	34.7	—	41.7	27,656	93.6

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.

USER DEFINED SET POINTS

SET POINT	FORMAT	DESCRIPTION	LIMITS	DEFAULT
OHSP	xx.xF	Occupied Heat Set Point	55 to 80 F	68 F
OCSP	xx.xF	Occupied Cool Set Point	55 to 80 F	78 F
UHSP	xx.xF	Unoccupied Heat Set Point	40 to 80 F	55 F
UCSP	xx.xF	Unoccupied Cool Set Point	75 to 95 F	90 F
SASP	xx.xF	Supply Air Set Point	45 to 70 F	55 F
OATL	xx.xF	Hi OAT Lockout Temperature	55 to 75 F	65 F
NTLO	xx.xF	Unoccupied OAT Lockout Temperature	40 to 70 F	50 F
RTIO	xx.x	Reset Ratio	0 to 10	3
LIMT	xx.x°F	Reset Limit	0 to 20° F	10° F
MDP	xxx%	Minimum Damper Position	0 to 100%	20%
LOW MDP	xxx%	Low Temperature Minimum Damper Position Override	0 to 100%	100%
IAQS	xxxx	IAQ Set Point	1 to 5000 PPM	650 PPM
UHDB	xx.x°F	Unoccupied Heating Deadband	0 to 10° F	1° F
UCDB	xx.x°F	Unoccupied Cooling Deadband	0 to 10° F	1° F
LTMP	xxx%	Low Temp. Min. Position	0 to 100%	10%
HTMP	xxx%	High Temp. Min. Position	0 to 100%	35%
PES1	xxx%	CV Power Exhaust Stage 1 Point	0 to 100%	25%
PES2	xxx%	CV Power Exhaust Stage 2 Point	0 to 100%	75%

LEGEND

CV — Constant Volume
IAQ — Indoor Air Quality
OAT — Outdoor Air Temperature

NOTE: Computer access may be required to reconfigure set points



FAN PERFORMANCE — POWER EXHAUST

48/50EJ,EK,EW,EY024-048 (20 THRU 45 TONS)																		
Airflow (Cfm)	Low Speed						Medium Speed						High Speed					
	208 v			230, 460, 575 v			208 v			230, 460, 575 v			208 v			230, 460, 575 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
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

Electrical data — 48EJ,EK,EW,EY024-048



UNIT SIZE 48EJ,EK, EW,EY	NOMNAL VOLTAGE (3 Ph 60 Hz)	VOLTAGE RANGE		COMPRESSOR				OFM			IFM		POWER EXHAUST		COMBUSTION FAN MOTOR	POWER SUPPLY												
				No. 1		No. 2																						
		Min	Max	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	FLA	MCA	MOCP*											
024	208/230	187	254	39 1	228	25 6	160	2	1	5 3	5	16 7/ 15 2	—	—	0.96	101.8/100.3	125/125											
												23.6	41 6	0.96	125.4/123 9	150/150												
											10	30 8/ 28.0	—	—	0.96	115.9/113 1	150/150											
												23.6	41.6	0.96	139.5/136.7	175/175												
											15	46 2/ 42.0	—	—	0.96	131 3/127 1	150/150											
												23 6	41.6	0.96	154.9/150.7	175/175												
											460	414	508	19 9	114	11.5	80	2	1	2 7	5	7 6	—	—	0.5	49 4	60	
																						12.6	23.6	0.5	62.0	80		
	10	14 0	—	—	0 5	55 8	70																					
		12.6	23.6	0.5	68.4	80																						
	15	21.0	—	—	0.5	62.8	80																					
		12.6	23 6	0 5	75.4	90																						
	575	518	632	16 0	91	9 6	64	2	1	2 4											5	6 1	—	—	0.5	40.5	50	
																						12.6	23.6	0.5	53.1	60		
											10	11 0	—	—	0.5	45.4	60											
												12 6	23.6	0 5	58 0	70												
											15	17.0	—	—	0.5	51.4	60											
												12 6	23 6	0.5	64 0	80												
											028	208/230	187	254	39 1	228	39 1	228	2	1	5 3	7 5	24.2/ 22 0	—	—	0.96	122.8/120.6	150/150
																							23.6	41 6	0.96	146.4/144 2	175/175	
	10	30 8/ 28 0	—	—	0.96	129.4/126.6	150/150																					
		23 6	41.6	0.96	153 0/150 2	175/175																						
	15	46.2/ 42 0	—	—	0.96	144.8/140.6	175/175																					
		23.6	41.6	0.96	168.4/164.2	200/200																						
460	414	508	19 9	114	19 9	114	2	1	2.7	7 5												11 0	—	—	0.5	61.2	80	
																						12.6	23.6	0 5	73.8	90		
										10		14 0	—	—	0.5	64 2	80											
												12.6	23 6	0.5	76.8	90												
										15		21.0	—	—	0.5	71 2	90											
												12.6	23.6	0 5	83.8	100												
										575		518	632	16.0	91	16 0	91	2	1	2 4	7 5	9 0	—	—	0.5	49.8	60	
																						12.6	23 6	0 5	62.4	70		
10	11 0	—	—	0 5	51.8	60																						
	12.6	23.6	0 5	64.4	80																							
15	17.0	—	—	0 5	57.8	70																						
	12.6	23.6	0.5	70.4	80																							
030	208/230	187	254	57 1	266	39 1	228	2	1												5 3	10	30 8/ 28.0	—	—	0 96	151.9/149.1	200/200
																							23.6	41.6	0 96	175.5/172.7	225/225	
										15		46 2/ 42 0	—	—	0.96	167.3/163.1	225/225											
												23 6	41.6	0 96	190.9/186.7	225/225												
										20		59.4/ 54.0	—	—	0.96	180.5/175.1	225/225											
												23.6	41 6	0.96	204.1/198.7	250/250												
										460	414	508	25 6	120	19 9	114	2	1	2.7	10		14 0	—	—	0 5	71 3	90	
																						12 6	23 6	0 5	83.9	100		
	15	21 0	—	—	0.5	78.3	100																					
		12 6	23 6	0.5	90 9	110																						
	20	27 0	—	—	0 5	84.3	100																					
		12.6	23 6	0 5	96 9	110																						
	575	518	632	20 5	96	16 0	91	2	1											2 4	10	11 0	—	—	0 5	57.4	70	
																						12 6	23.6	0.5	70 0	90		
										15	17 0	—	—	0.5	63 4	80												
											12.6	23.6	0.5	76.0	90													
										20	22 0	—	—	0.5	68.4	80												
											12.6	23 6	0.5	81 0	100													

UNIT SIZE 48EJ,EK, EW,EY	NOMINAL VOLTAGE (3 Ph 60 Hz)	VOLTAGE RANGE		COMPRESSOR				OFM			IFM		POWER EXHAUST		COMBUSTION FAN MOTOR	POWER SUPPLY	
				No. 1		No. 2											
		Min	Max	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	FLA	MCA	MOCPS*
034	208/230	187	254	57.1	266	57.1	266	2	1	5.3	10	30.8/ 28.0	—	—	0.96	169.9/167.1	225/200
												23.6	41.6	0.96	193.5/190.7	250/225	
											15	46.2/ 42.0	—	—	0.96	185.3/181.1	200/200
												23.6	41.6	0.96	208.9/204.7	250/250	
											20	59.4/ 54.0	—	—	0.96	198.5/193.1	250/250
												23.6	41.6	0.96	222.1/216.7	275/250	
	460	414	508	25.6	120	25.6	120	2	1	2.7	10	14.0	—	—	0.5	77.0	100
												12.6	23.6	0.5	89.6	110	
											15	21.0	—	—	0.5	84.0	100
												12.6	23.6	0.5	96.6	110	
											20	27.0	—	—	0.5	90.0	110
												12.6	23.6	0.5	102.6	125	
	575	518	632	20.5	96	20.5	96	2	1	2.4	10	11.0	—	—	0.5	61.9	80
												12.6	23.6	0.5	74.5	90	
											15	17.0	—	—	0.5	67.9	80
												12.6	23.6	0.5	80.5	100	
											20	22.0	—	—	0.5	72.9	90
												12.6	23.6	0.5	85.5	100	
038	208/230	187	254	57.1	266	57.1	266	4	1	5.3	10	30.8/ 28.0	—	—	0.96	180.5/177.7	225/225
												23.6	41.6	0.96	204.1/201.3	250/250	
											15	46.2/ 42.0	—	—	0.96	195.9/191.7	250/225
												23.6	41.6	0.96	219.5/215.3	275/250	
											20	59.4/ 54.0	—	—	0.96	209.1/203.7	250/250
												23.6	41.6	0.96	232.7/227.3	275/275	
	460	414	508	25.6	120	25.6	120	4	1	2.7	10	14.0	—	—	0.5	82.4	100
												12.6	23.6	0.5	95.0	110	
											15	21.0	—	—	0.5	89.4	110
												12.6	23.6	0.5	102.0	125	
											20	27.0	—	—	0.5	95.4	110
												12.6	23.6	0.5	108.0	125	
	575	518	632	20.5	96	20.5	96	4	1	2.4	10	11.0	—	—	0.5	66.7	80
												12.6	23.6	0.5	79.3	90	
											15	17.0	—	—	0.5	72.7	90
												12.6	23.6	0.5	85.3	100	
											20	22.0	—	—	0.5	77.7	90
												12.6	23.6	0.5	90.3	110	

LEGEND

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

*Fuse or HACR circuit breaker

NOTES

- 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. Canadian units may be fuse or circuit breaker.

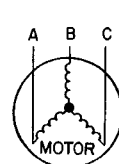
2 Unbalanced 3-Phase Supply Voltage

Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percent voltage imbalance

% Voltage Imbalance

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

EXAMPLE: Supply voltage is 460-3-60.



$$\begin{aligned} AB &= 452 \text{ v} \\ BC &= 464 \text{ v} \\ AC &= 455 \text{ v} \end{aligned}$$

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

Determine maximum deviation from average voltage.

$$\begin{aligned} (AB) \quad 457 - 452 &= 5 \text{ v} \\ (BC) \quad 464 - 457 &= 7 \text{ v} \\ (AC) \quad 457 - 455 &= 2 \text{ v} \end{aligned}$$

Maximum deviation is 7 v

Determine percent voltage imbalance

$$\begin{aligned} \% \text{ Voltage Imbalance} &= 100 \times \frac{7}{457} \\ &= 1.53\% \end{aligned}$$

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

Electrical data — 48EJ,EK,EW,EY024-048 (cont)



UNIT SIZE 48EJ,EK, EW,EY	NOMINAL VOLTAGE (3 Ph 60 Hz)	VOLTAGE RANGE		COMPRESSOR				OFM			IFM		POWER EXHAUST		COMBUSTION FAN MOTOR	POWER SUPPLY	
				No. 1		No. 2											
		Min	Max	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	FLA	MCA	MOCP*
044	208/230	187	254	69.2	345	69.2	345	4	1	5.3	15	46.2/42.0	—	—	0.96	223.1/218.9	275/275
													23.6	41.6	0.96	246.7/242.5	300/300
											20	59.4/54.0	—	—	0.96	236.3/230.9	300/300
													23.6	41.6	0.96	259.9/254.5	300/300
											25	74.8/68.0	—	—	0.96	251.7/244.9	300/300
													23.6	41.6	0.96	275.3/268.5	300/300
	460	414	508	28.8	173	28.8	173	4	1	2.7	15	21.0	—	—	0.5	96.6	125
													12.6	23.6	0.5	109.2	125
											20	27.0	—	—	0.5	102.6	125
													12.6	23.6	0.5	115.2	125
											25	34.0	—	—	0.5	109.6	125
													12.6	23.6	0.5	122.2	150
	575	518	632	26.7	120	26.7	120	4	1	2.4	15	17.0	—	—	0.5	86.7	110
													12.6	23.6	0.5	99.3	125
											20	22.0	—	—	0.5	91.7	110
													12.6	23.6	0.5	104.3	125
											25	27.0	—	—	0.5	96.7	110
													12.6	23.6	0.5	109.3	125
048	208/230	187	254	82.1	446	69.2	345	4	1	5.3	20	59.4/54.0	—	—	0.96	252.4/247.0	300/300
													23.6	41.6	0.96	276.0/270.6	300/300
											25	74.8/68.0	—	—	0.96	267.8/261.0	300/300
													23.6	41.6	0.96	291.4/284.6	300/300
											30	88.0/80.0	—	—	0.96	281.0/273.0	300/300
													23.6	41.6	0.96	304.6/296.6	350/300
	460	414	508	42.3	223	28.8	173	4	1	2.7	20	27.0	—	—	0.5	119.5	150
													12.6	23.6	0.5	132.1	150
											25	34.0	—	—	0.5	126.5	150
													12.6	23.6	0.5	139.1	175
											30	40.0	—	—	0.5	132.5	150
													12.6	23.6	0.5	145.1	175
	575	518	632	34.6	164	26.7	120	4	1	2.4	20	22.0	—	—	0.5	101.6	125
													12.6	23.6	0.5	114.2	125
											25	27.0	—	—	0.5	106.6	125
													12.6	23.6	0.5	119.2	150
											30	32.0	—	—	0.5	111.6	125
													12.6	23.6	0.5	124.2	150

LEGEND

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

*Fuse or HACR circuit breaker

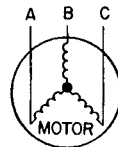


or



EXAMPLE: Supply voltage is 460-3-60

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



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

Determine maximum deviation from average voltage

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

Maximum deviation is 7 v

Determine percent voltage imbalance

$$\begin{aligned}
 \% \text{ Voltage Imbalance} &= 100 \times \frac{7}{457} \\
 &= 1.53\%
 \end{aligned}$$

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

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. 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 voltage imbalance.

