

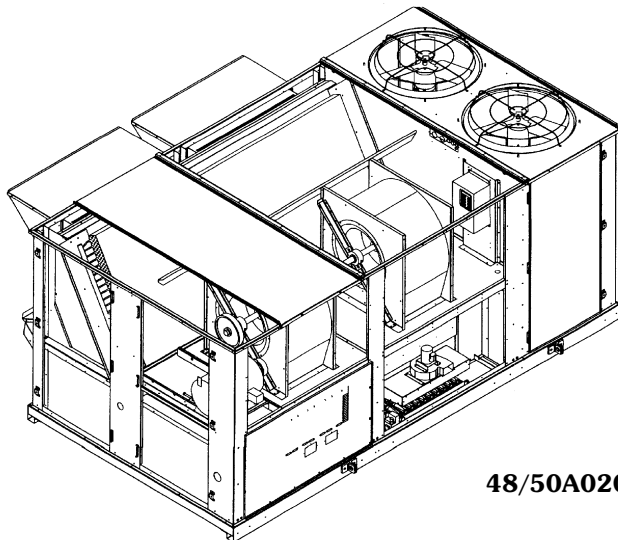


# Product Data

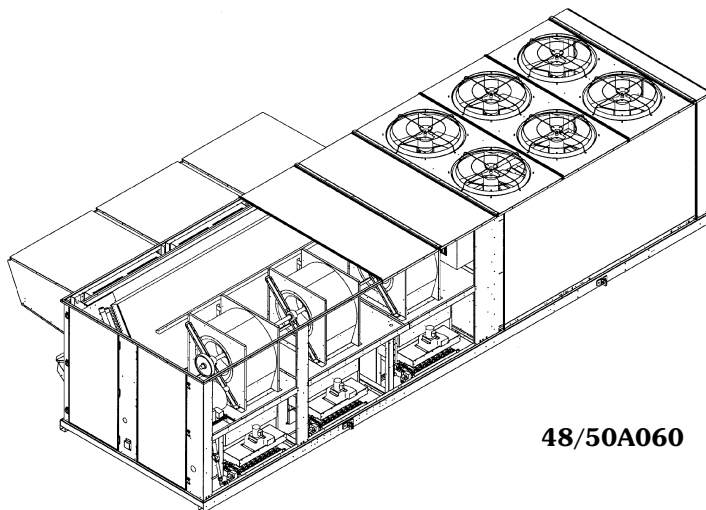
## 48/50AJ,AK,AW,AY Single-Package Rooftop Units with Scroll Compressors *ComfortLink™* Controls Gas Heating/Electric Cooling and Electric Cooling Units With Optional Electric Heat

20 to 60 Nominal Tons

# *ComfortLink™*



48/50A020-030



48/50A060



Single-Package Rooftop Units with the following features and benefits:

- *ComfortLink* control's easy to use plain language display
- EERs meet ASHRAE Standard 90.1-2001
- Meets ASHRAE Standard 62
- Constant and variable volume communicating controls
- Accurately match building loads with up to 6 steps of capacity on VAV units
- VFD (variable frequency drives) on all VAV (variable air volume) units
- Mechanical cooling operation at outdoor ambient temperatures as low as 32 F (-20 F with optional Motormaster® V fan speed control)
- Single power entry to unit
- Commercial duty, totally enclosed, 3-phase condenser motors with permanently lubricated bearings
- Alumagard™ heat exchanger coating
- Stainless steel heat exchanger option
- Staged gas heat option (constant volume units)
- Induced-draft fan for gas combustion system
- Pre-painted, galvanized steel cabinet
- Commercial strength base rails (full perimeter)
- 3 to 4 Hermetic Scroll Compressors with crankcase heaters
- Dual independent refrigerant circuits with intertwined evaporator coils and TXV's
- Hinged access panels
- Short cycle protection
- Service diagnostics
- Integrated economizer utilizing direct-drive actuators and opposed blade dampers
- IAQ (Indoor Air Quality) options
- Dedicated vertical and horizontal discharge configurations

# Features/Benefits



## Design flexibility

Dedicated vertical supply/return units (AJ,AK) 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.

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

Dedicated horizontal units (AW,AY) 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.

## ComfortLink™ control

The ComfortLink control is your link to a world of simple and easy to use rooftop units that offer outstanding performance and value. When used with a space temperature sensor, the ComfortLink control's intelligence maintains control over the economizer and condenser fans and optimizes the performance of the multiple refrigeration circuits as conditions change resulting in the following features:

- higher part load efficiency
- better control of temperature and humidity
- superior reliability
- automatic redundancy
- high ambient cooling operation at 115 F
- Low ambient cooling operation at 32 F as standard (optional Motormaster® V inverter fan speed control for operation down to -20 F)

The ComfortLink scrolling marquee display is very easy to use. Messages are displayed in easy to understand English, no decoding is required. A scrolling readout provides detailed explanations of control information. Only four, large, easy-to-use buttons are required to maneuver through the entire menu. The readout is designed to be visible even in the brightest sunlight. A hand-held Navigator accessory can be used for added service flexibility.

The ComfortLink control provides unparalleled service diagnostic information. Temperature and pressure can

be read from the display with no need for separate gages. Other data, such as compressor cycles, unit run time hours, current alarms, can also be accessed. A history of alarms is also available for viewing.

Service run test can be very helpful when troubleshooting. The user can run test major components to determine the root cause of a problem. The unit can be run-tested before an installation is complete to ensure satisfactory start-up.

To ensure reliability, the ComfortLink control prevents reverse compressor rotation.

No laptop computers are required for start-up. Time schedules are built in and the scrolling marquee display provides easy access to set points.

The ComfortLink control accepts input from a CO<sub>2</sub> sensor and a smoke detector. Both are available as factory-installed options or as field-installed accessories.

ComfortLink controls are fully communicating and are cable-ready for connection to the Carrier Comfort Network (CCN). The control communicates at 38.4 kilobaud. This provides high-speed communications for remote monitoring via the internet. Multiple rooftop units can be daisy-chained together using a 3-wire communication bus at the rooftop level. ComfortLink/CCN system is a peer-to-peer system, rather than a polling system. This results in lower cost installations.

The units have a terminal strip on board, allowing them to operate with a standard thermostat. Expensive interface devices are not required.

## Quality and reliability

Excellent full and part load efficiencies are achieved by using multiple scroll compressors and intertwined dual refrigerant circuits. The compressors are equipped with crankcase heaters and protected by electronic sensors and logic to control minimum on and off times and reverse rotation. The refrigerant circuits are both electrically and mechanically independent, to provide standby capability should one circuit require service.

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 duct static pressure for optimum supply fan energy savings.

VAV units have up to 6 stages of capacity control to match the load requirements of the conditioned space. Other VAV features include:

- provide cooling and heating (if equipped with heat) control in both occupied and unoccupied mode
- supports optional space temperature sensor
- control of modulating economizer to provide free cooling when outdoor conditions are suitable

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- support of IAQ sensor
- support linkage to ComfortID™ VAV systems

Constant volume units come equipped with 2 stages of capacity. Optional configuration is available to increase this up to 6 stages of operation. Unit operation will closely match the load and maintain comfort in the most energy-efficient manner.

### Factory-installed economizer

An optional integrated economizer 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 (2-stage CV)
- 100% modulating power exhaust (CV or 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.

### Gas heating units

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

All ignition components are contained in the compact IGC which is easily accessible for servicing. The IGC control board, designed and manufactured exclusively for Carrier rooftop units, provides built-in diagnostic capability. An LED (light-emitting diode) simplifies troubleshooting by providing visual fault notification and system status confirmation.

The IGC also contains an anti-cycle 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.

The IGC also contains burner control logic for accurate and dependable gas ignition. This LED fault-notification system reduces service

person troubleshooting time and minimizes service costs. The IGC can also maximize heating efficiency by controlling evaporator fan on and off delays.

#### Efficient, dependable operation —

Tubular, dimpled gas heat exchangers optimize heat transfer for improved efficiency. The tubular design permits hot gases to make multiple passes across the path of the supply air. The dimpled design creates a turbulent gas flow to maximize heating efficiency. The extra thick Alumagard™ heat exchanger coating provides corrosion resistance and ensures long life. An optional stainless steel heat exchanger is also available.

The unsightly appearance of flue stacks is eliminated and the effects of wind on heating operations are diminished by the induced draft combustion system. The inducer fan draws hot combustion gas through the heat exchanger at the optimum rate for the most effective heat transfer. Induced draft heating systems are safer than positive pressure, forced draft heating systems. With the induced draft heating system, the heat exchanger operates under negative pressure, preventing flue gas leakage into the indoor supply air.

During the Heating mode, the evaporator-fan relay automatically starts the evaporator fan after the heat exchanger warms up to a suitable temperature. The 30-second fan delay prevents cold air from entering the supply duct system when the conditioned space is calling for heat to maximize efficiency.

The direct-spark ignition system saves operating expense when compared to pilot ignition systems. No crossover tube is required, therefore no sooting or pilot fouling problems can occur.

All 48A standard units are designed for natural gas, but an accessory LP (liquid propane) conversion kit is available, if required.

**Safety is built in —** All 48A units have a flame rectification sensor to quickly sense the burner flame and ignite burners almost immediately. Fast shutdown is a certainty since the sensor reacts quickly to any flame outage or system failure. In the event of a shutdown, an error code is issued at the IGC board.

Safety is also assured due to the heating safety controls which will shut down the unit if there is a problem. If excessive temperatures develop, limit switches shut off the gas valve. After 4 continuous short cycles of the

high-temperature limit switch, the IGC board locks out the gas heat cycle to prevent any further short cycles. This safety feature is provided exclusively on Carrier rooftop units. The rollout switch also deenergizes the gas valve in the event of a flame rollout.

Support of fire and smoke control included with optional *ComfortLink* control expansion board.

### Staged gas unit heating

The Staged Gas Control option offered on 48AJ,AW020-060 units adds the capability to control the rooftop unit's gas heating system to a specified supply air temperature set point for purposes of tempering a cool mixed-air condition. The gas heating system employs multiple heating sections. Each section is equipped with a two-stage gas valve. The gas valves are sequenced by a factory-installed staged gas controller (SGC) as required to maintain the user-specified supply air set point. Up to eleven stages of heating control are available, based on quantity and heating capacity sizes of the individual heat exchanger sections provided in the base unit. In addition to providing system control for tempering heat operation, the new SGC also controls Demand Heat sequences for both First-Stage (W1) and Second-Stage (SW or full-fire) operation.

Tempering of supply air is desirable when rooftop units are operating in ventilation mode (economizer only operation) at low outdoor temperatures. At low outdoor temperatures, the mixed-air temperature (combination of return-from-space temperature and outdoor/ventilation air temperature) may become too low for the comfort of the occupants or for the terminal reheat systems. The tempering function adds incremental steps of heat capacity to raise the temperature of the mixed air up to levels suitable for direct admission into the occupied space or to levels consistent with reheat capabilities of the space terminals.