% Voltage Imbalance

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

Electrical data — 50EJ,EK,EW,EY024-048



UNIT SIZE 50EJ,EK, EW,EY	NOMINAL VOLTAGE (3 Ph 60 Hz)	VOLTAGE RANGE		COMPRESSOR				OFM			IFM		POWER EXHAUST		ELECTRIC HEAT*		POWER SUPPLY	
		Min	Max	No. 1		No. 2		Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	kW	FLA	MCA	MOCP†
024	208/230	187	254	39 1	228	25 6	160	2	1	5 3	5	16 7/ 15 2	—	—	—	—	101 8/100 3	125/125
													23.6	41.6	—	—	125.4/123.9	150/150
													—	—	27/36	75 1/ 86 6	114 7/127 3	125/150
													23.6	41.6	27/36	75.1/ 86.6	144.2/156.8	150/175
											10	30 8/ 28 0	—	—	54/72	150 1/173 2	171 0/192 2	200/225
													23.6	41.6	54/72	150.1/173.2	200.5/221.7	225/225
													—	—	—	—	115 9/113 1	150/150
													23.6	41.6	—	—	139.5/136.7	175/175
											15	46 2/ 42 0	—	—	27/36	75 1/ 86 6	132 3/143 3	150/150
													23.6	41.6	27/36	75.1/ 86.6	161.8/172.8	175/175
													—	—	54/72	150 1/173 2	188 6/208 2	200/225
													23.6	41.6	54/72	150.1/173.2	218.1/237.7	225/250
	460	414	508	19 9	114	11 5	80	2	1	2 7	5	7 6	12.6	23.6	—	—	49 4	60
													—	—	36	43 3	63 6	70
													12.6	23.6	36	43.3	79.4	80
													—	—	72	86 6	96 1	110
											10	14	12.6	23.6	—	—	55 8	70
													—	—	36	43 3	71 6	80
													12.6	23.6	36	43.3	87.4	90
													—	—	72	86 6	104 1	110
											15	21	12.6	23.6	—	—	55 8	70
													—	—	36	43 3	71 6	80
													12.6	23.6	36	43.3	87.4	90
													—	—	72	86 6	104 1	110
	575	518	632	16 0	91	9 6	64	2	1	2 4	5	6 1	12.6	23.6	—	—	40 5	50
													—	—	36	34 6	50 9	60
													12.6	23.6	36	34.6	66.7	70
													—	—	72	69 3	76 9	90
											10	11	12.6	23.6	—	—	45 4	60
													—	—	36	34 6	57 1	60
													12.6	23.6	36	34.6	72.8	80
													—	—	72	69 3	83 0	90
											15	17	12.6	23.6	—	—	51 4	60
													—	—	36	34 6	64 6	70
													12.6	23.6	36	34.6	80.3	90
													—	—	72	69 3	90 5	100
													12 6	23 6	72	69 3	106 3	110

LEGEND

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

*Heater capacity (kW) is based on heater voltage of 208 v, 240 v, 480 v, and 575 v. If power distribution voltage to unit varies from rated heater voltage, heater kW will vary accordingly.

†Fuse or HACR circuit breaker

NOTES:

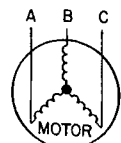
- In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. The Canadian units may be fuse or circuit breaker.
- Unbalanced 3-Phase Supply Voltage**

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

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



Determine maximum deviation from average voltage.

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

Maximum deviation is 7 v

Determine percent of voltage imbalance

$$\begin{aligned} \% \text{ Voltage Imbalance} &= 100 \times \frac{7}{457} \\ &= 1.53\% \end{aligned}$$

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.

- MCA calculation for units with electric heaters over 50 kW = (1.25 x IFM amps) + (1.00 x heater FLA).
- 72 kW heaters are for constant volume applications only.



Electrical data — 50EJ,EK,EW,EY024-048 (cont)



UNIT SIZE 50EJ,EK, EW,EY	NOMINAL VOLTAGE (3 Ph 60 Hz)	VOLTAGE RANGE		COMPRESSOR				OFM			IFM		POWER EXHAUST		ELECTRIC HEAT*		POWER SUPPLY		
				No. 1		No. 2													
		Min	Max	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	kW	FLA	MCA	MOCPT†	
028	208/230	187	254	39 1	228	39 1	228	2	1	5 3	7 5	24 2/ 22 0	—	—	—	—	122 8/120 6	150/150	
													23.6	41.6	27/36	75 1/ 86 6	124 1/135 8	150/150	
													—	—	54/72	150 1/173 2	180 4/200 7	200/225	
													23.6	41.6	54/72	150.1/173.2	209.9/230.2	225/250	
											10	30 8/ 28 0	23.6	41.6	—	—	129 4/126 6	150/150	
													—	—	27/36	75 1/ 86 6	132 3/143 3	150/150	
													23.6	41.6	27/36	75.1/ 86.6	161.8/172.8	175/175	
													—	—	54/72	150 1/173 2	188 6/208 2	200/225	
											15	46 2/ 42 0	23.6	41.6	54/72	150.1/173.2	218.1/237.7	225/250	
													—	—	—	—	144 8/140 6	175/175	
													23.6	41.6	27/36	75 1/ 86 6	151 6/160 8	175/175	
													—	—	54/72	150 1/173 2	207 9/225 7	250/250	
	460	414	508	19 9	114	19 9	114	2	1	2 7	7 5	11	—	—	—	—	61 2	80	
													12.6	23.6	—	—	73.8	90	
													—	—	36	43 3	67 9	80	
													12.6	23.6	36	43.3	83.6	90	
											10	14	—	—	72	86 6	100 4	110	
													12.6	23.6	72	86.6	116.1	125	
													—	—	—	—	64 2	80	
													12.6	23.6	—	—	76.8	90	
											15	21	—	—	72	86 6	104 1	110	
													12.6	23.6	72	86.6	119.9	125	
													—	—	—	—	71 2	90	
													12.6	23.6	—	—	83.8	100	
	575	518	632	16 0	91	16 0	91	2	1	2 4	7 5	9	—	—	—	—	49 8	60	
													12.6	23.6	—	—	62.4	70	
													—	—	36	34 6	54 6	60	
													12.6	23.6	36	34.6	70.3	80	
											10	11	—	—	72	69 3	80 5	90	
													12.6	23.6	72	69.3	96.3	100	
													—	—	—	—	51 8	60	
													12.6	23.6	—	—	64.4	80	
											15	17	—	—	36	34 6	57 1	60	
													12.6	23.6	36	34.6	72.8	80	
													—	—	72	69 3	83 0	90	
													12.6	23.6	72	69.3	98.8	100	
													—	—	—	—	57 8	70	
													12.6	23.6	—	—	70.4	80	
													—	—	36	34 6	64 6	70	
													12.6	23.6	36	34.6	80.3	90	
														—	—	72	69 3	90 5	100
														12 6	23 6	72	69 3	106 3	110

UNIT SIZE 50EJ,EK, EW,EY	NOMINAL VOLTAGE (3 Ph 60 Hz)	VOLTAGE RANGE		COMPRESSOR				OFM			IFM		POWER EXHAUST		ELECTRIC HEAT*		POWER SUPPLY							
				No. 1		No. 2																		
		Min	Max	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	kW	FLA	MCA	MOCP†						
030	208/230	187	254	57 1	266	39 1	228	2	1	5 3	10	30 8/ 28 0	23.6	41.6	—	—	151 9/149 1	200/200						
													—	—	27/36	75 1/ 86 6	151 9/149 1	200/200						
													23.6	41.6	27/36	75.1/ 86.6	175.5/172.8	225/225						
													—	—	54/72	150 1/173 2	188 6/208 2	200/225						
											23.6	41.6	54/72	150.1/173.2	218.1/237.7	225/250	15	46 2/ 42 0	23.6	41.6	—	—	167 3/163 1	200/200
											—	—	27/36	75 1/ 86 6	167 3/163 1	200/200								
											23.6	41.6	27/36	75.1/ 86.6	190.9/190.3	225/225								
											—	—	54/72	150 1/173 2	207 9/225 7	250/250								
											23.6	41.6	54/72	150.1/173.2	237.4/255.2	275/275	20	59 4/ 54 0	23.6	41.6	—	—	180 5/175 1	225/225
											—	—	27/36	75 1/ 86 6	180 5/175 8	225/225								
											23.6	41.6	27/36	75.1/ 86.6	204.1/205.3	250/250								
											—	—	54/72	150 1/173 2	224 4/240 7	275/275								
	23.6	41.6	54/72	150.2/173.2	253.9/270.2	300/300	460	414	508	25 6	120	19 9	114	2	1	2 7	10	14	12.6	23.6	—	—	71 3	90
	—	—	36	43 3	83.9	100																		
	12.6	23.6	36	43.3	71 6	90																		
	—	—	72	86 6	87.4	100																		
	12.6	23.6	72	86.6	104 1	110											15	21	12.6	23.6	—	—	119.9	125
	—	—	72	86 6	125	110																		
	12.6	23.6	36	43 3	78 3	100																		
	—	—	36	43.3	90.9	110																		
	12.6	23.6	36	43.3	80 4	100											20	27	12.6	23.6	—	—	96.1	110
	—	—	72	86 6	112 9	125																		
	12.6	23.6	72	86.6	128.6	150																		
	—	—	72	86.6	125	150																		
	575	518	632	20 5	96	16 0	91	2	1	2 4	10	11	12.6	23.6	—	—	84 3	100						
													—	—	36	43 3	96.9	110						
													12.6	23.6	36	43.3	87 9	100						
													—	—	72	86 6	103.6	110						
											12.6	23.6	72	86 6	120 4	125	15	17	12.6	23.6	—	—	136.1	150
											—	—	36	43.3	84 3	100								
											12.6	23.6	36	43.3	96.9	110								
											—	—	72	86 6	103.6	110								
											12.6	23.6	72	86 6	120 4	125	20	22	12.6	23.6	—	—	128.6	150
											—	—	36	43 3	84 3	100								
											12.6	23.6	36	43.3	96.9	110								
											—	—	72	86 6	103.6	110								
12.6											23.6	72	86 6	120 4	125	20	22	12.6	23.6	—	—	136.1	150	
—											—	36	43 3	84 3	100									
12.6											23.6	36	43.3	96.9	110									
—											—	72	86 6	103.6	110									

LEGEND

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†Fuse or HACR circuit breaker

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EXAMPLE: Supply voltage is 460-3-60

AB = 452 v

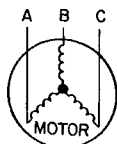
BC = 464 v

AC = 455 v

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

$$= \frac{1371}{3}$$

$$= 457$$



Determine maximum deviation from average voltage

$$(AB) 457 - 452 = 5 \text{ v}$$

$$(BC) 464 - 457 = 7 \text{ v}$$

$$(AC) 457 - 455 = 2 \text{ v}$$

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.

- MCA calculation for units with electric heaters over 50 kW = (1.25 x IFM amps) ÷ (1.00 x heater FLA).
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Electrical data — 50EJ,EK,EW,EY024-048 (cont)



UNIT SIZE 50EJ,EK, EW,EY	NOMINAL VOLTAGE (3 Ph 60 Hz)	VOLTAGE RANGE		COMPRESSOR				OFM			IFM		POWER EXHAUST		ELECTRIC HEAT*		POWER SUPPLY	
				No. 1		No. 2												
		Min	Max	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	kW	FLA	MCA	MOC†
034	208/230	187	254	57 1	266	57 1	266	2	1	5 3	10	30 8/ 28 0	—	—	—	—	169 9/167 1	225/200
													23.6	41.6	—	—	193.5/190.7	250/225
													—	—	27/36	75 1/ 86 6	169 9/167 1	225/200
													23.6	41.6	27/36	75.1/ 86.6	193.5/190.7	250/225
													—	—	54/72	150 1/173 2	188 6/208 2	225/225
													23.6	41.6	54/72	150.1/173.2	218.1/237.7	250/250
											15	46.2/ 42 0	23.6	41.6	—	—	185 3/181 1	225/225
													—	—	27/36	75 1/ 86 6	185 3/181 1	225/225
													23.6	41.6	27/36	75.1/ 86.6	208.9/204.7	250/250
													—	—	54/72	150 1/173 2	207 9/225 7	250/250
													23.6	41.6	54/72	150.1/173.2	237.4/255.2	275/275
													—	—	—	—	198 5/193 1	250/250
	20	59 4/ 54 0	23.6	41.6	—	—	222.1/216.7	275/250										
			—	—	27/36	75 1/ 86 6	198 5/193 1	250/250										
			23.6	41.6	27/36	75.1/ 86.6	222.1/216.7	275/250										
			—	—	54/72	150 1/173.2	224 4/240 7	275/275										
			23.6	41.6	54/72	150.1/173.2	253.9/270.2	300/300										
			—	—	—	—	77 0	100										
	460	414	508	25 6	120	25 6	120	2	1	2 7	10	14	12.6	23.6	—	—	89.6	110
													—	—	36	43 3	77 0	100
													12.6	23.6	36	43.3	89.6	110
													—	—	72	86 6	104 1	110
											15	21	12.6	23.6	72	86.6	119.9	125
													—	—	—	—	84 0	100
													12.6	23.6	36	43 3	84 0	100
													12.6	23.6	36	43.3	96.6	110
											20	27	—	—	72	86 6	112 9	125
													12.6	23.6	72	86.6	128.6	150
													—	—	—	—	90 0	110
													12.6	23.6	—	—	102.6	125
	575	518	632	20 5	96	20 5	96	2	1	2 4	10	11	—	—	—	—	61 9	80
													12.6	23.6	—	—	74.5	90
													—	—	36	34 6	61 9	80
													12.6	23.6	36	34.6	74.5	90
											15	17	—	—	72	69 3	83 0	90
													12.6	23.6	72	69.3	98.8	100
—													—	—	—	67 9	80	
12.6													23.6	—	—	80.5	100	
20											22	—	—	36	34 6	67 9	80	
												12.6	23.6	36	34.6	80.5	100	
												—	—	72	69 3	90 5	100	
												12.6	23.6	72	69.3	106.3	110	
20	22	—	—	—	—	72 9	90											
		12.6	23.6	—	—	85.5	100											
		—	—	36	34 6	72 9	90											
		12.6	23.6	36	34.6	86.6	100											
20	22	—	—	72	69 3	96 8	110											
		12 6	23 6	72	69 3	112 5	125											

UNIT SIZE 50EJ,EK, EW,EY	NOMINAL VOLTAGE (3 Ph 60 Hz)	VOLTAGE RANGE		COMPRESSOR				OFM			IFM		POWER EXHAUST		ELECTRIC HEAT*		POWER SUPPLY	
		Min	Max	No. 1		No. 2		Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	kW	FLA	MCA	MOCP†
				RLA	LRA	RLA	LRA											
038	208/230	187	254	57 1	266	57 1	266	4	1	5 3	10	30 8/ 28 0	—	—	—	—	180 5/177 7	225/225
													23.6	41.6	—	—	204.1/201.3	250/250
													—	—	27/36	75 1/ 86 6	180 5/177 7	225/225
													23.6	41.6	27/36	75.1/ 86.6	204.1/201.3	250/250
													—	—	54/72	150 1/173 2	188 6/208 2	225/225
													23.6	41.6	54/72	150.1/173.2	218.1/237.7	250/250
											15	46 2/ 42 0	—	—	—	—	195 9/191 7	250/225
													23.6	41.6	—	—	219.5/215.3	275/250
													—	—	27/36	75 1/ 86 6	195 9/191 7	250/225
													23.6	41.6	27/36	75.1/ 86.6	219.5/215.3	275/250
													—	—	54/72	150 1/173 2	207 9/225 7	250/250
													23.6	41.6	54/72	150.1/173.2	237.4/255.2	275/275
											20	59 4/ 54 0	—	—	—	—	209 1/203 7	250/250
													23.6	41.6	—	—	232.7/227.3	275/275
													—	—	27/36	75 1/ 86 6	209 1/203.7	250/250
													23.6	41.6	27/36	75.1/ 86.6	232.7/227.3	275/275
													—	—	54/72	150 1/173 2	224 4/240 7	275/275
													23.6	41.6	54/72	150.1/173.2	253.9/270.2	300/300
	460	414	508	25 6	120	25 6	120	4	1	2 7	10	14	12.6	23.6	—	—	82 4	100
													—	—	36	43 3	95.0	110
													12.6	23.6	36	43.3	82 4	100
													—	—	72	86 6	104 1	110
											15	21	12.6	23.6	72	86.6	119.9	125
													—	—	—	—	89 4	110
													12.6	23.6	—	—	102.0	125
													—	—	36	43 3	89 4	110
													12.6	23.6	36	43.3	102.0	125
													—	—	72	86 6	112 9	125
													12.6	23.6	72	86.6	128.6	150
											20	27	—	—	—	—	95 4	110
													12.6	23.6	—	—	108.0	125
													—	—	36	43 3	95 4	110
													12.6	23.6	36	43.3	108.0	125
	575	518	632	20 5	96	20 5	96	4	1	2 4	10	11	12.6	23.6	—	—	66 7	80
													—	—	36	34 6	79.3	90
													12.6	23.6	36	34.6	66 7	80
													—	—	72	69 3	79.3	90
											15	17	12.6	23.6	72	69.3	83 0	90
													—	—	—	—	98.8	100
													12.6	23.6	—	—	72 7	90
													—	—	36	34 6	85.3	100
													12.6	23.6	36	34.6	72 7	90
													—	—	72	69 3	85.3	100
													12.6	23.6	72	69.3	90 5	100
											20	22	—	—	—	—	106.3	110
													12.6	23.6	—	—	77 7	90
													—	—	36	34 6	90.3	110
													12.6	23.6	36	34.6	77 7	90
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													12 6	23 6	72	69 3	96 8	110
													12 6	23 6	72	69 3	112 5	125

LEGEND

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

*Heater capacity (kW) is based on heater voltage of 208 v, 240 v, 480 v, and 575 v. If power distribution voltage to unit varies from rated heater voltage, heater kW will vary accordingly.

†Fuse or HACR circuit breaker

NOTES:

- 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.

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

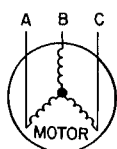
BC = 464 v

AC = 455 v

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

$$= \frac{1371}{3}$$

$$= 457$$



Determine maximum deviation from average voltage

$$(AB) 457 - 452 = 5 \text{ v}$$

$$(BC) 464 - 457 = 7 \text{ v}$$

$$(AC) 457 - 455 = 2 \text{ v}$$

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.

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

- 72 kW heaters are for constant volume applications only.



Electrical data — 50EJ,EK,EW,EY024-048 (cont)



UNIT SIZE 50EJ,EK, EW,EY	NOMINAL VOLTAGE (3 Ph 60 Hz)	VOLTAGE RANGE		COMPRESSOR				OFM			IFM		POWER EXHAUST		ELECTRIC HEAT*		POWER SUPPLY	
				No. 1		No. 2												
		Min	Max	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	kW	FLA	MCA	MOCPT
044	208/230	187	254	69 2	345	69 2	345	4	1	5 3	15	46 2/ 42 0	—	—	—	—	223 1/218 9	275/275
													23.6	41.6	—	—	246.7/242.5	300/300
													—	—	27/36	75 1/ 86 6	223 1/218 9	275/275
													23.6	41.6	27/36	75.1/ 86.6	246.7/242.5	300/300
													—	—	54/72	150 1/173 2	223 1/225 7	275/275
													23.6	41.6	54/72	150.1/173.2	246.7/255.2	300/300
											20	59 4/ 54 0	23.6	41.6	—	—	236 3/230 9	300/300
													—	—	27/36	75 1/ 86 6	236 3/230 9	300/300
													23.6	41.6	27/36	75.1/ 86.6	259.9/254.5	300/300
													—	—	54/72	150 1/173 2	236 3/240 7	300/300
													23.6	41.6	54/72	150.1/173.2	259.9/270.2	300/300
													—	—	—	—	—	—
											25	74 8/ 68 0	23.6	41.6	—	—	251 7/244 9	300/300
													—	—	27/36	75 1/ 86 6	251 7/244 9	300/300
													23.6	41.6	27/36	75.1/ 86.6	275.3/268.5	300/300
													—	—	54/72	150 1/173 2	251 7/258 2	300/300
													23.6	41.6	54/72	150.2/173.2	275.3/287.7	300/300
													—	—	—	—	—	—
	460	414	508	28 8	173	28 8	173	4	1	2 7	15	21	12.6	23.6	—	—	96 6	125
													—	—	36	43.3	96 6	125
													12.6	23.6	36	43.3	109.2	125
													—	—	72	86 6	112 9	125
													12.6	23.6	72	86.6	128.6	150
													—	—	—	—	—	—
											20	27	12.6	23.6	—	—	102 6	125
													—	—	—	—	115.2	125
													12.6	23.6	36	43 3	102 6	125
													12.6	23.6	36	43.3	115.2	125
													—	—	72	86 6	120 4	125
													12.6	23.6	72	86.6	136.1	150
											25	34	12.6	23.6	—	—	109 6	125
													—	—	—	—	122.2	150
													12.6	23.6	36	43 3	109 6	125
													12.6	23.6	36	43.3	122.2	150
													—	—	72	86 6	129 1	150
													12.6	23.6	72	86.6	144.9	175
	575	518	632	26 7	120	26 7	120	4	1	2 4	15	17	—	—	—	—	86 7	110
													12.6	23.6	—	—	99.3	125
													—	—	36	34 6	86 7	110
													12.6	23.6	36	34.6	99.3	125
													—	—	72	69 3	90 5	110
													12.6	23.6	72	69.3	106.3	125
											20	22	12.6	23.6	—	—	91 7	110
													—	—	—	—	104.3	125
													12.6	23.6	36	34 6	91 7	110
													12.6	23.6	36	34.6	104.3	125
													—	—	72	69 3	96 8	110
													12.6	23.6	72	69.3	112.5	125
25											27	12.6	23.6	—	—	96 7	110	
												—	—	—	—	109.3	125	
												12.6	23.6	36	34 6	96 7	110	
												12.6	23.6	36	34.6	109.3	125	
												—	—	72	69 3	103 0	125	
												12 6	23 6	72	69 3	118 8	125	

UNIT SIZE 50EJ,EK, EW,EY	NOMINAL VOLTAGE (3 Ph 60 Hz)	VOLTAGE RANGE		COMPRESSOR				OFM			IFM		POWER EXHAUST		ELECTRIC HEAT*		POWER SUPPLY	
				No. 1		No. 2												
		Min	Max	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	kW	FLA	MCA	MOCP†
048	208/230	187	254	82 1	446	69 2	345	4	1	5 3	20	59 4/ 54 0	—	—	—	—	252 4/247 0	300/300
													23.6	41.6	—	—	276.0/270.6	300/300
													—	—	27/36	75 1/ 86 6	252 4/247 0	300/300
													23.6	41.6	27/36	75.1/ 86.6	276.0/270.6	300/300
											25	74 8/ 68 0	—	—	54/72	150 1/173 2	252 4/247 0	300/300
													23.6	41.6	54/72	150.1/173.2	276.0/270.6	300/300
													—	—	—	—	267 8/261 0	300/300
													23.6	41.6	—	—	291.4/284.6	300/300
											30	88 0/ 80 0	—	—	27/36	75 1/ 86 6	281 0/273 0	300/300
													23.6	41.6	27/36	75.1/ 86.6	304.6/296.6	350/300
													—	—	54/72	150 1/173 2	281 0/273 0	300/300
													23.6	41.6	54/72	150.1/173.2	291.4/287.7	300/300
	460	414	508	42 3	223	28 8	173	4	1	2 7	20	27	12.6	23.6	—	—	119 5	150
													—	—	36	43 3	132.1	150
													12.6	23.6	36	43.3	119 5	150
													—	—	72	86 6	120 4	150
											25	34	12.6	23.6	72	86.6	136.1	150
													—	—	—	—	126 5	150
													12.6	23.6	36	43 3	139.1	175
													12.6	23.6	36	43.3	126 5	150
											30	40	—	—	72	86 6	139.1	175
													12.6	23.6	72	86.6	129 1	150
													12.6	23.6	72	86.6	144.9	175
													—	—	—	—	132 5	150
	575	518	632	34 6	164	26 7	120	4	1	2 4	20	22	12.6	23.6	—	—	145.1	175
													—	—	36	43 3	132 5	150
													12.6	23.6	36	43.3	145.1	175
													—	—	72	86 6	136 6	175
											25	27	12.6	23.6	72	86.6	152.4	175
													—	—	—	—	101 6	125
													12.6	23.6	36	34 6	114.2	125
													12.6	23.6	36	34.6	101 6	125
											30	32	—	—	72	69 3	114.2	125
													12.6	23.6	72	69.3	101 6	125
													12.6	23.6	72	69.3	119.2	150
													—	—	—	—	106.6	125

LEGEND

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

*Heater capacity (kW) is based on heater voltage of 208 v, 240 v, 480 v, and 575 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.