### 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.

All units are equipped with the *ComfortLink* Control System as standard. The *ComfortLink* Control system has a fully alpha-numeric display and keypad. The display has

# Features/Benefits (cont)



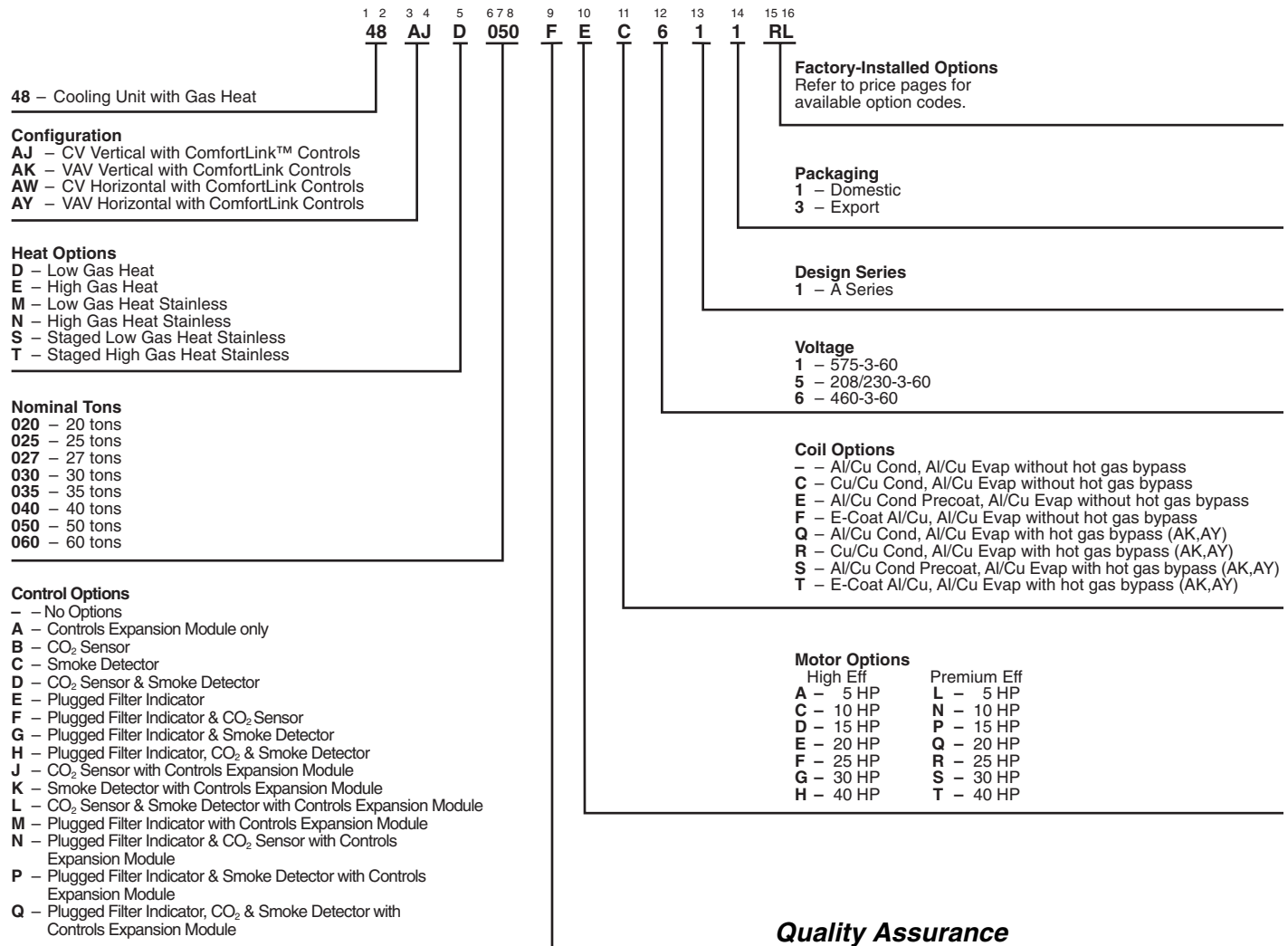
expandable text messages that eliminate the need to lookup coded display information. Unit also supports the use of the enhanced multiple line display that can be connected through a phone jack connection at either end of the unit. The standard microprocessor controls replace the need for field-installed 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. The unit can be run-tested before an installation is complete to ensure satisfactory start-up.

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.

## Model number nomenclature



### LEGEND

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

### NOTES:

1. VAV models (AK/AY) are equipped with variable frequency drives (VFD).
2. Premium-efficiency motors are not available in 575-3-60.
3. All indoor-fan motors meet the minimum efficiency requirements as established by Energy Policy Act (EPACT).

### Quality Assurance

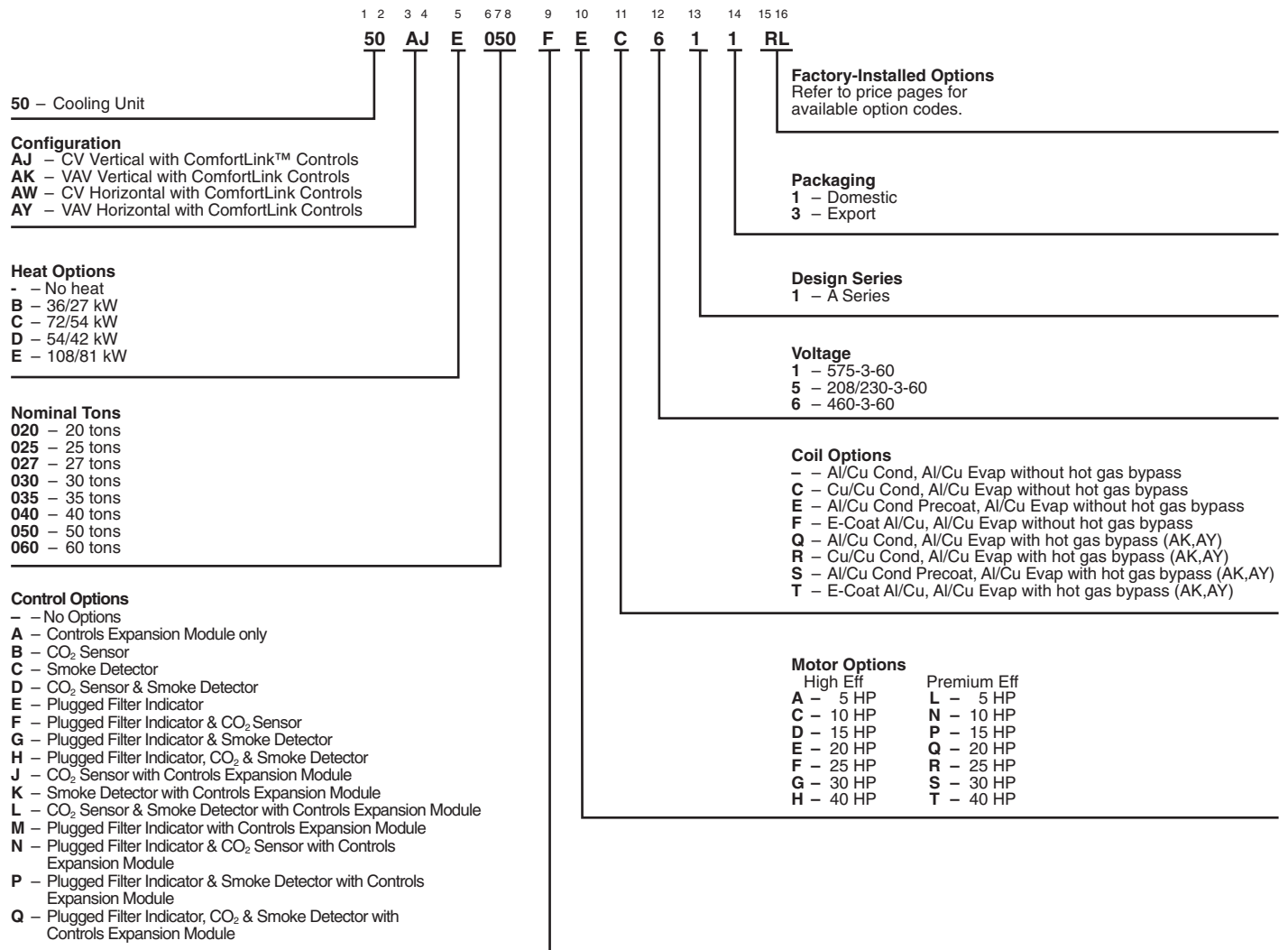


**Approvals:**  
 ISO 9001  
 EN 9000:2000

Certificate No FM 21837



# Model number nomenclature (cont)



## LEGEND

- Al** — Aluminum
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## NOTES:

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## Quality Assurance



Certificate No FM 21837

### Approvals:

ISO 9001  
 EN 9000:2000



# Physical data (gas heating units)



UNIT 48AJ,AK,AW,AY	020			025			027			030		
NOMINAL CAPACITY (tons)	20			25			27			30		
BASE UNIT OPERATING WEIGHT (lb)	See Operating Weights Table											
COMPRESSOR Quantity ... Type (Ckt 1, Ckt 2) Number of Refrigerant Circuits Oil (oz) (Ckt 1, Ckt 2)	2...SR*782AT/1...SR*782AE 2 Precharged			1...SR*812AT, 1...SR*942AT/1...SR*942AE 2 Precharged			2...SR*942AT/1...SR*942AE 2 Precharged			2...SR*782AT/2...SR*812AT 2 Precharged		
REFRIGERANT TYPE	R-22											
Operating Charge (lb-oz) Circuit 1 Circuit 2	26-8 14-0			32-0 17-0			34-0 19-0			27-8 29-0		
CONDENSER COIL Quantity Rows ... Fins/in. Total Face Area (sq ft)	Cross-Hatched 3/8" Copper Tubes, Aluminum Lanced, Aluminum Pre-Coated, or Copper Plate Fins											
	1 2... 15 33.3			1 3... 15 33.3			1 3... 15 33.3			1 4... 15 33.3		
CONDENSER FAN Nominal Cfm Quantity... Diameter (in.) Motor Hp	Propeller Type											
	17,200 2... 30 1			15,850 2... 30 1			15,850 2... 30 1			14,500 2... 30 1		
EVAPORATOR COIL Tube Size (in.) Rows ... Fins/in. Total Face Area (sq ft)	Cross-Hatched Copper Tubes, Aluminum Plate Fins											
	3/8 3... 15 31.7			3/8 3... 15 31.7			3/8 4... 15 31.7			3/8 4... 15 31.7		
EVAPORATOR FAN Quantity ... Size (in.) Type Drive Nominal Cfm Motor Hp Motor Frame Size Motor Bearing Type Maximum Allowable Rpm Motor Pulley Pitch Diameter Nominal Motor Shaft Diameter (in.) Fan Pulley Pitch Diameter (in.) Nominal Fan Shaft Diameter (in.) Belt Quantity Belt Type Belt Length (in.) Pulley Center Line Distance (in.) Factory Speed Setting (rpm)	Centrifugal Type											
	2... 20 X 15 Belt 8,000 5 10 15 184T 215T 254T			2... 20 X 15 Belt 10,000 5 10 15 184T 215T 254T			2... 20 X 15 Belt 11,000 10 15 20 215T 254T 256T			2... 20 X 15 Belt 12,000 10 15 20 215T 254T 256T		
	1200 4.8 4.4 5.7 1 1/8 1 3/8 1 5/8 12.4 8.6 9.1 1 1 1 2 BX56 BX50 5VX530 56 63 53 16.0-18.7 15.6-18.4 15.0-17.9 717 924 1096			1200 5.2 6.1 5.5 1 1/8 1 3/8 1 5/8 12.4 11.1 8.7 1 1 2 BX56 5VX570 5VX530 56 57 53 15.6-18.4 15.6-18.4 15.0-17.9 773 962 1106			1200 4.4 4.9 5.9 1 3/8 1 5/8 1 5/8 9.4 8.1 8.7 2 2 2 BX50 5VX500 5VX530 50 50 53 15.0-17.9 15.0-17.9 15.0-17.9 848 1059 1187			1200 4.4 5.7 5.9 1 3/8 1 5/8 1 5/8 9.0 9.1 8.7 2 2 2 BX50 5VX530 5VX530 50 53 53 15.6-18.4 15.0-17.9 15.0-17.9 856 1096 1187		
FURNACE SECTION Supply Line Pressure Range Rollout Switch Cutout Temp (F)† Burner Orifice Diameter (in ...drill size) Natural Gas Std Liquid Propane Alt Thermostat Heat Anticipator Setting Stage 1 (amps) Stage 2 (amps) Gas Input (Btuh) Stage 1 (Low Heat/High Heat) Stage 2 (Low Heat/High Heat) Efficiency (Steady State) (%) Temperature Rise Range Manifold Pressure (in. wg) Natural Gas Std Liquid Propane Alt Gas Valve Quantity	5.0-in. wg min/13.5-in. wg max.											
	225 .111 ... 34 .089 ... 43 0.1 0.1 262,500/394,000 350,000/525,000 82 15-45/35-65 3.5 3.5 2			225 .111 ... 34 .089 ... 43 0.1 0.1 262,500/394,000 350,000/525,000 82 15-45/35-65 3.5 3.5 2			225 .111 ... 34 .089 ... 43 0.1 0.1 262,500/394,000 350,000/525,000 82 15-45/35-65 3.5 3.5 2			225 .111 ... 34 .089 ... 43 0.1 0.1 262,500/394,000 350,000/525,000 82 15-45/35-65 3.5 3.5 2		
HIGH-PRESSURE SWITCH (psig) Cutout Reset (Auto.)	426 320			426 320			426 320			426 320		
RETURN-AIR FILTERS Quantity ... Size (in.)	10 ... 20 x 24			10 ... 20 x 24			10 ... 20 x 24			10 ... 20 x 24		
OUTDOOR-AIR FILTERS Quantity...Size (in.)	8...16 x 25 x 2 4...20 x 25 x 2											
POWER EXHAUST Motor, Quantity...Hp Fan, Diameter...Width (in.)	Direct Drive, Single-Phase Motors (Factory-Wired for High Speed Operation), Forward-Curved Fan Wheels with Backdraft Dampers on Each Fan Housing 4...1 11 x 10											

LEGEND

Al — Aluminum  
Cu — Copper

\*Sizes 020-030: Circuit 1 uses the lower portion of condenser coil, Circuit 2 uses the upper portion.  
Sizes 035-060: Circuit 1 uses the left condenser coil, Circuit 2 the right. All units have inter-twined evaporator coils.