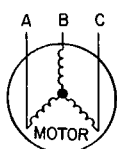
2 Unbalanced 3-Phase Supply Voltage

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

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



Determine maximum deviation from average voltage

$$(AB) 457 - 452 = 5 \text{ v}$$

$$(BC) 464 - 457 = 7 \text{ v}$$

$$(AC) 457 - 455 = 2 \text{ v}$$

Maximum deviation is 7 v

Determine percent of voltage imbalance

$$\begin{aligned}
 \% \text{ Voltage Imbalance} &= 100 \times \frac{7}{457} \\
 &= 1.53\%
 \end{aligned}$$

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.

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

4 72 kW heaters are for constant volume applications only.



Controls options

The control options that the units can provide are based on the following parameters: CV (constant volume) or VAV (variable air volume) operation; stand-alone unit with field-supplied sensors installed (CV or VAV); as a system via the Carrier Comfort System (TEMP or VVT® [Variable Volume and Temperature]); optional electronic expansion board installed (CV or VAV); linked to the Carrier Comfort Network; and availability of a computer and software (Comfort Works™, Building Supervisor, and Service Tool software) or accessory LID-2B 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.

Every unit is equipped with a supply air thermistor (SAT) located in the supply fan discharge and an outdoor air thermistor (OAT) located in the outdoor air hood. Variable air volume units are supplied with a return air thermistor (RAT) located in the return air damper.

Constant volume applications — 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 field-supplied 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 of 4 or 9 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 condenser 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 CV 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 CV unit without a thermostat requires a field-supplied sensor for operation.

Features with Sensor Control of Unit (Stand-Alone Applications) — Unit control is limited to CV 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 $\pm 5^\circ$ 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 (for a timed period of 1 to 4 hours)
- ability to use multiple space temperature sensors to average the space temperature
- 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 (if electric heat is installed).

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 (if heat is installed).

CONTROLS OPTIONS AND CONFIGURATIONS (NON-THERMOSTAT APPLICATIONS)

UNIT CONFIGURATION	DEFAULT COOLING	DEFAULT HEATING
CV or VAV Unit with SPT Sensor	Unoccupied Cooling — 32 C (90 F) (SPT) Occupied Cooling — NA	Unoccupied Heating — 13 C (55 F) (SPT) Occupied Heating — NA
CV Unit with SPT Sensor and Remote Start/Stop Switch	Unoccupied Cooling — 32 C (90 F) (SPT) Occupied Cooling — 26 C (78 F) (SPT)	Unoccupied Heating — 13 C (55 F) (SPT) Occupied Heating — 20 C (68 F) (SPT)
VAV Unit Remote Start/Stop Switch Only	Unoccupied Cooling — 32 C (90 F) (RAT) Occupied Cooling — 13 C (55 F) (SAT)	Unoccupied Heating — 13 C (55 F) (RAT) Occupied Heating — 20 C (68 F) (RAT)*
VAV Unit with SPT Sensor and Remote Start/Stop Switch	Unoccupied Cooling — 32 C (90 F) (SPT) Occupied Cooling — 13 C (55 F) (SAT)	Unoccupied Heating — 13 C (55 F) (SPT) Occupied Heating — 20 C (68 F) (RAT)*

LEGEND

CV — Constant Volume
NA — Not Available
RAT — Return-Air Temperature
SAT — Supply-Air Temperature
SPT — Space Temperature
VAV — Variable Air Volume

*With DIP (dual-in-line package) Switch No. 5 configured to OPEN (Occupied Heat Enabled).

NOTE: Space temperature sensor and remote stop/switch are field supplied.

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

NOTE: The IAQ sensor must be set for current output (4 to 20 mA). This requires removing the sensor cover and moving a jumper on the sensor.

- provide discrete inputs for fan status, filter status, field-applied status, and demand limit
- provide an output for the external alarm light indicator
- provide power exhaust fire outputs for direct control of power exhaust stages during fire or smoke modes
- control of smoke control modes including evacuation, smoke purge, pressurization, and fire shutdown (non-modulating or modulating power exhaust required)

When the unit is connected to the CCN (Carrier Comfort Network), 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
- provide CCN IAQ participation

See Carrier TEMP or VVT® literature for complete TEMP (single zone) or VVT (multi-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 VVT 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, or accessory LID-2B, 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 internal timeclock has a 10-hour minimum back-up 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 product literature.

Variable air volume (VAV) applications

Features with Stand-Alone Applications — The units, as shipped, are operable as stand-alone units with the addition of a field-supplied timeclock to establish unit start and stop times.

Heating (if equipped with heat) and cooling in both on and off modes is controlled to default values by the base unit control. Set points may be changed with appropriate input devices.

The control has an on-board occupancy schedule which can be set using an input device and eliminates the need for an external timeclock.

During both the on and off periods, cooling operation is controlled to the supply air setting and heating is controlled to the return air setting (or to the optional space temperature sensor). During the on period, the supply fan runs continuously. During the off period, the supply fan will be activated if the return air sensor is outside of the set points and will run long enough to accurately sample the space temperature. The supply fan will then continue to run until any heating or cooling load is satisfied, at which point it will turn off.

Controls (cont)



The use of a space sensor will allow for supply air reset to conserve energy and maintain comfort. If equipped with an override feature, the sensor will allow operation during the off period for a fixed length of time.

Base unit control supports a Heat Interlock Relay (field supplied) to fully open the VAV terminal devices during heating operation.

Standard features of a VAV unit with a remote start/stop switch are:

- control board diagnostics
- control of an outdoor condenser fan based upon outdoor-air temperature
- control of modulating economizer to provide free cooling when outdoor conditions are suitable, using supply-air temperature as a set point
- support of remote occupied/unoccupied input to start or stop the unit
- provide power exhaust output to an external power exhaust controller
- support supply air temperature reset to offset supply air set point
- support a field test for field check out
- support linkage to DAV (digital air volume) systems
- cooling capacity control of up to 6 stages plus economizer with compressors and unloaders to maintain supply-air temperature set point during occupied periods
- control of one stage of heat to maintain return-air temperature
- provide a variable frequency drive (VFD) relay output to enable VFD
- control of heat interlock relay
- compressor Time Guard® override (power up, minimum off and on times)

With the addition of a remote start/stop switch heating or cooling is enabled during unoccupied periods as required to maintain space temperature to within unoccupied set points.

Occupied heating is enabled or disabled by the position of DIP (dual in-line package) switch no. 5.

Additional features may be provided with electronic access to unit control board. These features are:

- additional control board diagnostics
- electronic expansion board features (if installed)
- control of the economizer damper and indoor fan to option unoccupied free cooling
- 365-day timeclock with backup (supports minute, hour, day, month, and year)
- holiday table containing up to 18 holiday schedules
- occupancy control with 8 periods for unit operation
- support a set of display, maintenance, configuration, service, and set point data tables for interface with Building Supervisor, ComfortWorks™, or Service Tool software

When a VAV unit with a space temperature sensor is accessed via a computer, the following additional features are available:

- ability to initiate timed override from T-55 sensors

- temperature compensated start to calculate early start time before occupancy
- provide space temperature reset to reset the supply air set point upward when the temperature falls below the occupied cooling set point

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

- fan status
- filter status
- field-applied status
- demand limiting
- IAQ (indoor air quality) sensor
- OAQ (outdoor air quality) sensor
- alarm light
- fire unit shutdown
- fire pressurization
- fire evacuation
- fire smoke purge

When the unit is connected to the CCN (Carrier Comfort Network), the following expansion board features can be utilized:

- CCN IAQ participation
- CCN OAQ participation
- CCN demand limit participation
- ability to use multiple space temperature sensors (multiples of 4 or 9 only) to average space temperature (DAV only)

A field-supplied space temperature sensor can be added to allow an accessory T-55 sensor to monitor room temperature and provide unoccupied override capability (1 hour)

When the unit is equipped with a field-supplied space temperature sensor and a remote contact closure (remote start/stop), the occupied default set points will monitor unit operation. The occupied default set points are 55 F (supply air) cooling and 68 F (return-air temperature) heating (if heat is installed).

NOTE: For units without a space temperature sensor and 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 of 55 F (supply-air temperature) cooling and 68 F (return-air temperature) heating. Without an occupancy schedule, the unit will control to the unoccupied default set points of 90 F (return air) cooling and 55 F (return air) heating (if heat is installed).

Features with Network Applications — The base control board provides, as standard, a connection for use with a Carrier Comfort 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 or accessory LID-2B, 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 internal timeclock has a 10-hour minimum back-up time to provide for unit power off for servicing unit or during unexpected power outages. For complete Carrier Comfort System (CCS) or Carrier Comfort Network (CCN) features and benefits, refer to the product literature.

Sequence of operation

NOTE: Unit is shipped with default values that can be changed through CCN software or accessory LID-2B.

Cooling, constant volume (CV) units — On power up, the control module will activate the initialization software. The initialization software reads each DIP switch to determine the unit configuration. The initialization sequence: clears all alarms and alerts; re-maps the input/output database for CV operation; sets maximum heat stages to 2; and sets maximum cool stages to 3. The control module reads DIP switch no. 3 and determines if the unit will use expansion mode operation.

The TSTAT function performs a thermostat based control by monitoring Y1, Y2, W1, W2, and G inputs. These functions control stages: cool1, cool2, heat1, heat2, and the indoor fan, respectively. If the TSTAT function is not selected, the control module determines the occupancy state based on the system time schedules with a field-supplied sensor installed, or with remote occupied/unoccupied input. If Temperature Compensated Start is active, the unit will be controlled as in the Occupied mode. User defined set points are shown on page 40.

Occupied or unoccupied comfort set points must be selected. The control module will set appropriate operating mode and fan control. The control module will turn on indoor fan if in Occupied mode or if the unit is in Unoccupied mode and the space temperature is outside of the unoccupied comfort set points (Unoccupied Heat or Unoccupied Cool). The control module will then monitor space temperature against comfort set points and control heating or cooling stages as required. If the system is in the Occupied mode, the economizer will operate as required. If the system is in Unoccupied mode, the system will perform night-time free cool and IAQ (indoor air quality) pre-occupancy purge as required (when functions are enabled via software). Whenever the DX (direct expansion) cooling is requested, the outdoor fan will operate.

The control module will operate economizer, run diagnostics to monitor alarms/alerts at all times, and respond to CCN communications to perform any configured network POC (product outboard control) functions such as time/outdoor-air temperature broadcast and global occupancy broadcast. When the optional expansion I/O board is employed, it will: perform a periodic scan and maintain a database of expanded I/O points; perform Fire/Smoke control (power exhaust required); if in Occupied mode, perform IAQ control and monitor the fan, filter, demand limit, and field-applied status (with accessories).

If thermostats are used to energize the G input, the control module will turn on the indoor fan without delay and open the economizer dampers to minimum position. If thermostats are used to deenergize the G input, the control module will turn off the indoor fan without delay and close the economizer dampers.

When cooling, G must be energized before cooling can operate. The control module determines if outdoor conditions are suitable for economizer cooling using the standard outdoor air thermistor. For the economizer to function for outside air cooling: the enthalpy must be below the enthalpy set point; the outdoor-air temperature must be equal to or less than the High Outdoor Air Temperature Lock-out (default is 65 F); the SAT (supply-air temperature) thermistor must not be in alarm; and the outdoor air reading is available. When these conditions are satisfied, the control module will use economizer as the first stage of cooling.

When Y1 input is energized, the economizer will be modulated to maintain SAT at the defined set point. (The default is 55 F.) When SAT is above the set point, the economizer will be 100% open. When SAT is below the set point, the economizer will modulate between minimum and 100% open position. When Y2 is energized, the control module will turn on compressor no. 1 and continue to modulate the economizer as described above. If the Y2 remains energized and the SAT reading remains above the set point for 15 minutes, compressor no. 2 will turn on. If Y2 is deenergized at any time, only the last stage of compression that was energized will be turned off. If outdoor conditions are not suitable for economizer cooling, the economizer will go to minimum position and cycle compressors no. 1 and 2 based on demand from Y1 and Y2 respectively. The compressors will be locked out when the SAT temperature is too low (less than 40 F for compressor no. 1 and less than 45 F for compressor no. 2). After a compressor is locked out, it can restart after normal time-guard period.

The Time Guard® function maintains a minimum off time of 5 minutes, a minimum on time of 10 seconds, and a minimum delay before starting the second compressor of 10 seconds.

When heating, the heat stages respond to the demand from W1 and W2 of the thermostat input. Heating and cooling will be mutually locked out on demand on a first call basis. The heating and the cooling functions cannot operate simultaneously.