†Rollout switch is manual reset.



UNIT 48AJ,AK,AW,AY	035	040	050	060
<b>NOMINAL CAPACITY (tons)</b>	35	40	50	60
<b>BASE UNIT OPERATING WEIGHT (lb)</b>	See Operating Weights Table			
<b>COMPRESSOR</b>	R-22			
Quantity ... Type (Ckt 1, Ckt 2)	1...SR*812AT, 1...SR*942AT/2...SR*942AT	2...SR*942AT/2...SM125	2...SM125/1...SM125, 1...SM175	1..SM160,1..SM175/ 1..SM160,1..SM175
Number of Refrigerant Circuits	2	2	2	2
Oil (oz) (Ckt 1, Ckt 2)	Precharged	Precharged	Precharged	Precharged
<b>REFRIGERANT TYPE</b>	R-22			
Operating Charge (lb-oz)				
Circuit 1	33-0	34-8	56-8	77-0
Circuit 2	38-0	45-8	52-8	75-0
<b>CONDENSER COIL</b>	Cross-Hatched 3/8" Copper Tubes, Aluminum Lanced, Aluminum Pre-Coated, or Copper Plate Fins			
Quantity	1	2	2	2
Rows ... Fins/in.	4 ... 15	2 ... 15 / 4 ... 15	4 ... 15	4 ... 15
Total Face Area (sq ft)	33.3	66.7	66.7	100
<b>CONDENSER FAN</b>	Propeller Type			
Nominal Cfm	14,500	30,000	25,600	38,400
Quantity... Diameter (in.)	2 ... 30	4 ... 30	4 ... 30	6 ... 30
Motor Hp	1	1	1	1
<b>EVAPORATOR COIL</b>	Cross-Hatched Copper Tubes, Aluminum Plate Fins			
Tube Size (in.)	1/2	1/2	1/2	1/2
Rows ... Fins/in.	6 ... 16	4 ... 16	6 ... 16	4 ... 17
Total Face Area (sq ft)	31.3	31.3	31.3	48.1
<b>EVAPORATOR FAN</b>	Centrifugal Type			
Quantity ... Size (in.)	2 ... 20 X 15	2 ... 20 X 15	2 ... 20 X 15	3 ... 20 X 15
Type Drive	Belt	Belt	Belt	Belt
Nominal Cfm	14,000	16,000	18,000	24,000
Motor Hp	15   20   25	15   20   25	20   25   30	25   30   40
Motor Frame Size	254T   256T   284T	254T   256T   284T	256T   284T   286T	284T   286T   324T
Motor Bearing Type	Ball	Ball	Ball	Ball
Maximum Allowable Rpm	1300	1300	1300	1200
Motor Pulley Pitch Diameter	5.1   5.7   6.2	5.3   5.7   7.5	5.7   6.2   6.7	5.3   5.9   6.5
Nominal Motor Shaft Diameter (in.)	1 5/8   1 5/8   1 7/8	1 5/8   1 5/8   1 7/8	1 5/8   1 7/8   1 7/8	1 7/8   1 7/8   2 1/8
Fan Pulley Pitch Diameter (in.)	8.7   8.7   8.7	9.5   9.5   11.1	9.5   9.5   9.5	9.1   9.5   9.5
Nominal Fan Shaft Diameter (in.)	1 15/16	1 15/16	1 15/16	1 15/16
Belt Quantity	2	2	2	3
Belt Type	5VX500	5VX530	5VX550	5VX530
Belt Length (in.)	50	53	55	53
Pulley Center Line Distance (in.)	15.0-17.9	15.0-17.9	14.6-17.6	15.2-17.5
Factory Speed Setting (rpm)	1025	1147	1247	1087
<b>FURNACE SECTION</b>	5.0-in. wg min/13.5-in. wg max.			
Supply Line Pressure Range				
Rollout Switch Cutout Temp (F)†	225	225	225	225
Burner Orifice Diameter (in ...drill size)				
Natural Gas Std	.111 ... 34	.120 ... 31	.120 ... 31	.120 ... 31
Liquid Propane Alt	.089 ... 43	.096 ... 41	.096 ... 41	.096 ... 41
Thermostat Heat Anticipator Setting				
Stage 1 (amps)	0.1	0.1	0.1	0.1
Stage 2 (amps)	0.1	0.1	0.1	0.1
Gas Input (Btuh) Stage 1 (Low Heat/High Heat)	262,500/394,000	300,000/600,000	300,000/600,000	582,000/873,000
Stage 2 (Low Heat/High Heat)	350,000/525,000	400,000/800,000	400,000/800,000	776,000/1,164,000
Efficiency (Steady State) (%)	82	82	82	82
Temperature Rise Range	15-45/35-65	10-40/3 -60	10-40/30-60	10-40/30-60
Manifold Pressure (in. wg)				
Natural Gas Std	3.5	3.5	3.5	3.3
Liquid Propane Alt	3.5	3.5	3.5	3.3
Gas Valve Quantity	2	2	2	3
<b>HIGH-PRESSURE SWITCH (psig)</b>				
Cutout	426	426	426	426
Reset (Auto.)	320	320	320	320
<b>RETURN-AIR FILTERS</b>				
Quantity ... Size (in.)	10 ... 20 x 24	10 ... 20 x 24	10 ... 20 x 24	16 ... 20 x 24
<b>OUTDOOR-AIR FILTERS</b>				
Quantity...Size (in.)	8...16 x 25 x 2 4...20 x 25 x 2			12...16 x 25 x 2 6...20 x 25 x 2
<b>POWER EXHAUST</b>	Direct Drive, Single-Phase Motors (Factory-Wired for High Speed Operation), Forward-Curved Fan Wheels with Backdraft Dampers on Each Fan Housing			
Motor, Quantity...Hp	4...1			
Fan, Diameter...Width (in.)	11 x 10			

LEGEND

Al — Aluminum  
Cu — Copper

\*Sizes 020-030: Circuit 1 uses the lower portion of condenser coil, Circuit 2 uses the upper portion.

Sizes 035-060: Circuit 1 uses the left condenser coil, Circuit 2 the right. All units have inter-twined evaporator coils.

†Rollout switch is manual reset.

# Physical data (electric heating units)



UNIT 50AJ,AK,AW,AY	020	025	027	030
<b>NOMINAL CAPACITY (tons)</b>	20	25	27	30
<b>BASE UNIT OPERATING WEIGHT (lb)</b>	See Operating Weights Table			
<b>COMPRESSOR</b>				
Quantity ... Type (Ckt 1, Ckt 2)	2...SR*782AT/1...SR*782AE	1...SR*812AT, 1...SR*942AT/1...SR*942AE	2 ... SR*942AT/1...SR*942AE	2...SR*782AT/2...SR*812AT
Number of Refrigerant Circuits	2	2	2	2
Oil (oz) (Ckt 1, Ckt 2)	Precharged	Precharged	Precharged	Precharged
<b>REFRIGERANT TYPE</b>	R-22			
Operating Charge (lb-oz)				
Circuit 1	26-8	32-0	34-0	27-8
Circuit 2	14-0	17-0	19-0	29-0
<b>CONDENSER COIL</b>	Cross-Hatched 3/8" Copper Tubes, Aluminum Lanced, Aluminum Pre-Coated, or Copper Plate Fins			
Quantity	1	1	1	1
Rows ... Fins/in.	2 ... 15	3 ... 15	3 ... 15	4 ... 15
Total Face Area (sq ft)	33.3	33.3	33.3	33.3
<b>CONDENSER FAN</b>	Propeller Type			
Nominal Cfm	17,200	15,850	15,850	14,500
Quantity... Diameter (in.)	2 ... 30	2 ... 30	2 ... 30	2 ... 30
Motor Hp	1	1	1	1
<b>EVAPORATOR COIL</b>	Cross-Hatched Copper Tubes, Aluminum Plate Fins			
Tube Size (in.)	3/8	3/8	3/8	3/8
Rows ... Fins/in.	3 ... 15	3 ... 15	4 ... 15	4 ... 15
Total Face Area (sq ft)	31.7	31.7	31.7	31.7
<b>EVAPORATOR FAN</b>	Centrifugal Type			
Quantity ... Size (in.)	2 ... 20 X 15	2 ... 20 X 15	2 ... 20 X 15	2 ... 20 X 15
Type Drive	Belt	Belt	Belt	Belt
Nominal Cfm	8,000	10,000	11,000	12,000
Motor Hp	5	10	15	20
Motor Frame Size	184T	215T	254T	256T
Motor Bearing Type	Ball	Ball	Ball	Ball
Maximum Allowable Rpm	1200	1200	1200	1200
Motor Pulley Pitch Diameter	4.8	4.4	5.7	5.2
Nominal Motor Shaft Diameter (in.)	1 1/8	1 3/8	1 5/8	1 5/8
Fan Pulley Pitch Diameter (in.)	12.4	8.6	9.1	12.4
Nominal Fan Shaft Diameter (in.)	1 15/16	1 15/16	1 15/16	1 15/16
Belt Quantity	1	2	2	2
Belt Type	BX56	BX50	5VX530	BX50
Belt Length (in.)	56	63	53	50
Pulley Center Line Distance (in.)	16.0-18.7	15.6-18.4	15.0-17.9	15.6-18.4
Factory Speed Setting (rpm)	717	924	1096	856
<b>HIGH-PRESSURE SWITCH (psig)</b>				
Cutout	426	426	426	426
Reset (Auto.)	320	320	320	320
<b>RETURN-AIR FILTERS</b>				
Quantity ... Size (in.)	10 ... 20 x 24	10 ... 20 x 24	10 ... 20 x 24	10 ... 20 x 24
<b>OUTDOOR-AIR FILTERS</b>				
Quantity...Size (in.)	8...16 x 25 x 2 4...20 x 25 x 2			
<b>POWER EXHAUST</b>	Direct Drive, Single-Phase Motors (Factory-Wired for High Speed Operation), Forward-Curved Fan Wheels with Backdraft Dampers on Each Fan Housing			
Motor, Quantity...Hp	4...1			
Fan, Diameter...Width (in.)	11 x 10			

## LEGEND

Al — Aluminum  
Cu — Copper

\*Sizes 020-030: Circuit 1 uses the lower portion of condenser coil, Circuit 2 uses the upper portion.  
Sizes 035-060: Circuit 1 uses the left condenser coil, Circuit 2 the right. All units have inter-twined evaporator coils.



UNIT 50AJ,AK,AW,AY	035	040	050	060
<b>NOMINAL CAPACITY (tons)</b>	35	40	50	60
<b>BASE UNIT OPERATING WEIGHT (lb)</b>	See Operating Weights Table			
<b>COMPRESSOR</b>	R-22			
Quantity ... Type (Ckt 1, Ckt 2)	1...SR*812AT, 1...SR*942AT/2...SR*942AT	2...SR*942AT/2...SM125	2...SM125/1...SM125, 1...SM175	1...SM160,1...SM175/ 1...SM160,1...SM175
Number of Refrigerant Circuits Oil (oz) (Ckt 1, Ckt 2)	2 Precharged	2 Precharged	2 Precharged	2 Precharged
<b>REFRIGERANT TYPE</b>	R-22			
Operating Charge (lb-oz)				
Circuit 1	33-0	34-8	56-8	77-0
Circuit 2	38-0	45-8	52-8	75-0
<b>CONDENSER COIL</b>	Cross-Hatched 3/8" Copper Tubes, Aluminum Lanced, Aluminum Pre-Coated, or Copper Plate Fins			
Quantity	1	2	2	2
Rows ... Fins/in.	4 ... 15	2 ... 15 / 4 ... 15	4 ... 15	4 ... 15
Total Face Area (sq ft)	33.3	66.7	66.7	100
<b>CONDENSER FAN</b>	Propeller Type			
Nominal Cfm	14,500	30,000	25,600	38,400
Quantity... Diameter (in.)	2 ... 30	4 ... 30	4 ... 30	6 ... 30
Motor Hp	1	1	1	1
<b>EVAPORATOR COIL</b>	Cross-Hatched Copper Tubes, Aluminum Plate Fins			
Tube Size (in.)	1/2	1/2	1/2	1/2
Rows ... Fins/in.	6 ... 16	4 ... 16	6 ... 16	4 ... 17
Total Face Area (sq ft)	31.3	31.3	31.3	48.1
<b>EVAPORATOR FAN</b>	Centrifugal Type			
Quantity ... Size (in.)	2 ... 20 X 15	2 ... 20 X 15	2 ... 20 X 15	3 ... 20 X 15
Type Drive	Belt	Belt	Belt	Belt
Nominal Cfm	14,000	16,000	18,000	24,000
Motor Hp	15   20   25	15   20   25	20   25   30	25   30   40
Motor Frame Size	254T   256T   284T	254T   256T   284T	256T   284T   286T	284T   286T   324T
Motor Bearing Type	Ball	Ball	Ball	Ball
Maximum Allowable Rpm	1300	1300	1300	1200
Motor Pulley Pitch Diameter	5.1   5.7   6.2	5.3   5.7   7.5	5.7   6.2   6.7	5.3   5.9   6.5
Nominal Motor Shaft Diameter (in.)	1 5/8   1 5/8   1 7/8	1 5/8   1 5/8   1 7/8	1 5/8   1 7/8   1 7/8	1 7/8   1 7/8   2 1/8
Fan Pulley Pitch Diameter (in.)	8.7   8.7   8.7	9.5   9.5   11.1	9.5   9.5   9.5	9.1   9.5   9.5
Nominal Fan Shaft Diameter (in.)	1 15/16	1 15/16	1 15/16	1 15/16
Belt Quantity	2	2	2	3
Belt Type	5VX500	5VX530	5VX550	5VX530
Belt Length (in.)	50	53	55	53
Pulley Center Line Distance (in.)	15.0-17.9	15.0-17.9	15.0-17.9	15.2-17.5
Factory Speed Setting (rpm)	1025	1147	1247	1019
<b>HIGH-PRESSURE SWITCH (psig)</b>	426			
Cutout	320	320	320	320
Reset (Auto.)				
<b>RETURN-AIR FILTERS</b>	10 ... 20 x 24			
Quantity ... Size (in.)				
<b>OUTDOOR-AIR FILTERS</b>	8...16 x 25 x 2 4...20 x 25 x 2			
Quantity...Size (in.)				12...16 x 25 x 2 6...20 x 25 x 2
<b>POWER EXHAUST</b>	Direct Drive, Single-Phase Motors (Factory-Wired for High Speed Operation), Forward-Curved Fan Wheels with Backdraft Dampers on Each Fan Housing			
Motor, Quantity...Hp	4...1			
Fan, Diameter...Width (in.)	11 x 10			

LEGEND

Al — Aluminum  
Cu — Copper

\*Sizes 020-030: Circuit 1 uses the lower portion of condenser coil, Circuit 2 uses the upper portion.  
Sizes 035-060: Circuit 1 uses the left condenser coil, Circuit 2 the right. All units have inter-twined evaporator coils.

# Physical data (cont)



## 48/50A020-060 UNIT WEIGHTS BASE UNIT WEIGHTS\* (lb)

UNIT	020	025	027	030	035	040	050	060
48AJD,AKD	3842	3915	4032	4182	4435	4975	5446	7388
48AJE,AKE	3922	3995	4112	4262	4595	5135	5606	7628
48AWD,AYD	3882	3955	4072	4222	4475	5015	5486	7428
48AWE,AYE	3962	4035	4152	4302	4635	5175	5646	7678
50AJ,AK	3642	3715	3832	3982	4120	4660	5131	7148
50AW,AY	3720	3793	3910	4060	4313	4853	5324	7363
OPTIONS/ACCESSORIES (WEIGHT ADDERS) (lb)								
Barometric Relief	300	300	300	300	300	300	300	450
Non Mod.Power Exhaust	450	450	450	450	450	450	450	675
Mod.Power Exhaust	500	500	500	500	500	500	500	725
Electric Heat	110	110	110	110	110	110	110	165
cu.tu./cu. Fin Cond. Coil	220	220	220	220	220	380	380	651
O.A.Hood Crate/Pkg'g (Less Hoods' Weight)	45	45	45	45	45	45	45	45
	(Packaging Only)				(Packaging Only)			
Outdoor Air Hoods/Filters	170	170	170	170	170	170	170	255

### CV MOTOR WEIGHTS (lb)

MOTOR HP	UNIT VOLTAGE	HIGH EFFICIENCY IFM	PREMIUM EFFICIENCY IFM
5 HP	230/460	78	94
	575	78	92
10 HP	230/460	118	164
	575	118	156
15 HP	230/460	150	217
	575	150	220
20 HP	230/460	212	250
	575	212	258
25 HP	230/460	240	309
	575	240	319
30 HP	230/460	283	355
	575	283	359
40 HP	230/460	372	415
	575	372	410

### VAV MOTOR WEIGHTS (lb)

MOTOR HP	UNIT VOLTAGE	HIGH EFFICIENCY IFM	PREMIUM EFFICIENCY IFM
5 HP	230/460	125	141
	575	163	177
10 HP	230/460	204	250
	575	204	242
15 HP	230/460	238	305
	575	240	310
20 HP	230/460	348	386
	575	304	350
25 HP	230/460	377	446
	575	375	454
30 HP	230/460	480	552
	575	418	494
40 HP	230/460	637	680
	575	587	625

#### LEGEND

<b>Cu</b>	—	Copper
<b>CV</b>	—	Constant Volume
<b>FIOP</b>	—	Factory-Installed Option
<b>HP</b>	—	Horsepower
<b>IFM</b>	—	Indoor-Fan Motor
<b>OA</b>	—	Outdoor Air
<b>VAV</b>	—	Variable Air Volume
<b>VFD</b>	—	Variable Frequency Drive

\*Outdoor-air hoods and filters included in base unit weights; indoor-fan motors are NOT included.

#### NOTES:

1. Base Unit Weight includes OA hoods (economizer or outdoor air damper); does not include an indoor fan motor. ADD indoor motor, FIOPS and Accessories for TOTAL operating weight.
2. VAV Motor Weights include the indoor motor and the VFD, compressor electric unloaders, VFD transducer and associated wiring.



**RIGGING WEIGHTS**

**48/50AK,AY020-060 UNIT WEIGHTS (VAV)**

**Maximum Weights (includes outdoor air hoods/filters included;  
indoor fan motor, modulating power exhaust, VFD, HEAT (gas or electric) & Economizer)**

UNIT	020	025	027	030	035	040	050	060
<b>48AK Low Heat</b>	4697	4770	4963	5113	5434	5974	6543	8838
<b>48AK High Heat</b>	4777	4850	5043	5193	5594	6134	6703	9078
<b>48AY Low Heat</b>	4237	4310	4503	4653	4974	5514	6083	8153
<b>48AY High Heat</b>	4317	4390	4583	4733	5134	5674	6243	8403
<b>50AK</b>	4607	4680	4873	5023	5229	5769	6338	8598
<b>50AY</b>	4185	4258	4451	4601	4922	5462	6031	8088

**NOTE:**

On 48/50AK020-050 includes 500 lb and on 060 725 lb for modulating power exhaust.

On 020-050 includes 170 lb and on 060 255 lb for economizer hoods.

Includes 45 lb for the economizer hood packaging.

On 50A()020-050 includes 110 lb and on 50A()060 165 lb for electric heaters.

Add 220 lb for copper coil on the 020-035 size.

Add 380 lb for copper coil on the 040-050 size.

Add 651 lb for copper coil on the 060 size.

**48/50AJ,AW020-060 UNIT WEIGHTS (CV)**

**Maximum Weights (includes outdoor air hoods/filters included;  
indoor fan motor, modulating power exhaust, HEAT (gas or electric) & Economizer)**

UNIT	020	025	027	030	035	040	050	060
<b>48AJ Low Heat</b>	4607	4680	4835	4985	5299	5839	6350	8573
<b>48AJ High Heat</b>	4687	4760	4915	5065	5459	5999	6510	8813
<b>48AW Low Heat</b>	4147	4220	4375	4525	4839	5379	5890	7888
<b>48AW High Heat</b>	4227	4300	4455	4605	4999	5539	6050	8138
<b>50AJ</b>	4517	4590	4745	4895	5094	5634	6145	8498
<b>50AW</b>	4095	4168	4323	4473	4787	5327	5838	7988

**NOTE:**

On 48/50AJ 020-050 includes 500 lb and on 060 725 lb for modulating power exhaust.

On 020-050 includes 170 lb and on 060 255 lb for economizer hoods.

Includes 45 lb for the economizer hood packaging.

On 50A()020-050 includes 110 lb and on 50A()060 165 lb for electric heaters.

Add 220 lb for copper coil on the 020-035 size.

Add 380 lb for copper coil on the 040-050 size.

Add 651 lb for copper coil on the 060 size.