Cooling, variable volume units — On power up, the control module will activate the initialization software. The initialization software reads each DIP switch to determine the unit configuration. The initialization sequence: clears all alarms and alerts; re-maps the input/output database for VAV operation; sets maximum heat stages to 1; and sets maximum cool stages to 6. The control module reads DIP switch no. 3 and determines if the unit will use expansion mode operation. Power up takes a random time of 1 to 63 seconds plus 5 minutes the first time power is sent to the control board after a power outage.

Controls (cont)



The control module will determine if an interface (linkage) is active and if the unit will operate in a Digital Air Volume (DAV) mode. In a DAV system, the room terminals are equipped with microprocessor controls that give commands to the base unit module. If a linkage is active, the control module will replace local comfort set points, space and return air temperatures, and occupancy status with the linkage data supplied.

The control module will determine occupancy status from Time Schedules (if programmed), Remote Occupied/Unoccupied input, global occupancy schedules, or DAV. If temperature compensated start is active, the unit will be controlled as in the Occupied mode.

NOTE: The temperature compensated start is a period of time calculated to bring the unit on while in Unoccupied mode to reach the occupied set point when occupancy occurs.

The control module will set the appropriate operating mode and fan control. The control module will turn on the VFD if Occupied mode is evident. If in Unoccupied mode and a valid return-air temperature reading is available (either from a sensor or DAV), the control module will monitor return-air temperature against unoccupied heat and cool set points. The control module will start the VFD whenever return-air temperature is outside of the set points (Unoccupied Heat or Unoccupied Cool). The VFD may also be started by nighttime thermostat via remote Occupied/Unoccupied input or by a temperature compensated start algorithm. When the VFD is running in a normal mode, the control module will start heating or cooling as required to maintain supply-air temperature at the supply air set point plus the reset (when enabled). The reset value is determined by SAT (supply-air temperature) reset and/or space temperature reset algorithms. The space temperature reset is only available when enabled through software.

When cooling, the control module will energize the power exhaust enable output to the external power exhaust controller (when power exhaust is used).

The control module will run continuous diagnostics for alarms/alerts; respond to CCN (Carrier Comfort Network) communications; perform any configured network POC (Product Outboard Control) functions such as time/outdoor air temperature broadcast and global broadcast; and perform Fire/Smoke control.

Heating, constant volume (CV) units

48 series units — The gas heat units incorporate 2 separate systems to provide gas heat. Each system incorporates its own induced-draft motor, Integrated Gas Control (IGC) board, 2 stage gas valve, manifold, etc. The systems are operated in parallel; for example, when there is a call for first stage heat, both induced-draft motors operate, both gas valves are energized, and both IGC boards initiate spark.

All of the gas heating control is performed through the IGC boards (located in the heating section). The base module board serves only to initiate and terminate heating operation.

The base module board is powered by 24 vac. When the thermostat or room sensor calls for heating, power is sent from the base module board to W on each of the IGC boards. An LED on the IGC board will be on during normal operation. A check is made to ensure that the rollout switches

and limit switches are closed and the induced-draft motors are not running. The induced-draft motors are then energized, and when speed is proven with the hall effect sensor on the motor, the ignition activation period begins. The burners will ignite within 5 seconds.

When ignition occurs the IGC board will continue to monitor the condition of the rollout and limit switches, the hall effect sensor, as well as the flame sensor. If the unit is controlled through a room thermostat set for fan auto., 45 seconds after ignition occurs, the indoor-fan motor will be energized and the outdoor-air dampers will open to their minimum position. If for some reason the overtemperature limit opens prior to the start of the indoor fan blower, on the next attempt, the 45-second delay will be shortened to 5 seconds less than the time from initiation of heat to when the limit tripped. Gas will not be interrupted to the burners and heating will continue. Once modified, the fan on delay will not change back to 45 seconds unless power is reset to the control. If the unit is controlled through a room sensor, the indoor fan will be operating in the Occupied mode and the outdoor-air dampers will be in the minimum position.

If the unit is controlled with a room sensor in the Unoccupied mode, the indoor fan will be energized through the IGC board with a 45-second delay and the outside-air dampers will move to the IAQ position (generally closed in the Unoccupied mode). If IAQ is not enabled, dampers will move to the minimum position.

When additional heat is required, W2 closes and initiates power to the second stage of the main gas valves. When the thermostat is satisfied, W1 and W2 open and the gas valves close interrupting the flow of gas to the main burners. If the call for W1 lasted less than 1 minute, the heating cycle will not terminate until 1 minute after W1 became active. If the unit is controlled through a room thermostat set for fan auto., the indoor-fan motor will continue to operate for an additional 45 seconds then stop and the outdoor-air dampers will close. If the overtemperature limit opens after the indoor motor is stopped within 10 minutes of W1 becoming inactive, on the next cycle the time will be extended by 15 seconds. The maximum delay is 3 minutes. Once modified, the fan off delay will not change back to 45 seconds unless power is reset to the control. If the unit is controlled through a room sensor, the indoor fan will be operating in the Occupied mode and turned off after 45 seconds in the Unoccupied mode.

50 Series Units — 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 of heat is energized, the indoor-fan motor will turn on, and the outdoor-air damper will move to the minimum position. Upon a call for additional heat (if the unit is equipped with a two-stage heater), the second stage of heat is energized. When the call for heat is satisfied, the heaters will deenergize. The indoor-fan motor will also deenergize (unless controlled by a room sensor) 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. Upon a call for heat, the first stage of heat is energized, the indoor-fan motor will

turn on, 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 (if the unit is equipped with a two-stage heater), the second stage of heat is energized. When the call for heat is satisfied, the heaters and indoor-fan motor will deenergize and the outdoor-air damper will move to the closed position (if open).

Heating, variable air volume (VAV) units

48 series units — All of the gas heating control is performed through the integrated gas control (IGC) board. The base module board serves only to initiate and terminate heating operation.

NOTE: The unit is factory-configured for disabled occupied heating. Dual In-line Package (DIP) switch 5 is used to enable occupied heating (DIP switch 5 set to OPEN).

The base module board is powered by 24 vac. When there is a call for heating (either Morning Warm-Up, Unoccupied, or Occupied modes), power is sent from the base module board to W on each of the IGC boards and W2 of the main gas valve. A field-supplied heat interlock relay signals for the air terminals to open fully. The heat interlock relay is not required on DAV systems. In the Occupied mode the indoor-fan motor will be operating and the outdoor-air dampers will be in the minimum position. In the Unoccupied mode the indoor-fan motor will be off, but will energize 45 seconds after the call for heat and the outdoor-air dampers will move to the IAQ Unoccupied position (generally set to closed in the Unoccupied mode). The duct pressure sensor will signal to the variable frequency drive to operate at full speed since all terminals have been driven open. An LED on the IGC board will be on during normal operation. A check is made to ensure that the rollout switches and limit switches are closed and the induced-draft motors are not running. The induced-draft motors are then energized and when speed is proven with the hall effect sensor on the motor, the ignition activation period begins. The burners will ignite within 5 seconds.

When ignition occurs the IGC board will continue to monitor the condition of the rollout and limit switches, the hall effect sensor, and the flame sensor.

If the call for heat lasted less than 1 minute, the heating cycle will not terminate until 1 minute after heat became active. When heating is satisfied, the power will be interrupted to the IGC board and W1 and W2 of the main gas valve. If the unit is controlled through a room sensor, the indoor fan will be operating in the Occupied mode and turned off after 45 seconds in the Unoccupied mode.

50 Series Units — The control board is powered by 24 vac. When there is a call for heating (from Morning Warm-Up, Unoccupied, or Occupied modes), power is sent from the control module to energize the first stage of electric heat. A field-supplied heat interlock relay signals for the air terminals to fully open. In the Occupied mode, the indoor-fan motor will operate continuously and the outdoor-air dampers will be in the minimum position. In the Unoccupied mode, the indoor-fan motor will be off, but will energize upon the call for heat. The outdoor-air dampers will move to the IAQ unoccupied position (generally set to zero in the Unoccupied mode). The duct pressure sensor will signal to

the variable frequency drive to operate at full speed. When the call for heat is satisfied, the heaters will deenergize.

NOTE: The HIR is not needed in a DAV system.

If the unit is in the Unoccupied mode, the indoor-fan motor will deenergize and the outdoor-air damper will move to the closed position (if open).

Morning warm-up (VAV only with PC accessed/CCN operation) — Morning warm-up occurs when the control module has been programmed to turn on heat, prior to the Occupied mode, to be ready for the occupancy. Morning warm-up is a condition in VAV systems that occurs when the Temperature Compensated Start algorithm calculates a biased occupied start time and the unit has a demand for heating. The warm-up will continue into the occupied period as long as there is a need for heat. During warm-up, the unit can continue heating into the occupied period, even if occupied heating is disabled. When the heating demand is satisfied, the warm-up condition will terminate. To increase or decrease the heating demand, use the network access software to change the occupied heating set point.

NOTE: To utilize morning warm-up mode, the unit occupancy schedule must be accessed via Service Tool, ComfortWorks™, or Building Supervisor software or an accessory LID-2B.

Morning warm-up (VAV only with stand-alone operation) — When a unit operates in stand-alone mode, morning warm-up occurs when the unit is energized in Occupied mode and return-air temperature (RAT) is below 68 F. Warm-up will not terminate until the RAT reaches 68 F. The heat interlock relay output is energized during morning warm-up. (A field-installed 24-vdc heat interlock relay is required.) The output will be energized until the morning warm-up cycle is complete.

Space temperature reset sensor (VAV only) — An accessory space temperature sensor wired to terminals T1 and T2 on the control module is required. Space temperature reset is used to reset the supply-air temperature set point of a VAV system higher, as the space temperature falls below the Occupied Cool set point. As the space temperature falls below the cool set point, the supply-air temperature will be reset upward as a function of the reset ratio. Reset ratio is expressed in degrees change in supply-air temperature per degree of space temperature change. A reset limit will exist which will limit the maximum number of degrees the supply-air temperature may be raised. Both the reset ratio and the reset limit are user definable. The sequence of operation is as follows:

1. The on/off status of the unit supply fan is determined.
2. If the fan is on, the sequence will check if the system is in Occupied mode.
3. If the system is in Occupied mode, the sequence will determine if the reset option is enabled.
4. If the reset option is enabled, the sequence will read the space temperature and compare it to the Occupied Cool set point. If the temperature is below the Occupied Cool set point, the algorithm will compute the reset value and compare this value against the reset limit. If it is greater than the reset limit, the sequence will use the reset limit as the reset value.

Controls (cont)



Supply-air temperature reset (VAV only) — A field-supplied 4 to 20 mA input signal enables the supply-air temperature to be reset 0° to 20° F. The supply air temperature reset option does not need to be enabled.

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 (offered with constant volume and variable air volume units) and modulating power exhaust (offered on VAV units and CV 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 control modes — The 48/50EJ,EK,EW,EY units with an optional expansion board 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.

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."

NOTE: On standard gas models, the indoor fan will continue to run 45 seconds after the call for heat has been terminated. If fire shutdown is initiated the fan will stop immediately. No 45-second delay will occur.

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.

IAQ control — The accessory expansion board and accessory IAQ sensor are required for IAQ control. The Carrier sensors operate with a 4 to 20 mA signal. The 4 to 20 mA signal is connected to T11 (+) and T12 (–) on the expansion board for the IAQ sensor, and T13 (+) and T14 (–) on the expansion board for the OAQ sensor. The sensor is field-mounted and wired to the expansion board installed in the unit main control box. The IAQ sensor must be powered by a field-supplied 24-v power supply (ungrounded). Do not use the unit 24-v power supply to power the sensor.

Once installed, the sensor must be enabled. The sensor is configured with default values which may be changed through network access software. To work properly, the IAQ sensor high and low reference points for the sensor that is used must match the configured values. The expansion board reacts to a 4 to 20 mA signal from the IAQ sensor. The low reference (4 mA output) must be configured to the minimum IAQ sensor reading. The high reference (20 mA output) must be configured to the maximum IAQ sensor reading.

The IAQ sensor can be configured to either low or high priority. The priority value can be changed by the user. The default is low.

Low priority — When the priority is set to low, the initial control is to the IAQ set point, but the outside air damper position will change to its minimum position when the following conditions occur:

- CV units with sensor — when the space temperature is greater than the occupied cooling set point plus 2° F or when the space temperature is less than the occupied heating set point minus 2° F.
- VAV units and CV units with thermostat — when the supply-air temperature is less than the supply-air temperature set point minus 8° F or when the supply-air temperature is greater than the supply air temperature set point plus 5° F for 4 minutes.
- When the outdoor air quality is greater than the outdoor air quality set point (ppm)

High priority — When the priority is set to high, the IAQ set point controls the outside air damper exclusively, with no regard to comfort conditioning.