# Physical data (cont)



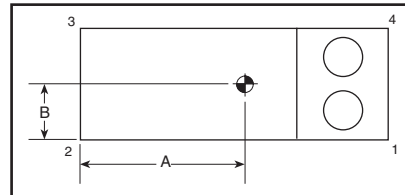
## CENTER OF GRAVITY AND CORNER WEIGHTS

UNIT	WEIGHT		INCHES		MM		LB				KG			
	Lb	Kg	A	B	A	B	1	2	3	4	1	2	3	4
50AJ,AK020	4607	2090	94.1	46.0	2390	1168	1254	945	1035	1373	569	429	469	623
48AJ,AKD020	4697	2131	93.1	45.5	2365	1156	1280	988	1058	1370	581	448	480	622
48AJ,AKE020	4777	2167	92.2	47.0	2342	1194	1244	982	1126	1426	564	445	511	647
50AW,AY020	4685	2125	94.1	46.0	2390	1168	1275	961	1052	1397	578	436	477	634
48AW,AYD020	4737	2149	93.1	45.5	2365	1156	1291	997	1067	1382	586	452	484	627
48AW,AYE020	4817	2185	92.2	47.0	2342	1194	1254	990	1135	1438	569	449	515	652
50AJ,AK025	4680	2123	97.0	44.1	2464	1120	1373	962	967	1379	623	436	438	625
48AJ,AKD025	4770	2164	95.9	43.7	2436	1110	1396	1006	992	1377	633	456	450	624
48AJ,AKE025	4850	2200	95.4	43.4	2423	1102	1421	1037	1009	1383	645	470	458	627
50AW,AY025	4758	2158	97.0	44.1	2464	1120	1395	978	983	1402	633	444	446	636
48AW,AYD025	4810	2182	95.9	43.7	2436	1110	1407	1014	1000	1388	638	460	454	630
48AW,AYE025	4890	2218	95.4	43.4	2423	1102	1433	1045	1017	1394	650	474	461	632
50AJ,AK027	4873	2210	97.0	44.1	2464	1120	1429	1002	1006	1436	648	454	457	651
48AJ,AKD027	4963	2251	95.9	43.7	2436	1110	1452	1046	1032	1432	659	475	468	650
48AJ,AKE027	5043	2287	95.4	43.4	2423	1102	1478	1078	1049	1438	670	489	476	652
50AW,AY027	4951	2246	97.0	44.1	2464	1120	1452	1018	1023	1459	659	462	464	662
48AW,AYD027	5003	2269	95.9	43.7	2436	1110	1464	1055	1040	1444	664	478	472	655
48AW,AYE027	5083	2306	95.4	43.4	2423	1102	1489	1087	1057	1449	676	493	480	657
50AJ,AK030	5023	2278	97.0	44.4	2464	1128	1463	1026	1044	1490	664	465	474	676
48AJ,AKD030	5113	2319	95.9	44.0	2436	1118	1486	1071	1071	1486	674	486	486	674
48AJ,AKE030	5193	2356	95.4	43.7	2423	1110	1511	1103	1088	1491	686	500	493	676
50AW,AY030	5101	2314	97.0	44.4	2464	1128	1486	1042	1061	1513	674	472	481	686
48AW,AYD030	5153	2337	95.9	44.0	2436	1118	1497	1079	1079	1497	679	489	489	679
48AW,AYE030	5233	2374	95.4	43.7	2423	1110	1523	1111	1096	1502	691	504	497	682
50AJ,AK035	5229	2372	96.7	41.5	2456	1054	1619	1144	1021	1445	735	519	463	656
48AJ,AKD035	5434	2465	95.6	41.1	2428	1044	1678	1218	1067	1470	761	553	484	667
48AJ,AKE035	5594	2537	95.0	40.8	2413	1036	1728	1273	1100	1493	784	577	499	677
50AW,AY035	5422	2459	96.7	41.5	2456	1054	1679	1186	1058	1499	762	538	480	680
48AW,AYD035	5474	2483	95.6	41.1	2428	1044	1690	1227	1075	1481	767	557	488	672
48AW,AYE035	5634	2556	95.0	40.8	2413	1036	1740	1282	1108	1504	789	582	503	682
50AJ,AK040	5769	2617	124.2	41.5	3155	1054	1761	1287	1149	1572	799	584	521	713
48AJ,AKD040	5974	2710	122.7	41.1	3117	1044	1817	1367	1198	1592	824	620	543	722
48AJ,AKE040	6134	2782	121.2	40.8	3078	1036	1855	1435	1241	1603	841	651	563	727
50AW,AY040	5962	2704	124.2	41.5	3155	1054	1820	1330	1187	1624	825	604	539	737
48AW,AYD040	6014	2728	122.7	41.1	3117	1044	1829	1376	1206	1603	830	624	547	727
48AW,AYE040	6174	2801	121.2	40.8	3078	1036	1867	1445	1249	1614	847	655	566	732
50AJ,AK050	6338	2875	125.8	41.9	3195	1064	1943	1378	1252	1766	881	625	568	801
48AJ,AKD050	6543	2968	124.3	41.5	3157	1054	1999	1459	1302	1784	907	662	590	809
48AJ,AKE050	6703	3040	122.8	41.2	3119	1046	2036	1529	1346	1792	924	693	610	813
50AW,AY050	6531	2962	125.8	41.9	3195	1064	2002	1419	1290	1820	908	644	585	825
48AW,AYD050	6583	2986	124.3	41.5	3157	1054	2011	1467	1310	1795	912	666	594	814
48AW,AYE050	6743	3059	122.8	41.2	3119	1046	2048	1538	1354	1803	929	698	614	818
50AJ,AK060	8598	3900	187.7	43.4	4768	1102	2627	1730	1684	2557	1192	785	764	1160
48AJ,AKD060	8838	4009	180.6	41.4	4587	1052	2715	1965	1746	2412	1232	891	792	1094
48AJ,AKE060	9078	4118	173.6	39.4	4409	1001	2796	2218	1798	2267	1268	1006	816	1028
50AW,AY060	8813	3998	187.7	43.4	4768	1102	2693	1773	1726	2621	1222	804	783	1189
48AW,AYD060	8878	4027	180.6	41.4	4587	1052	2727	1974	1754	2423	1237	895	795	1099
48AW,AYE060	9128	4140	173.6	39.4	4409	1001	2811	2230	1808	2279	1275	1011	820	1034

NOTES:

- Center of gravity
- Do not locate adjacent units with flue discharge facing economizer inlet. Minimum Clearance to be:
  - Adjacent Units 15'-0" [4572]
  - Top of Units: No overhang
  - Condenser Coil: 4'-0" [1219]
  - Economizer Side: 6'-0" [1829]
  - Heat Side: 4'-0" [1219]
  - Filter Access Side: 15'-0" [4572] (For Removal of Evaporator Coil)
- For smaller service and operational clearances, contact Carrier Application Engineering department.
- Bottom ducts are designed to be attached to accessory roof curb. The ducts must be supported by cross braces as done on accessory roof curb.

- Variable frequency drive (VFD) is only available for VAV (variable air volume) units.



# Ratings and capacities



## ELECTRIC RESISTANCE HEATER DATA

UNIT 50AJ,AK,AW,AY	HEATER kW				HEATER STAGES	% HEAT PER STAGE	DESIGN RANGE		DESIGN RANGE	
	Unit Voltages						Min CFM	Max CFM	Min L/s	Max L/s
	208	230	460	575						
020-035 LO HEAT	27	36	36	36	1	100	6,000	15,000	2,830	7,075
020-035 HIGH HEAT	54	72	72	72	2	50/100	6,000	15,000	2,830	7,075
040-050 LO HEAT	27	36	36	36	1	100	10,500	20,000	4,953	9,433
040-050 HIGH HEAT	54	72	72	72	2	50/100	10,500	20,000	4,953	9,433
060 LO HEAT	41	54	54	54	1	100	15,000	27,000	7,075	12,735
060 HIGH HEAT	81	108	108	108	2	50/100	15,000	27,000	7,075	12,735

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

## COOLING CFM OPERATING RANGE

UNIT	MIN CFM	MAX CFM*	MIN L/s	MAX L/s
48/50AJ,AW020	6,000	10,000	2,832	4,719
48/50AK,AY020	4,000	10,000	1,888	4,719
48/50AJ,AW025	7,500	12,500	3,540	5,899
48/50AK,AY025	5,000	12,500	2,360	5,899
48/50AJ,AW027	8,100	13,500	3,823	6,371
48/50AK,AY027	5,400	13,500	2,549	6,371
48/50AJ,AW030	9,000	15,000	4,248	7,079
48/50AK,AY030	6,000	15,000	2,832	7,079
48/50AJ,AW035	10,500	17,500	4,955	8,259
48/50AK,AY035	7,000	17,500	3,304	8,259
48/50AJ,AW040	12,000	20,000	5,663	9,439
48/50AK,AY040	8,000	20,000	3,776	9,439
48/50AJ,AW050	13,500	20,000	6,371	9,439
48/50AK,AY050	10,000	20,000	4,719	9,439
48/50AJ,AW060	18,000	27,000	8,495	12,743
48/50AK,AY060	12,000	27,000	5,663	12,743

\*Operation at these levels may be limited by entering evaporator air wet bulb temperatures. See Cooling Capacities tables on pages 35-42 for further details.

## GAS HEATING CAPACITIES AND EFFICIENCIES STANDARD UNITS

UNITS 48AJ,AW	INPUT (Btu/hr)		MAXIMUM OUTPUT	TEMPERATURE RISE (°F)	STEADY-STATE EFFICIENCY (%)	DESIGN RANGE	
	Stage 1	Stage 2				Min CFM	Max CFM
020-035 LO HEAT	265,600	350,000	287,000	15 to 45	82	5,900	15,000
020-035 HIGH HEAT	398,400	525,000	430,500	35 to 65	82	6,100	11,400
040-050 LO HEAT	303,500	400,000	328,000	10 to 40	82	7,600	22,500
040-050 HIGH HEAT	607,000	800,000	656,000	30 to 60	82	10,100	20,200
060 LO HEAT	582,000	776,000	636,300	10 to 40	82	11,000	27,000
060 HIGH HEAT	873,000	1,164,000	954,480	30 to 60	82	14,700	27,000

## UNITS WITH STAGED GAS OPTION

UNITS 48AJ,AW	STAGES OF GAS CONTROL (% Full Heat Output)	MIN. OUTPUT (Btuh)	MAX. OUTPUT (Btuh)	DESIGN RANGE	
				Min CFM	Max CFM
020-030 LOW GAS HEAT	38, 50, 75, 88, 100	107,625	287,000	5,900	15,000
020-030 HIGH GAS HEAT	25, 33, 50, 67, 75, 83, 100	107,625	430,500	6,100	11,400
035-050 LOW GAS HEAT	38, 50, 76, 88, 100	124,435	328,000	7,600	22,500
035-050 HIGH GAS HEAT	38, 50, 76, 88, 100	248,870	656,000	10,100	20,200
060 LOW GAS HEAT	19, 25, 38, 44, 50, 56, 63, 75, 88, 94, 100	119,300	477,200	11,000	27,000
060 HIGH GAS HEAT	25, 33, 50, 58, 67, 75, 83, 92, 100	238,625	954,500	14,700	27,000

### CAUTION

This MINIMUM heating CFM must be maintained during heating operation. Failure to maintain this minimum heating CFM will result in operational issues such as limit switch tripping due to the reduced airflow that allows adjacent temperatures to rise beyond the limit switch set points. Cycling the unit on the limit switches may result in customer dissatisfaction and pose a potentially hazardous situation.

#### NOTES:

1. 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.
2. At altitudes up to 2000 ft, the following formula may be used to calculate air temperature rise:

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

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

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

4. 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.
5. Total unit design is listed by ETL Testing Laboratories Inc.
6. 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.



# Ratings and capacities (cont)



## CAPACITY CONTROL STAGING OPTIONS

APPLICATION	UNIT	DEMAND SOURCE	COOLING CONTROL METHOD	COMPRESSOR SEQUENCE			
				20-27 UNITS		30-60 UNITS	
VAV	48/50AK,AY	RAT	Multiple Stage EDT	Table C	Table D	Table E	Table F
	48/50AK,AY	SPT	Multiple Stage EDT	Table C	Table D	Table E	Table F
VVT Linkage	48/50AJ,AW	SPT	2 Stage Demand	Table A	NA	Table B	NA
	48/50AJ,AW	SPT	Multiple Stage SPT	Table C	Table D	Table E	Table F
VVT 2-Stage Demand	48/50AJ,AW	Y1,Y2	2 Stage Demand	Table A	NA	Table B	NA
	48/50AJ,AW	Y1,Y2	Multiple Adaptive Demand	Table C	Table D	Table E	Table F
CV T55, T56, T58 Sensor	48/50AJ,AW	SPT	2 Stage Demand	Table A	NA	Table B	NA
	48/50AJ,AW	SPT	Multiple Stage EDT	Table C	Table D	Table E	Table F
CV, Mech Thermostat	48/50AJ,AW	Y1,Y2	2 Stage Demand	Table A	NA	Table B	NA
	48/50AJ,AW	Y1,Y2	Multiple Adaptive Demand	Table C	Table D	Table E	Table F

### LEGEND

- CV — Constant Volume
- EDT — Evaporator Discharge Temperature
- RAT — Return Air Temperature
- SPT — Space Temperature
- VAV — Variable Air Volume

**CAPACITY CONTROL STAGING OPTIONS TABLE A**  
20-27 TON CV 2-STAGE SEQUENCE

STAGE	SEQUENCE 1			SEQUENCE 2		
	0	1	2	0	1	2
	Thermostat Inputs			Thermostat Inputs		
Y1	OPEN	CLOSED	CLOSED	OPEN	CLOSED	CLOSED
Y2	OPEN	CLOSED	CLOSED	OPEN	CLOSED	CLOSED
COMP	Compressor Status			Compressor Status		
A1	OFF	ON	ON	OFF	OFF	ON
A2	OFF	OFF	ON	OFF	ON	ON
B1	OFF	OFF	ON*	OFF	OFF	ON*
UNIT	Capacity 48/50A			Capacity 48/50A		
20	0%	33%	100%	0%	33%	100%
25	0%	30%	100%	0%	30%	100%
27	0%	33%	100%	0%	33%	100%

\*Compressor start is delay 10 seconds from other compressor.