SMOKE CONTROL MODES

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

LEGEND

HIR — Heat Interlock Relay
VFD — Variable Frequency Drive

I/O CHANNEL DESIGNATIONS BASE MODULE — CV

TERMINAL NO.	ASSIGNMENT	TERMINAL NO.	ASSIGNMENT
T1-2	SPT (CCN) — 10K Ω Thermistor	T23-25	Compressor 2 Safety — DI (24 vac)
T3-4	STO (CCN) — 10K Ω Thermistor	T24-25	Outside Air Enthalpy — DI (24 vac)
T5-6	OAT — 5K Ω Thermistor	T26-27	Economizer Pos. — AO (4-20 mA)
T7-8	SAT — 5K Ω 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 BASE MODULE — VAV

TERMINAL NO.	ASSIGNMENT	TERMINAL NO.	ASSIGNMENT
T1-2	SPT (CCN) — 10K Ω Thermistor	T23-25	Compressor 2 Safety — DI (24 vac)
T3-4	RAT — 5K Ω Thermistor	T24-25	Outside Air Enthalpy — DI (24 vac)
T5-6	OAT — 5K Ω Thermistor	T26-27	Economizer Pos — AO (4-20 mA)
T7-8	SAT — 5K Ω Thermistor	T28-29	Heat 1 Relay — DO (24 v)
T9-10	—	T30-29	Heat Interlock Relay — DO (24 v)
T11-12	SAT Reset — AI (4 to 20 mA)	T31-32	Modulated Power Exhaust — DO (24 vac)
T13-14	—	T33-32	—
T15-16	—	T34-35	Condenser Fan — DO (115 vac)
T17-25	Remote Start/Stop — DI (24 vac)	T36-35	OFC2 — DO (115 vac)
T18-25	—	T37-38	Unloader 1 — DO (115 vac)
T19-25	—	T39-38	Unloader 2 — DO (115 vac)
T20-25	—	K1	Indoor Fan Relay — DO (LV)
T21-25	—	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) — CV AND VAV

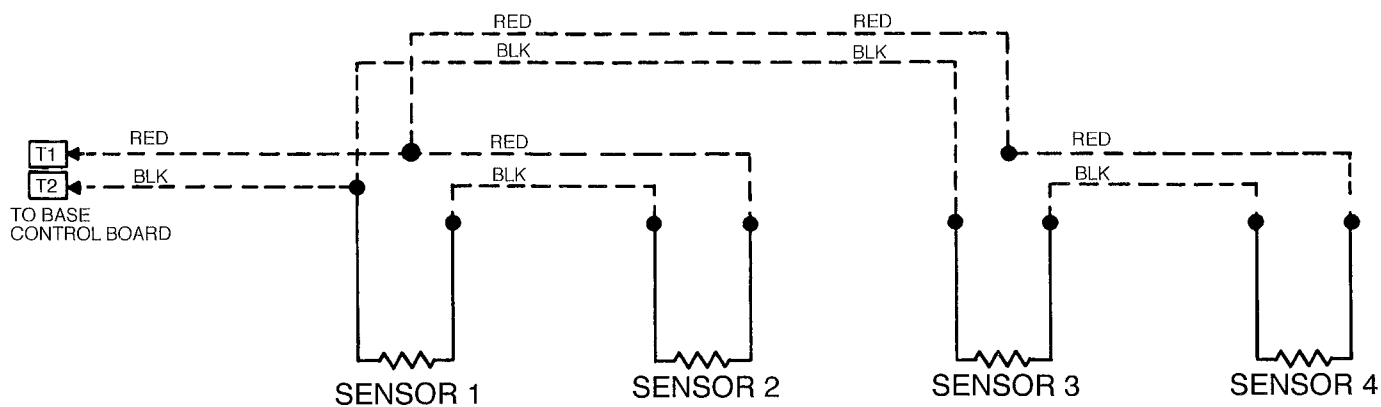
TERMINAL NO.	ASSIGNMENT	TERMINAL NO.	ASSIGNMENT
T1-2	—	T23-25	Fire — Evacuation — DI (24 vac)
T3-4	—	T24-25	Fire — Smoke Purge — DI (24 vac)
T5-6	—	T26-27	—
T7-8	—	T28-29	—
T9-10	—	T30-29	Alarm Light Indicator — DO (24 vac)
T11-12	IAQ Indoor — AI (4 to 20 mA)	T31-32	Power Exhaust Fire No. 1 — DO (115 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

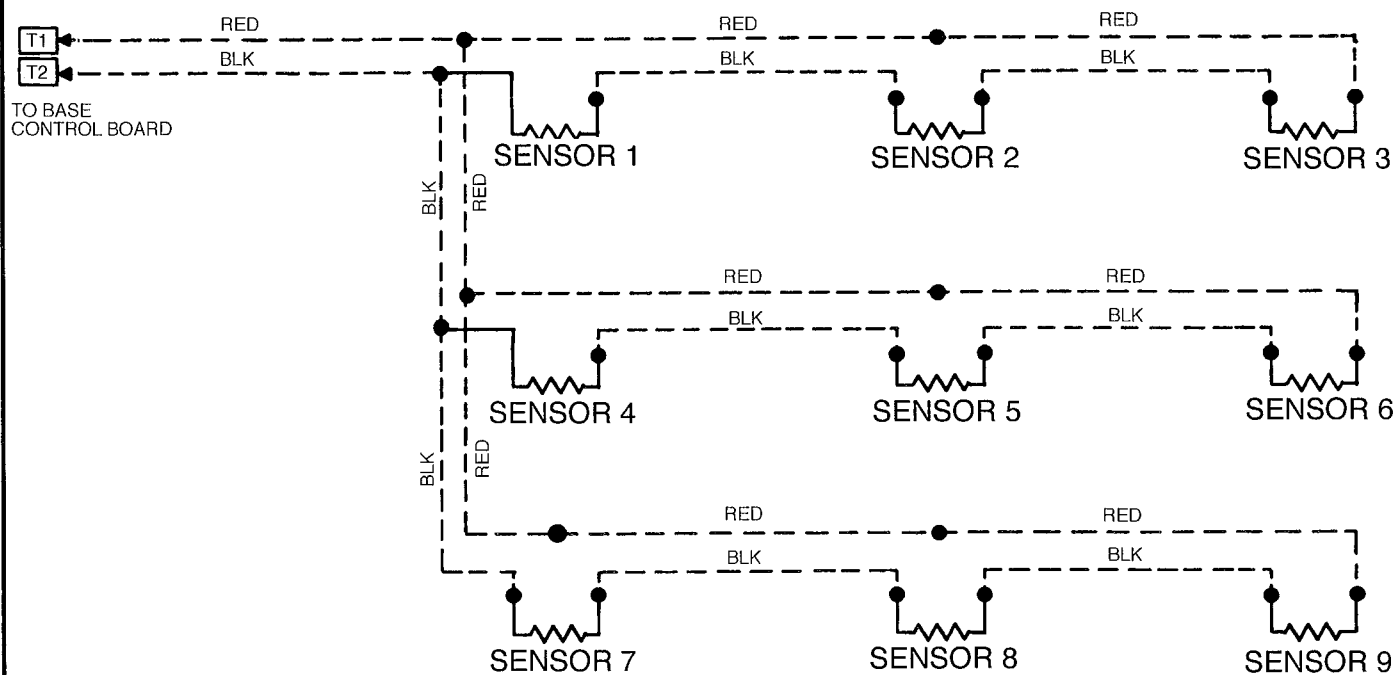
AI	— Analog Input	LV	— Low Voltage
AO	— Analog Output	OAT	— Outdoor-Air Temperature
CCN	— Carrier Comfort Network	OFC	— Outdoor Fan Contactor
CV	— Constant Volume	RAT	— Return-Air Temperature
DI	— Direct Input	SAT	— Supply-Air Temperature
DO	— Direct Output	SPT	— Space Temperature
HV	— High Voltage	STO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

NOTE All even numbered terminals are negative (–) polarity and all odd numbered terminals are positive (+) polarity

SPACE TEMPERATURE AVERAGING WIRING

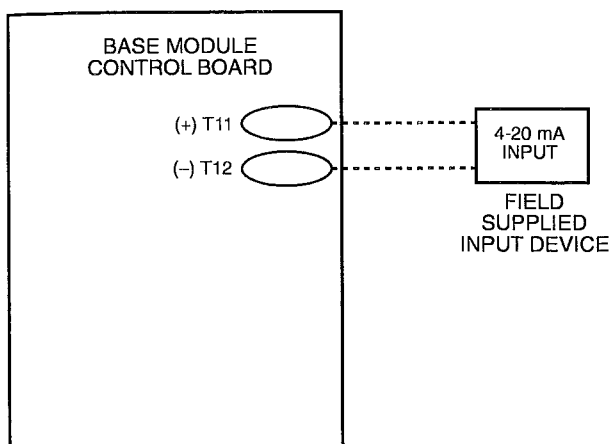


SPACE TEMPERATURE AVERAGING — 4 SENSOR APPLICATION



SPACE TEMPERATURE AVERAGING — 9 SENSOR APPLICATION

SUPPLY TEMPERATURE RESET WIRING



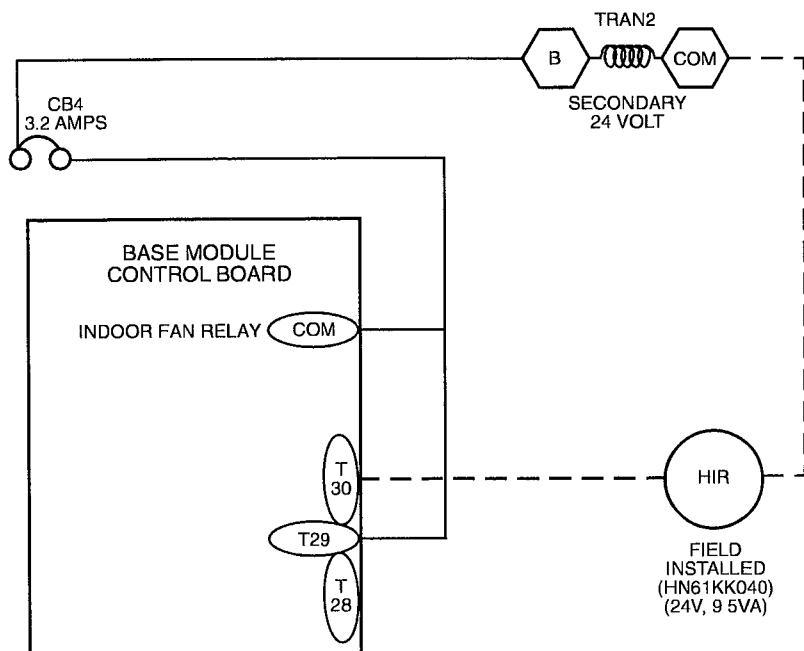
mA INPUT	DEG. F RESET
4	0.00
5	1.25
6	2.50
7	3.75
8	5.00
9	6.25
10	7.50
11	8.75
12	10.00
13	11.25
14	12.50
15	13.75
16	15.00
17	16.25
18	17.50
19	18.75
20	20.00

LEGEND

T — Terminal

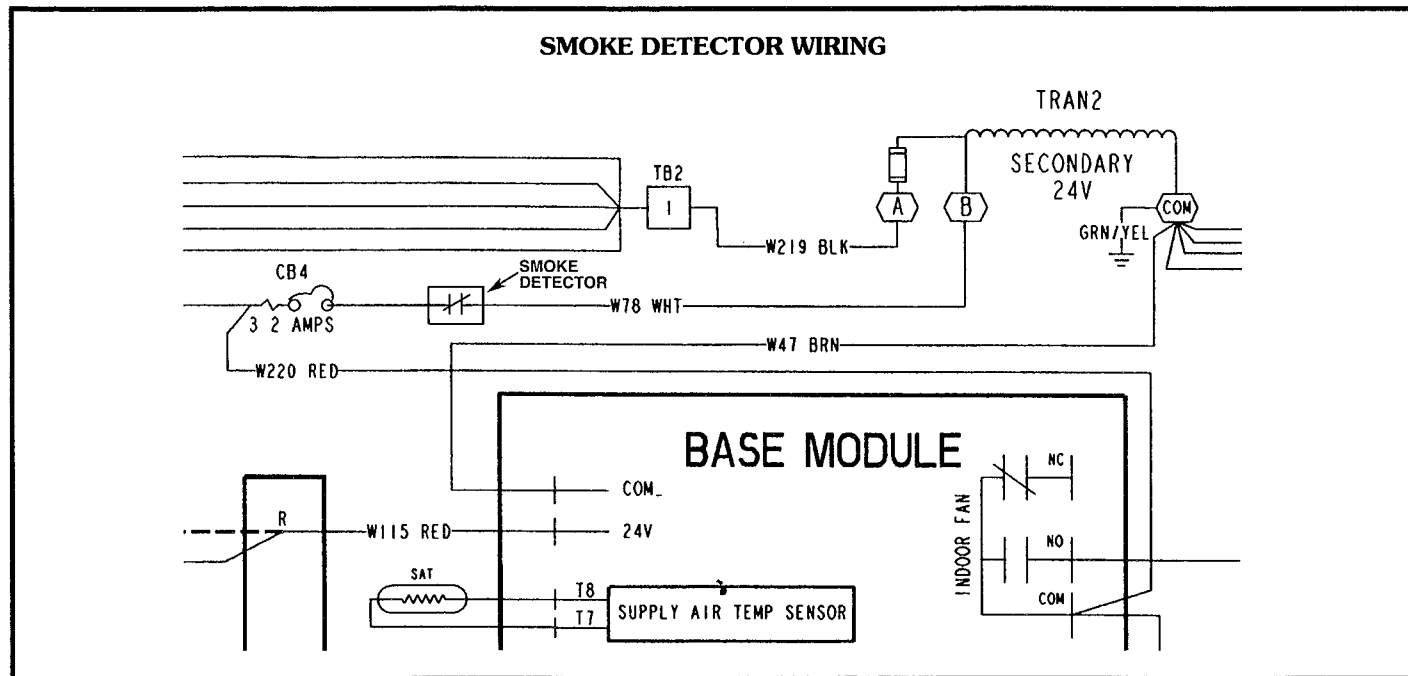
NOTE: The 4 to 20 mA input is a field-supplied non-Carrier EMS (Energy Management System) device.