**CAPACITY CONTROL STAGING OPTIONS TABLE B**  
30-60 TON CV 2-STAGE SEQUENCE

STAGE	SEQUENCE 1			SEQUENCE 2		
	0	1	2	0	1	2
	Thermostat Inputs			Thermostat Inputs		
Y1	OPEN	CLOSED	CLOSED	OPEN	CLOSED	CLOSED
Y2	OPEN	CLOSED	CLOSED	OPEN	CLOSED	CLOSED
COMP	Compressor Status			Compressor Status		
A1	OFF	ON	ON	OFF	ON*	ON
A2	OFF	ON*	ON	OFF	ON	ON
B1	OFF	OFF	ON	OFF	OFF	ON*
B2	OFF	OFF	ON*	OFF	OFF	ON
UNIT	Capacity 48/50A			Capacity 48/50A		
30	0%	33%	100%	0%	49%	100%
35	0%	49%	100%	0%	48%	100%
40	0%	48%	100%	0%	43%	100%
50	0%	43%	100%	0%	45%	100%
60	0%	50%	100%	0%	50%	100%

\*Compressor start is delay 10 seconds from other compressor.

**CAPACITY CONTROL STAGING OPTIONS TABLE C**  
20-27 TON VAV AND ADAPTIVE CV STAGING SEQUENCE WITHOUT HOT GAS BYPASS

STAGE	SEQUENCE 1					SEQUENCE 2				
	0	1	2	3	4	0	1	2	3	4
COMP	Compressor Status					Compressor Status				
A1	OFF	ON	ON	OFF	ON	OFF	OFF	ON	ON	ON
A2	OFF	OFF	ON	ON	ON	OFF	ON	ON	OFF	ON
B1	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	ON	ON
Unit	Capacity 48/50A					Capacity 48/50A				
20	0%	33%	67%	67%	100%	0%	33%	67%	67%	100%
25	0%	30%	65%	70%	100%	0%	35%	65%	65%	100%
27	0%	33%	67%	67%	100%	0%	33%	67%	67%	100%



**CAPACITY CONTROL STAGING OPTIONS TABLE D  
20-27 TON VAV WITH HOT GAS BYPASS**

STAGE	SEQUENCE 1						SEQUENCE 2					
	0	1	2	3	4	5	0	1	2	3	4	5
<b>COMP</b>	<b>Compressor Status</b>						<b>Compressor Status</b>					
<b>A1</b>	OFF	ON*	ON	ON	OFF	ON	OFF	OFF	OFF	ON	ON	ON
<b>A2</b>	OFF	OFF	OFF	ON	ON	ON	OFF	ON*	ON	ON	OFF	ON
<b>B1</b>	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF	ON	ON
<b>UNIT</b>	<b>Capacity 48/50A</b>						<b>Capacity 48/50A</b>					
<b>20</b>	0%	18%	33%	67%	67%	100%	0%	18%	33%	67%	67%	100%
<b>25</b>	0%	17%	30%	65%	70%	100%	0%	22%	35%	65%	65%	100%
<b>27</b>	0%	21%	33%	67%	67%	100%	0%	21%	33%	67%	67%	100%

**CAPACITY CONTROL STAGING OPTIONS TABLE E  
30-60 TON VAV AND ADAPTIVE CV STAGING SEQUENCE WITHOUT HOT GAS BYPASS**

STAGE	SEQUENCE 1						SEQUENCE 2					
	0	1	2	3	4	5	0	1	2	3	4	5
<b>COMP</b>	<b>Compressor Status</b>						<b>Compressor Status</b>					
<b>A1</b>	OFF	ON	ON	OFF	ON	ON	OFF	OFF	ON	ON	ON	ON
<b>A2</b>	OFF	OFF	ON	ON	ON	ON	OFF	ON	ON	OFF	ON	ON
<b>B1</b>	OFF	OFF	OFF	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	ON
<b>B2</b>	OFF	OFF	OFF	OFF	OFF	ON	OFF	ON	OFF	ON	ON	ON
<b>UNIT</b>	<b>Capacity 48/50A</b>						<b>Capacity 48/50A</b>					
<b>30</b>	0%	23%	45%	50%	73%	100%	0%	23%	45%	50%	73%	100%
<b>35</b>	0%	22%	48%	52%	74%	100%	0%	26%	48%	48%	74%	100%
<b>40</b>	0%	21%	43%	50%	71%	100%	0%	21%	42%	50%	72%	100%
<b>50</b>	0%	23%	45%	45%	68%	100%	0%	23%	45%	54%	77%	100%
<b>60</b>	0%	24%	50%	50%	74%	100%	0%	26%	50%	50%	76%	100%

**CAPACITY CONTROL STAGING OPTIONS TABLE F  
30-60 TON VAV WITH HOT GAS BYPASS STAGING SEQUENCE**

STAGE	SEQUENCE 1							SEQUENCE 2						
	0	1	2	3	4	5	6	0	1	2	3	4	5	6
<b>COMP</b>	<b>Compressor Status</b>							<b>Compressor Status</b>						
<b>A1</b>	OFF	ON*	ON	ON	OFF	ON	ON	OFF	OFF	OFF	ON	ON	ON	ON
<b>A2</b>	OFF	OFF	OFF	ON	ON	ON	ON	OFF	ON*	ON	ON	OFF	ON	ON
<b>B1</b>	OFF	OFF	OFF	OFF	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	ON
<b>B2</b>	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	ON	OFF	ON	ON	ON
<b>UNIT</b>	<b>Capacity 48/50A</b>							<b>Capacity 48/50A</b>						
<b>30</b>	0%	12%	23%	45%	50%	73%	100%	0%	12%	23%	45%	50%	73%	100%
<b>35</b>	0%	12%	22%	48%	52%	74%	100%	0%	16%	26%	48%	48%	74%	100%
<b>40</b>	0%	13%	21%	43%	50%	71%	100%	0%	13%	21%	42%	50%	72%	100%
<b>50</b>	0%	16%	23%	45%	45%	68%	100%	0%	16%	23%	45%	54%	77%	100%
<b>60</b>	0%	19%	24%	50%	50%	74%	100%	0%	21%	26%	50%	50%	76%	100%

**ALTITUDE COMPENSATION**

ELEVATION (ft)	SIZES 020-035		SIZES 040-060	
	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	7/64"	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.

**ARI\* CERTIFIED RATINGS**

UNIT	CAPACITY	EER	IPLV
48A_020	238,000	9.5	10.0
50A_020	238,000	9.7	10.3

LEGEND  
**EER** — Energy Efficiency Ratio  
**IPLV** — Integrated Part Load Value

\*Air-Conditioning and Refrigeration Institute.  
 NOTE: Please contact Carrier application engineering for ratings for other units.

# Options and accessories



ITEM	FACTORY-INSTALLED OPTIONS				FIELD-INSTALLED ACCESSORIES			
	AJ	AK	AW	AY	AJ	AK	AW	AY
<b>GAS HEAT OPTIONS</b>								
Low Gas Heat - Aluminized	X	X	X	X				
High Gas Heat - Aluminized	X	X	X	X				
Low Gas Heat - Stainless Steel	X	X	X	X				
High Gas Heat - Stainless Steel	X	X	X	X				
Staged Gas Heat - Low - Stainless Steel	X		X					
Staged Gas Heat - High - Stainless Steel	X		X					
LP Conversion Kit					X	X	X	X
<b>ELECTRIC HEAT</b>								
Low Electric Heat	X	X	X	X				
High Electric heat	X	X	X	X				
<b>INDOOR AIR QUALITY</b>								
2-inch Filters	X	X	X	X				
4-inch Filters	X	X	X	X				
Return Air CO <sub>2</sub> Sensor	X	X	X	X	X	X	X	X
CO <sub>2</sub> Space Sensor					X	X	X	X
CO <sub>2</sub> Aspirator Box					X	X	X	X
<b>ECONOMIZER</b>								
Manual Outside Air Self-Closing Damper	X	X	X	X				
Modulating Economizer 3-Position Damper	X	X	X	X				
Outdoor or Return Humidity Sensor (Enthalpy)					X	X	X	X
<b>EXHAUST AIR CONTROL</b>								
Barometric Relief	X	X			X	X	X	X
Non-Modulating Power Exhaust	X				X	X	X	X
Modulating Power Exhaust and Static Sensor	X	X			X	X	X	X
Supply and Building Pressure Control Board (ECB2)					X	X	X	X
Build Pressure Control Sensor					X	X	X	X
<b>CONDENSER &amp; EVAPORATOR COIL OPTIONS</b>								
Al/Cu Cond & Evap	X	X	X	X				
Al/Cu Pre-Coat Cond & Al/Cu Evap (E option)	X	X	X	X				
Al/Cu E-Coat Cond & Al/Cu Evap (F option)	X	X	X	X				
Cu/Cu Cond & Al/Cu Evap (C option)	X	X	X	X				
Hot Gas Bypass - Circuit A (requires ECB2)		X		X	X		X	
Condenser Coil Hail Guard Assembly					X	X	X	X
Galvanized Drain Pan	X	X	X	X				
Stainless Drain Pan	X	X	X	X				
<b>CONTROLS</b>								
Controls Option Board	X	X	X	X	X	X	X	X
Enhanced Display					X	X	X	X
Navigator™ Display					X	X	X	X
Return Air CO <sub>2</sub> Sensor	X	X	X	X	X	X	X	X
Return Air Smoke Detector	X	X	X	X				
Supply Smoke Detector					X	X	X	X
Filter Switch	X	X	X	X	X	X	X	X
Fan Status Switch (requires options board)					X	X	X	X
T55 Thermostat					X	X	X	X
T56 Thermostat					X	X	X	X
T58 Sensor					X	X	X	X
Space Temperature Sensor with CO <sub>2</sub> Override					X	X	X	X
Space Temperature Sensor Setpoint and CO <sub>2</sub> Override					X	X	X	X
Remote Enhanced Display					X	X	X	X
Thermostats (Temp System)					X		X	
Thermostats (Debonair®)					X		X	
Thermostats (Slimline)					X		X	
Thermostats (Corporate)					X		X	
Dataport Control Panel Assembly (one-way ready interface)					X	X	X	X
Datalink™ Control Panel Assembly (two-way read write interface)					X	X	X	X
<b>POWER CIRCUIT</b>								
GFI Convenience Outlet (powered)	X	X	X	X				
GFI Convenience Outlet (not powered)	X	X	X	X				
Power Terminal Block	X	X	X	X				
Non-Fused Disconnect	X	X	X	X				
<b>INDOOR MOTOR OPTIONS</b>								
Low HP, Std Eff	X	X	X	X				
Medium HP, Std Eff	X	X	X	X				
High HP, Std Eff	X	X	X	X				
Low HP, High Eff	X	X	X	X				
Medium HP, High Eff	X	X	X	X				
High HP, High Eff	X	X	X	X				
<b>FAN CFM CONTROL</b>								
VFD Remote Display Module						X		X
<b>PACKAGING</b>								
Domestic	X	X	X	X				
Export	X	X	X	X				
<b>MISCELLANEOUS OPTIONS</b>								
Roofcurb Adapter Kit					X	X	X	X
14-inch Roof Curb					X	X	X	X
Motormaster V Control					X	X	X	X

LEGEND

Al — Aluminum    CV — Constant Volume    IAQ — Indoor Air Quality    VAV — Variable Air Volume  
 Cu — Copper    GFI — Ground Fault Circuit Interrupter    LP — Liquid Propane    VVT — Variable Volume Temperature

# Base unit dimensions, 48AJ,AK020-035



UNIT SIZE	OPERATING WEIGHT (LBS)		CORNER WEIGHTS (LBS)				
	WEIGHT	A	B	1	2	3	4
48AJ/AK/D, M, S1020	4697	5'-0 1/8"	3'-6 1/2"	968	1058	1370	1280
48AJ/AK/E, N, T1020	4710	5'-0 1/8"	3'-6 1/2"	1030	1120	1430	1340
48AJ/AK/D, M, S1025	4850	5'-0 1/8"	3'-8 1/4"	1037	1127	1437	1347
48AJ/AK/E, N, T1025	4863	5'-0 1/8"	3'-8 1/4"	1046	1136	1446	1356
48AJ/AK/D, M, S1030	5113	5'-0 1/8"	3'-8 1/4"	1071	1161	1471	1381
48AJ/AK/E, N, T1030	5193	5'-0 1/8"	3'-8 1/4"	1103	1193	1503	1413
48AJ/AK/D, M, S1035	5434	5'-0 1/8"	3'-10 7/8"	935	1025	1335	1245
48AJ/AK/E, N, T1035	5594	5'-0 1/8"	3'-10 7/8"	971	1061	1371	1281

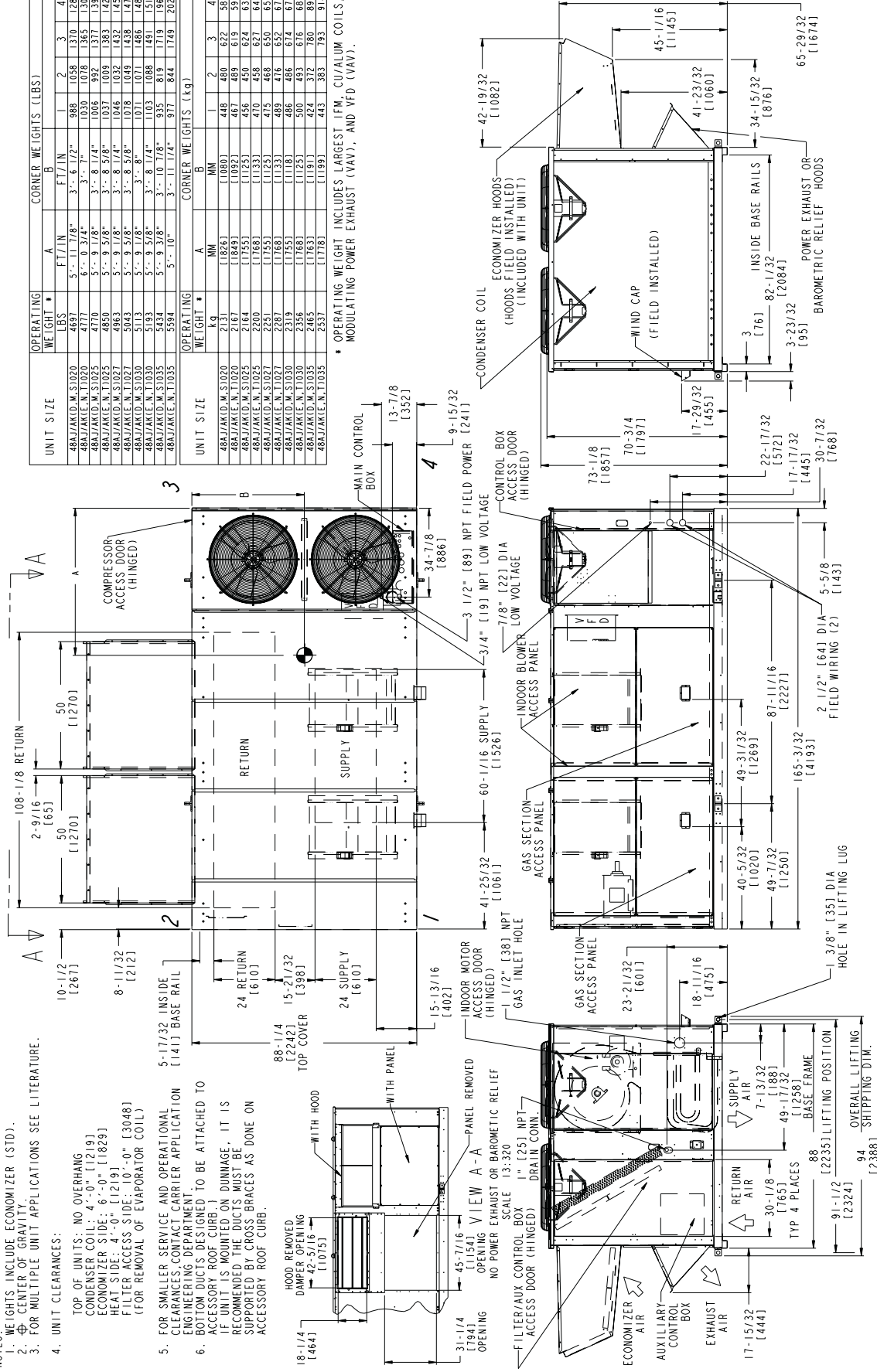
  

UNIT SIZE	OPERATING WEIGHT (kg)		CORNER WEIGHTS (kg)				
	WEIGHT	A	B	1	2	3	4
48AJ/AK/D, M, S1020	2131	1182EJ	11080J	448	480	622	581
48AJ/AK/E, N, T1020	2167	1184J	11092J	467	489	619	592
48AJ/AK/D, M, S1025	2184	1195J	1125J	456	490	624	633
48AJ/AK/E, N, T1025	2250	1195J	1125J	479	468	650	670
48AJ/AK/D, M, S1030	2287	1168J	1133J	489	478	652	679
48AJ/AK/E, N, T1030	2319	1155J	1118J	486	486	674	674
48AJ/AK/D, M, S1035	2356	1168J	1125J	500	493	676	686
48AJ/AK/E, N, T1035	2465	1163J	1181J	424	372	780	890
48AJ/AK/E, N, T1035	2537	1178J	1199J	443	383	793	918

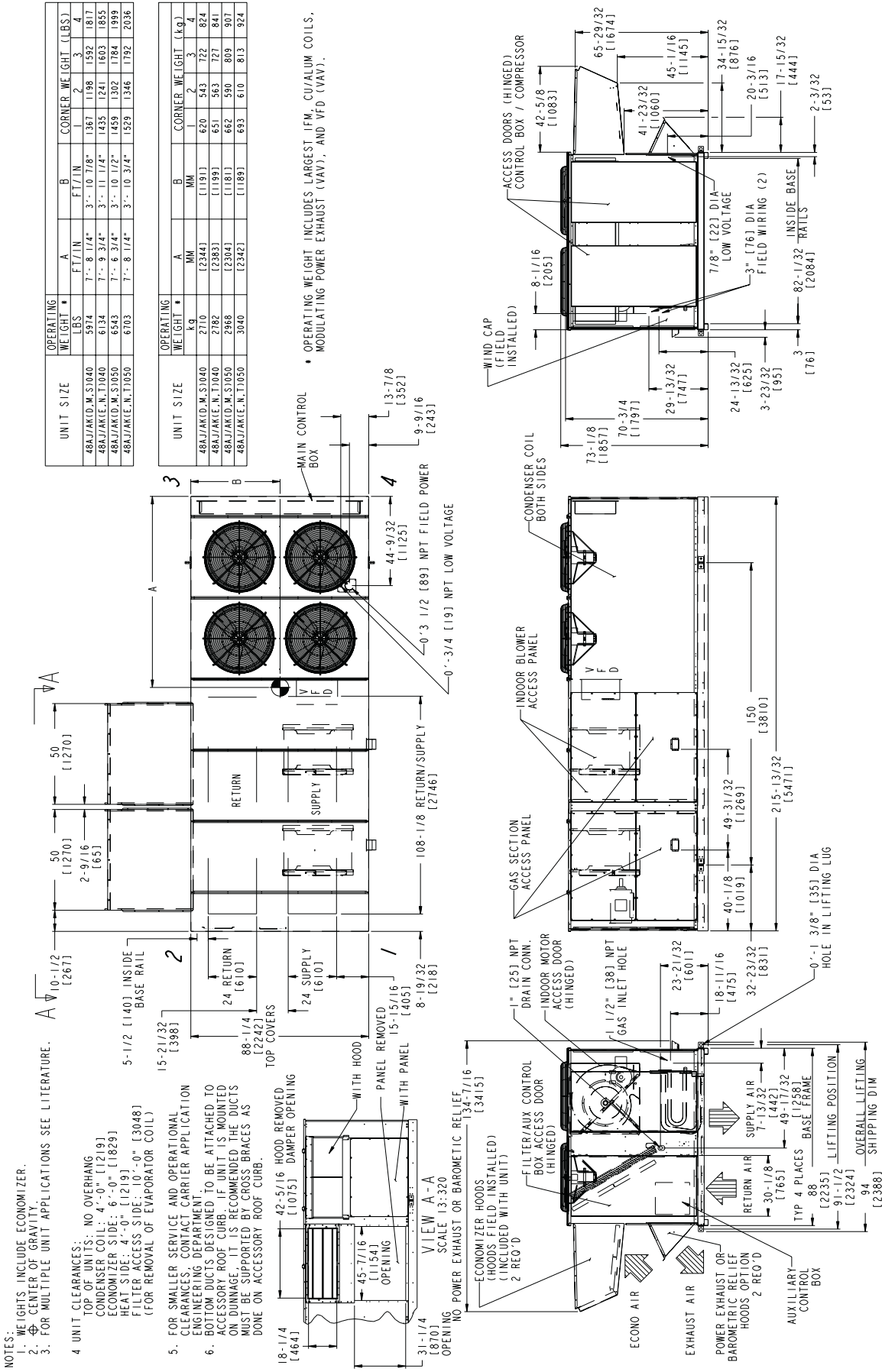
\* OPERATING WEIGHT INCLUDES LARGEST IFM, CU/ALUM COILS, MODULATING POWER EXHAUST (VAV), AND VFD (VAV).

- NOTES:
- WEIGHTS INCLUDE ECONOMIZER (STD).
  - Φ CENTER OF GRAVITY.
  - FOR MULTIPLE UNIT APPLICATIONS SEE LITERATURE.
  - UNIT CLEARANCES:

- TOP OF UNITS: NO OVERHANG ECONOMIZER COIL: 4'-0" [1219] ECONOMIZER SIDE: 6'-0" [1829] HEAT SIDE: 4'-0" [1219] FILTER ACCESS SIDE: 10'-0" [3048] (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 MUST BE SUPPORTED BY CROSS BRACES AS DONE ON ACCESSORY ROOF CURB.