HEAT INTERLOCK RELAY WIRING



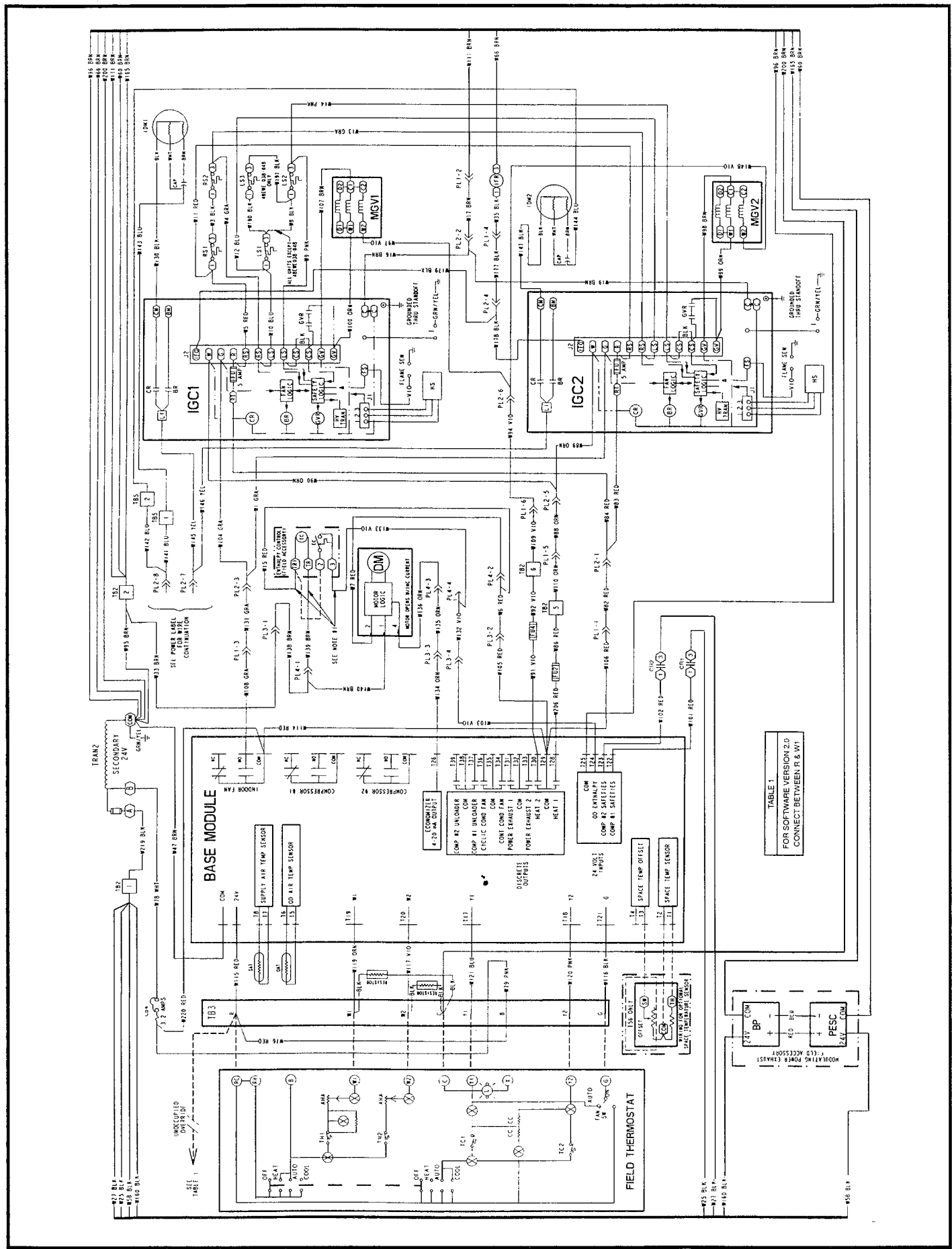
LEGEND

CB — Circuit Breaker
 COM — Common
 HIR — Heat Interlock Relay
 T — Terminal
 TRN — Transformer





Typical wiring schematic (48EJ,EW units)



LEGEND AND NOTES FOR TYPICAL WIRING SCHEMATIC

LEGEND

AHA — Adjustable Heat Anticipator	LS — Limit Switch	VFD — Variable Frequency Drive
BP — Building Pressure	NC — Normally Closed	 Terminal (Marked)
CB — Circuit Breaker	NO — Normally Open	 Terminal (Unmarked)
CC — Cooling Compensator	OAT — Outdoor-Air Thermistor	 Terminal Block
COM — Communication	OD — Outdoor	 Splice
CR — Control Relay	PESC — Power Exhaust Sequencer Controller	 Factory Wiring
DM — Damper Motor	PL — Plug Assembly	 Field Wiring
DP — Duct Pressure	RAT — Return-Air Thermistor	 Not to Indicate Common Potential Only
EC — Enthalpy Control	SAT — Supply-Air Thermistor	 Not to Represent Wiring
FU — Fuse	TB — Terminal Block	
HC — Heater Contactor	TC — Thermostat Cooling	
HR — Heater Relay	TH — Thermostat Heating	
IFR — Indoor-Fan Relay	TRAN — Transformer	

NOTE Red wire and violet wire are spliced together at the factory. The brown wire has a wire nut added at the factory.

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 (CV only) — 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 blow-thru on 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 for constant volume units and 70 cfm/ton for VAV (variable air volume) units. Performance at 70 cfm/ton is limited to unloaded operation and may be additionally limited by entering-air temperatures. Refer to Heating Capacities and Efficiencies table on page 10 for minimum airflow cfm for heating.

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. 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. Some models will operate up to 125 F depending on model and operating conditions.

High altitude — A change to the gas orifice may be required at high altitudes. Refer to Altitude Compensation table on page 12.

Minimum temperature — Minimum allowable temperature of mixed air entering the heat exchanger during half-rate (first stage) operation is 50 F. There is no minimum mixture temperature during full-rate operation. Comfort conditioning may be compromised at temperatures below 50 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.

Existing roof curbs (48/50DD,DF,DL024-054 units) — The 48/50E 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.

Guide specifications — 48/50EJ,EW constant volume units



Packaged Rooftop Cooling Unit and Packaged Rooftop Cooling Unit With Gas Heat — Constant Volume Application

HVAC Guide Specifications — Section 48/50EJ,EW

Size Range: **20 to 45 Tons, Nominal**

Carrier Model Number: **48EJ, 48EW, 50EJ, 50EW**

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 duty and gas or electric heat for 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 360 and designed in accordance with UL Standard 1995.
- B. Unit shall be designed to conform to ANSI/ASHRAE 15 (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.
- F. Unit shall be manufactured in a facility registered to the ISO 9002 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, micro-processor 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. Base pans in the heating and return air sections shall be 16-gage galvanized steel.
 - e. Base pans in the condenser 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 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 Evaporator 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. Evaporator 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. Condenser 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. Evaporator Coil:

- a. Intertwined circuited, constructed of lanced aluminum fins mechanically bonded to seamless, internally enhanced copper tubes.
- b. Full face active type during full load and part load conditions.
- c. Coils shall be leak tested at 150 psig and pressure tested at 450 psig.

2. Condenser Coil:

- a. Constructed of aluminum fins mechanically bonded to seamless, internally grooved, copper tubes.
- b. Air-cooled condenser 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:

Electric Heat:

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

Gas Heat:

1. Induced-draft combustion type with energy saving direct spark ignition systems and redundant main gas valves.
2. The heat exchanger shall be of the tubular section type constructed of a minimum of 20-gage steel coated with a nominal 1.2 mil aluminum-silicone alloy for corrosion resistance.
3. Burners shall be of the in-shot type constructed of aluminum coated steel.
4. All gas piping shall enter the unit cabinet at a single location.
5. Induced Draft Fans:
 - a. Direct-driven, single inlet, forward-curved centrifugal type.
 - b. Statically and dynamically balanced.
 - c. Made from steel with a corrosion-resistant finish and dynamically balanced.

6. High-corrosion areas such as flue gas collection and exhaust areas shall be lined with corrosion-resistant material.

G. Refrigerant Components:

Unit shall be equipped with dual refrigerant circuits each containing:

1. Liquid line service valve.
2. Solid core filter drier.
3. Thermostatic expansion valve.
4. Fusible plug.

H. Filter Section:

Filter section shall consist of 2-in. thick, disposable fiberglass filters of 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 remote start/stop switch and a room sensor, room thermostat, or on a TEMP system or CCN (Carrier Comfort Network) 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) Evaporator leaving-air temperature.
 - 2) Economizer position.
 - 3) Minimum economizer set point.
 - 4) Morning warm-up set point.
 - 5) 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.
- i. Control boards shall be equipped with flashing LED(s) for diagnostics.
- j. With gas heat, upon flame failure a new ignition sequence must start (rather than locking out heat).
- k. Minimum heat on-time of 1 minute.

Guide specifications — 48/50EJ,EW constant volume units (cont)



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 re-starting for a minimum of 5 minutes after shutdown. Compressor shall run a minimum of 10 seconds after starting.
- 7) Freeze protection thermostat (FPT) shall shut down unit operation based on coil temperature.

b. Heating Section:

Gas Heat:

- 1) High-temperature limit switch.
- 2) Redundant dual-stage gas valve.
- 3) Flame rollout switches.
- 4) Flame proving controls.
- 5) Speed sensor on each induced draft fan motor.

Electric Heat:

- 1) Automatic reset high-temperature limit switches.
- 2) Heat limiters (fusible links).
- 3) Overcurrent protection short-circuit fuses.
- 4) Branch circuit protection.

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 360.
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.

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. Condenser-fan motors shall be totally enclosed, 3-phase type with permanently lubricated ball bearings and internal, automatic-reset thermal overload protection.

3. Indoor blower motor shall be of the 3-phase ball bearing type.

4. Induced-draft motor shall be of the permanently lubricated sealed bearing type with inherent automatic reset thermal overload protection.

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.
5. Motor shall be controlled by 4 to 20 mA input.
6. Minimum position set point shall be adjustable by the control module DIP (dual in-line package) switches in 10% increments.

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 (light-emitting diodes) 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 (computer access required).

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 Condenser Coil Materials:

- a. Unit shall be factory equipped with a condenser coil made from copper tubes and copper fins.
- b. Unit shall be factory equipped with a condenser coil made from corrosion resistant pre-coated 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.
- c. Motors shall be 1 hp, 3-speed, single-phase design.

*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.
- d. Each damper (4 total) shall consist of six, 26-gage, aluminum blades with a total area of 1.085 ft² each and a maximum velocity of 2600 ft/min.

6. Modulating Head Pressure Control:

Package shall consist of an accessory outdoor-air package and a solid-state control with condenser coil temperature sensor capable of modulating outdoor fan speed to maintain condensing temperature between 90 F and 100 F at outdoor ambient temperature down to -20 F.

7. Condenser Coil Hail Guard:

Hood with welded wire grille complete with support retainers and fasteners shall be provided for protection of condensing coil(s).

8. LP Gas Conversion Package:

ETL and ETL, Canada, approved package allows unit to be field converted for use with LP (liquid propane) gas.

9. Electric Heat Package:

Shall be fully-assembled for installation. The 208/230-v, 460-v, and 575-v units are designed in accordance with UL standards and all units feature a single point connection.

*10. Space Temperature Sensor (T-55):

This space temperature sensor shall determine the actual temperature in the conditioned space. Sensor shall be equipped with an override button for timed override. Override shall be configurable at 1 to 4 hours with a default of 1 hour.

*11. 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 $\pm 5^{\circ}$ F.

*12. Enthalpy Control:

Shall provide efficient economizer control based on outdoor air enthalpy. Shall include logic and one sensor to calculate both dry and wet bulb of the outdoor air.

*13. Enthalpy Sensor:

- a. For use with economizer only and enthalpy control.
- b. Capable of measuring temperature of return air to provide economizer control with a comparison of outdoor temperature and humidity and return-air temperature and humidity.

*14. Thermostat and Subbase Assembly:

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

15. Indoor Air Quality (CO₂) Sensor (Accessory Electronic Expansion Board Required):

- a. Shall have the ability to provide demand ventilation indoor-air quality (IAQ) control through 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 CO₂ in parts per million. The set point shall have adjustment capability.
- c. The IAQ sensor must be powered by a separate field-supplied 24-v transformer.

Guide specifications — 48/50EJ,EW constant volume units (cont)



- d. The IAQ sensor shall provide a 4 to 20 mA signal to the expansion board.
NOTE: A jumper is provided on the sensor to change the IAQ output to 4 to 20 mA from the factory setting of 0 to 10 VDC.
- 16. 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.
 - f. Pre-occupancy purge shall be available.
 - g. Power to expansion board shall be provided by a separate 24-v power source.
 - h. All even numbered terminals shall have negative (-) potential. All odd numbered terminals shall have positive (+) potential.
- 17. Pressure Operated Unloader:
Additional steps for unloading can be obtained by the addition of accessory pressure-actuated suction cutoff unloaders to the lead compressor.
- 18. Roof Curb Retrofit Kit:
Shall provide duct support hardware to retrofit unit to an existing 48/50DD,DF,DL roof curb.
NOTE: Duct transition from new unit duct configuration to existing ductwork design will be required below the existing roof curb.
- 19. Field-Installed Interface Device (LID-2B):
Shall be field-mounted to provide a remote 40-character per line, 16-line display panel. Device is not qualified for outdoor installation. The interface device is for use with temporary installation during service of unit. Requires a field-supplied 24-v power supply.

Guide specifications — 48/50EK,EY variable air volume units



Packaged Rooftop Cooling Unit and Packaged Rooftop Cooling Unit With Gas Heat — Variable Air Volume Application

HVAC Guide Specifications — Section 48/50EK,EY

Size Range: **20 to 45 Tons, Nominal**

Carrier Model Number: **48EK, 48EY, 50EK, 50EY**

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 duty and gas combustion or electric heaters for heating duty. Units shall discharge supply air horizontally or vertically as shown on contract drawings.

1.02 QUALITY ASSURANCE

- A. Unit shall be rated in accordance with ARI Standard 360 and designed in accordance with UL Standard 1995.
- B. Unit shall be designed to conform to ANSI/ASHRAE 15 (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 9002 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, micro-processor 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. Base pans in the heating and return air sections shall be 16-gage galvanized steel.
 - e. Base pans in the condenser 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.
 - 4. Interior cabinet surfaces shall be sheet metal lined or insulated with 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 Evaporator 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. Evaporator 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.
- f. Statically and dynamically balanced.
- g. Evaporator fan shaft bearings shall have a life of 200,000 hours at design operating conditions in accordance with ANSI B3.15.

Guide specifications — 48/50EK,EY variable air volume units (cont)



2. Condenser 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.

3. Supply Fan Drive:

Unit shall be equipped with Variable Frequency Drive (VFD, inverter). The VFD shall be provided with a metal enclosure and shall be factory-mounted, -wired and -tested. The VFD shall control motor speed to maintain set point static pressure at the sensor tube location of the supply duct pressure transducer (transducer is factory-provided and -installed; sensor tube must be field-routed). The VFD may be field-adjusted to maintain supply duct static pressure set points from 0-in. wg to 3.5-in. wg.

The variable speed drive shall include the following features:

- a. Full digital control.
- b. Insulated Gate Bi-Polar Transistors (IGBT) used to produce the output pulse width modulated (PWM) waveform, allowing for quiet motor operation.
- c. Inverters capable of operation at a frequency of 8 kHz, so no acoustic noise shall be produced by the motor.
- d. NEMA 1 metal enclosure for reduction of RFI (radio frequency interference).
- e. Self diagnostics.
- f. Personal lockout code for additional security.
- g. Critical frequency avoidance.
- h. PID set point control.
- i. RS232C/RS485 capability (accessory card source required).
- j. Electronic thermal overload protection.

D. Compressors:

1. Reciprocating, semi-hermetic type only and shall be located for easy servicing.
2. Equipped with suction-cutoff type unloader(s).
3. Mounted on spring vibration isolators with an isolation efficiency of no less than 95%.
4. 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.
5. Maximum operating speed of 1800 rpm (30 rps).
6. Each on independent refrigerant and electrical circuits.

E. Coils:

1. Evaporator Coil:

- a. Intertwined circuited, constructed of lanced aluminum fins mechanically bonded to seamless, internally enhanced copper tubes.
- b. Full-face active type during full load and part load conditions.
- c. Coils shall be leak tested at 150 psig and pressure tested at 450 psig.

2. Condenser Coil:

- a. Constructed of aluminum fins mechanically bonded to seamless, internally grooved copper tubes.
- b. Air-cooled condenser 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:

Electric Heat:

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

Gas Heat:

1. Induced-draft combustion type with energy saving direct spark ignition systems and redundant main gas valves.
2. The heat exchanger shall be of the tubular section type constructed of a minimum of 20-gage steel coated with a nominal 1.2 mil aluminum-silicone alloy for corrosion resistance.
3. Burners shall be of the in-shot type constructed of aluminum coated steel.
4. All gas piping shall enter the unit cabinet at a single location.
5. Induced Draft Fans:
 - a. Direct-driven, single inlet, forward-curved centrifugal type.
 - b. Statically and dynamically balanced.
 - c. Made from steel with a corrosion-resistant finish and dynamically balanced.
6. High corrosion areas such as flue gas collection and exhaust areas shall be lined with corrosion-resistant material.

G. Refrigerant Components:

Unit shall be equipped with dual refrigerant circuits each containing:

1. Liquid line service valve.
2. Solid core filter drier.
3. Thermostatic expansion valve.
4. Fusible plug.

H. Filter Section:

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

I. Controls, Safeties and Diagnostics:

1 Controls:

- a. Control shall be accomplished through the use of a factory-installed, microprocessor based control system and associated electronic and electrical hardware. Control system shall determine control sequences through monitoring the following operational variables:
 - 1) Evaporator leaving-air temperature.
 - 2) Evaporator entering-air temperature.
 - 3) Economizer position.
 - 4) Minimum economizer set point.
 - 5) Morning warm-up set point.
 - 6) Outdoor-air temperature.

NOTE: A field-supplied remote start/stop switch contact closure is required for stand-alone applications to run unit during occupied time period.

- b. Controls shall be capable of performing the following functions:
 - 1) Capacity control based on discharge air temperature and compensated by rate of change of return-air temperature. Capacity control shall be accomplished through the use of an unloading device and compressor staging.
 - 2) Perform a quick test to check the status of all input and output signals to the control system.
 - 3) Control of integrated economizer operation.
 - 4) Capable of single-step demand limit control.
 - 5) Condenser fan cycling to maintain correct head pressure.
 - 6) Morning warm-up.
 - 7) Remote monitoring and set point adjustments.
 - 8) In the event of a power failure, unit control system shall sequence the unit to restart beginning with the first stage of cooling or heating.
 - 9) Nighttime free cooling.
 - 10) Control boards shall be equipped with flashing LED(s) (light-emitting diodes) for diagnostics.
 - 11) With gas heat, upon flame failure a new ignition sequence must start (rather than locking out heat)
 - 12) Minimum heat on-time of 1 minute.

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 re-starting for a minimum of 5 minutes after shutdown. Compressor must run for at least 10 seconds after start-up.
- 7) Freeze protection thermostat (FPT) shall shut down unit operation based on coil temperature.

b. Heating Section:

Gas Heat:

- 1) High-temperature limit switch.
- 2) Redundant dual-stage gas valve.
- 3) Flame rollout switches.
- 4) Flame proving controls.
- 5) Speed sensor on each induced draft fan motor.

Electric Heat:

- 1) Automatic reset high-temperature limit switches.
- 2) Overcurrent protection short-circuit fuses.
- 3) Branch circuit protection.

3. Diagnostics:

- a. Diagnostic display via the Carrier Comfort Network (CCN) shall be capable of indicating a safety lockout condition.
- b. Diagnostics must also be capable of displaying outputs of microprocessor controlled run test to verify operation of every thermistor, potentiometer, fan and compressor before unit is started.

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 360.
2. Unit shall be capable of mechanical cooling operation down to 35 F ambient outdoor temperature.
3. Provides multi-stage mechanical cooling capability and single-stage morning warm-up heating.
4. Unit provided with fan time delay to prevent cold starts.

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. Condenser-fan motors shall be totally enclosed, 3-phase type with permanently lubricated ball bearings and internal, automatic-reset thermal overload protection.
3. Indoor blower motor shall be of the 3-phase ball bearing type.
4. Induced-draft motor shall be of the permanently lubricated sealed bearing type with inherent automatic reset thermal overload protection.

Guide specifications — 48/50EK,EY variable air volume units (cont)



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.
5. Motor shall be controlled by 4 to 20 mA input.
6. Minimum position set point shall be adjustable by the control module DIP (dual in-line package) switches in 10% increments.

N. 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 Condenser Coil Materials:

- a. Unit shall be factory equipped with a condenser coil made from copper tubes and copper fins.
- b. Unit shall be factory equipped with a condenser coil made from corrosion resistant pre-coated aluminum fins.

*2. Roof Curb:

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

*3. 100% Modulating Power Exhaust:

Package shall include 4 double-width, double inlet direct drives, forward-curved power exhaust fans staged independently to maintain a field adjustable interior space pressure set point.

- a. Fans shall be statically and dynamically balanced.
- b. Exhaust hood and eliminators shall prevent objects from entering unit through the relief dampers.

4. 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.

- d. Each damper (4 total) shall consist of six 26-gage aluminum blades with a total area of 1.085 ft² each and a maximum velocity of 2600 ft./min.

5. Modulating Head Pressure Control:

Package shall consist of an accessory outdoor-air package and a solid-state control with condenser coil temperature sensor capable of modulating outdoor fan speed to maintain condensing temperature between 90 F and 100 F at outdoor ambient temperature down to -20 F.

6. Condenser Coil Hail Guard:

Hood with welded wire grille complete with support retainers and fasteners shall be provided for protection of condensing coil.

7. LP Gas Conversion Package:

ETL and ETL, Canada approved package allows unit to be field converted for use with LP (liquid propane) gas.

8. Electric Heat Package:

Shall be fully-assembled for installation. The 208/230-v, 460-v, and 575-v units are designed in accordance with UL standards and all units feature a single point connection.

*9. Space Temperature Sensor (T-55):

This space temperature sensor shall determine the actual temperature in the conditioned space. Sensor shall be equipped with an override button for timed override. Override shall be configurable at 1 to 4 hours with a default of 1 hour.

*10. Enthalpy Control:

Shall provide efficient economizer control based on outdoor air enthalpy. Shall include logic and one sensor to calculate both dry and wet bulb of the outdoor air.

*11. Enthalpy Sensor:

- a. For use with economizer only and enthalpy control.
- b. Capable of measuring temperature of return air to provide economizer control with a comparison of outdoor temperature and humidity and return-air temperature and humidity.

*12. Thermostat and Subbase Assembly:

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

13. Indoor Air Quality (CO₂) Sensor (Electronic Expansion Board Required):

- a. Shall have the ability to provide demand ventilation indoor air quality (IAQ) control through 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 CO₂ in parts per million. The set point shall have adjustment capability.
- c. The IAQ sensor must be powered by a separate field-supplied 24-v transformer.
- d. The IAQ sensor shall provide a 4 to 20 mA signal to the expansion board.

NOTE: A jumper is provided on the sensor to change the IAQ output to 4 to 20 mA from the factory setting of 0 to 10 VDC.

14. 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.
- f. Pre-occupancy purge shall be available.
- g. Power to expansion board shall be provided by a separate 24-v power source.
- h. All even numbered terminals shall have negative (-) potential. All odd numbered terminals shall have positive (+) potential.

15. Roof Curb Retrofit Kit:

Shall provide duct support hardware to retrofit unit to an existing 48/50DD,DF,DL roof curb.

NOTE: Duct transition from new unit duct configuration to existing ductwork design will be required below the existing roof curb.

16. Field-Installed Interface Device (LID-2B):

Shall be field-mounted to provide a remote 40-character per line, 16-line display panel. Device is not qualified for outdoor installation. The interface device is for use with temporary installation during service of unit. Requires a field-supplied 24-v power supply.