# Base unit dimensions, 48AJ,AK040-050

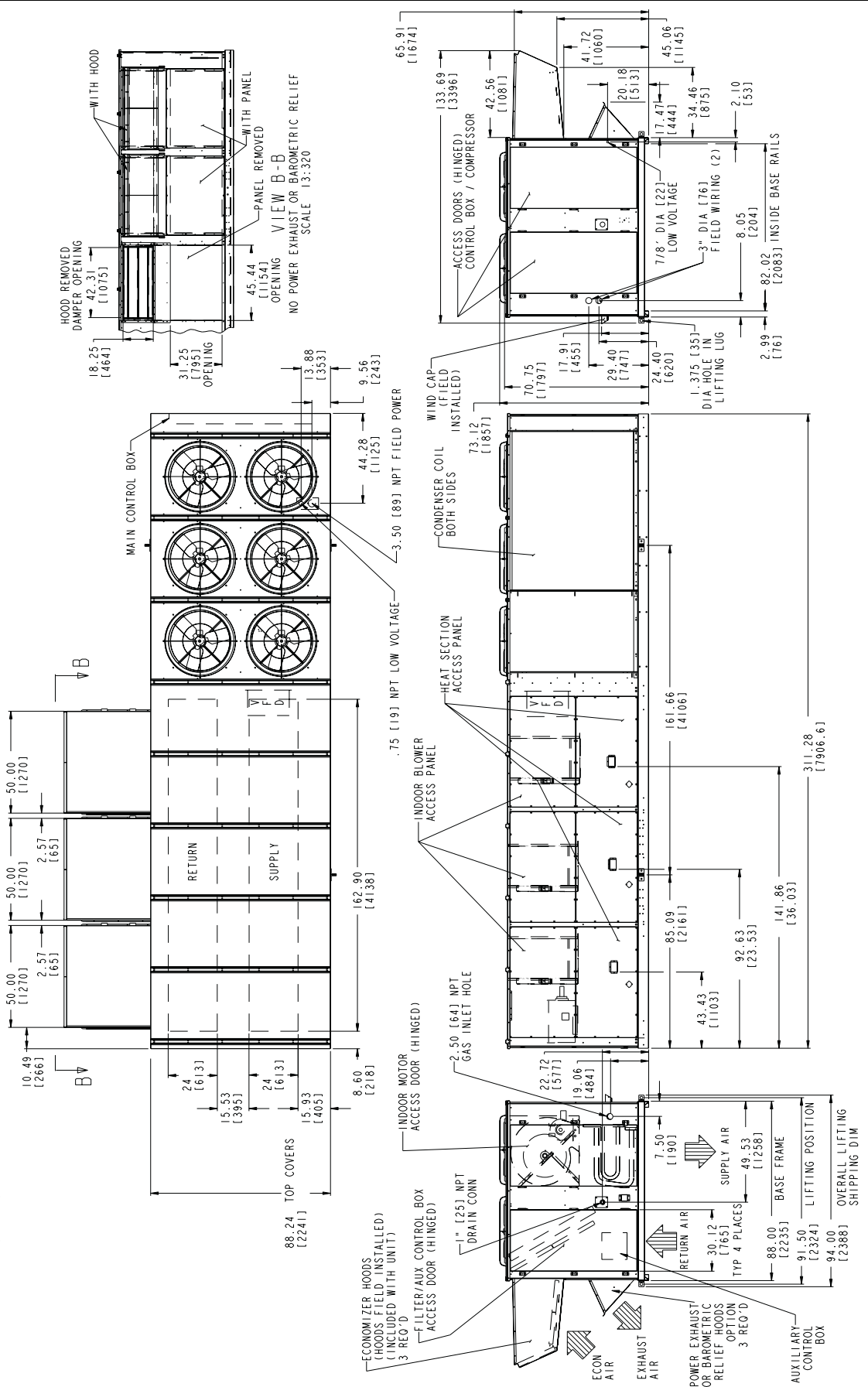


# Base unit dimensions, 48AJ,AK060



6. Bottom ducts designed to be attached to accessory roof curb. If unit is mounted on downpipe, it is recommended the ducts must be supported by cross braces as done on accessory roof curb.
7. Base unit weights include outdoor air hoods and filters (indoor fan motor is not included). Add indoor motor, FOP's and accessories for total operating weight.
8. VAV motor weights include indoor motor, VFD, VFD transducer and associated wiring.
9. Dimensions in ( ) are in millimeters, kilograms or kilowatts.
10. For side-supply/return applications, a single return and supply ductwork connection is recommended for covering all three return and all three supply openings. The entire area around the duct openings is available for a 1.5" duct flange attachment.

- NOTES:**
1. Weights include economizer or outdoor air damper.
  2. Center of Gravity.
  3. For multiple unit applications see literature.
  4. Unit clearances:  
Top of Units: No Overhang  
Condenser Coil: 4'-0" (1219)  
Economizer: 5'-0" (1524)  
Heat Side: 4'-0" (1219)  
Filter Access Side: 15'-0" (4572)  
(For Removal of Evaporator Coil)
  5. For smaller service and operational clearance, contact Carrier Application Engineering Department.



# Base unit dimensions, 48AW,AY020-035

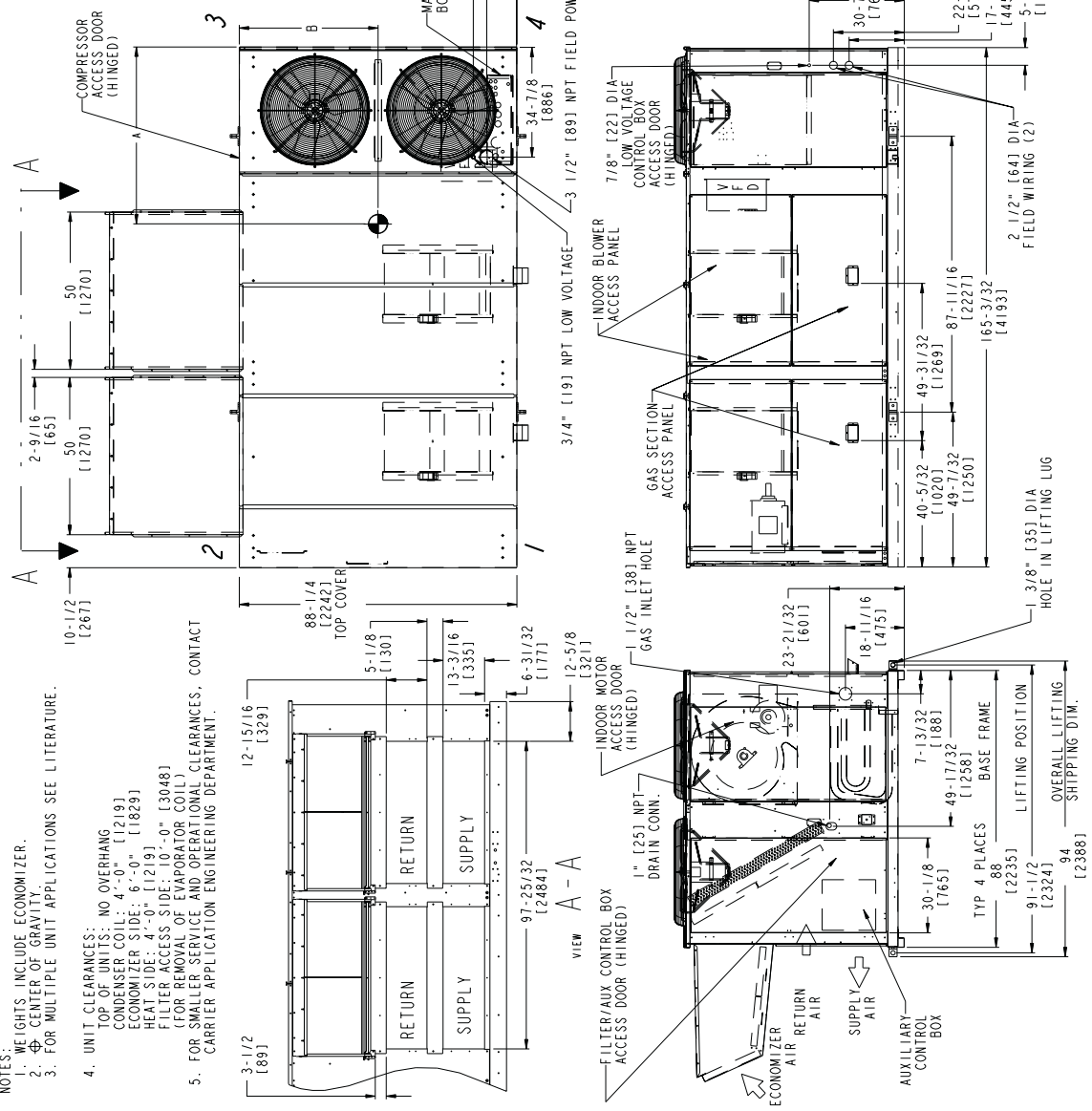


UNIT SIZE	OPERATING WEIGHT (LBS)			CORNER WEIGHT (LBS)		
	WEIGHT	A	B	1	2	3
48AW/AY020.M.S1020	4137	5'-11 1/8"	3'-6 1/2"	997	1067	1382
48AW/AY020.N.1020	4817	6'-0 3/4"	3'-7"	1039	1087	1376
48AW/AY025.M.S1025	4810	5'-9 1/8"	3'-8 1/4"	1014	1000	1388
48AW/AY025.N.1025	5003	5'-9 1/8"	3'-8 1/4"	1045	1017	1394
48AW/AY027.M.S1027	5083	5'-8 5/8"	3'-8 5/8"	1055	1040	1444
48AW/AY027.N.1027	5083	5'-8 5/8"	3'-8 5/8"	1087	1057	1449
48AW/AY030.M.S1030	5133	5'-8 5/8"	3'-8 5/8"	1019	1094	1562
48AW/AY030.N.1030	5474	5'-8 3/8"	3'-10 1/8"	942	926	1231
48AW/AY035.M.S1035	5634	5'-10"	3'-11 1/4"	984	850	1162
48AW/AY035.N.1035	5556	5'-10"	3'-11 1/4"	984	850	1162

UNIT SIZE	OPERATING WEIGHT (K.G)			CORNER WEIGHT (K.G)		
	WEIGHT	A	B	1	2	3
48AW/AY020.M.S1020	2149	(1826)	(1080)	452	484	627
48AW/AY020.N.1020	2185	(1849)	(1082)	471	493	624
48AW/AY025.M.S1025	2182	(1155)	(1125)	460	454	630
48AW/AY025.N.1025	2218	(1168)	(1133)	474	461	632
48AW/AY027.M.S1027	2269	(1125)	(1125)	418	472	655
48AW/AY027.N.1027	2269	(1155)	(1125)	483	489	619
48AW/AY030.M.S1030	2374	(1183)	(1125)	504	497	682
48AW/AY030.N.1030	2483	(1163)	(1191)	427	374	785
48AW/AY035.M.S1035	2556	(1178)	(1193)	446	386	799
48AW/AY035.N.1035	2556	(1178)	(1193)	446	386	799

\* OPERATING WEIGHT INCLUDES LARGEST IFM, CU/ALUM COILS, MODULATING POWER EXHAUST (VAV), AND VFD (VAV).



- NOTES:
- WEIGHTS INCLUDE ECONOMIZER.
  - CENTER OF GRAVITY.
  - FOR MULTIPLE UNIT APPLICATIONS SEE LITERATURE.
  - UNIT CLEARANCES:  
TOP OF UNITS: NO OVERHANG  
CONDENSER COIL: 4'-0" [1219]  
ECONOMIZER SIDE: 6'-0" [1829]  
HEAT SIDE: 4'-0" [1219]  
FILTER ACCESS SIDE: 10'-0" [3048]  
(FOR REMOVAL OF EVAPORATOR COIL)  
5. FOR SMALLER SERVICE AND OPERATIONAL CLEARANCES, CONTACT CARRIER APPLICATION ENGINEERING DEPARTMENT.

# Base unit dimensions, 48AW,AY040-050



UNIT SIZE	OPERATING WEIGHT		CORNER WEIGHT (LBS.)	
	LBS	FT./IN.	A	B
48AW/AYC.D.M.S1040	6014	7'-8 1/4"	3'-10 7/8"	376
48AW/AYC.E.N.S1040	6174	7'-9 3/4"	3'-11 1/4"	445
48AW/AYC.D.M.S1050	6583	7'-6 3/4"	3'-10 1/2"	467
48AW/AYC.E.N.S1050	6143	7'-8 1/4"	3'-10 3/4"	538

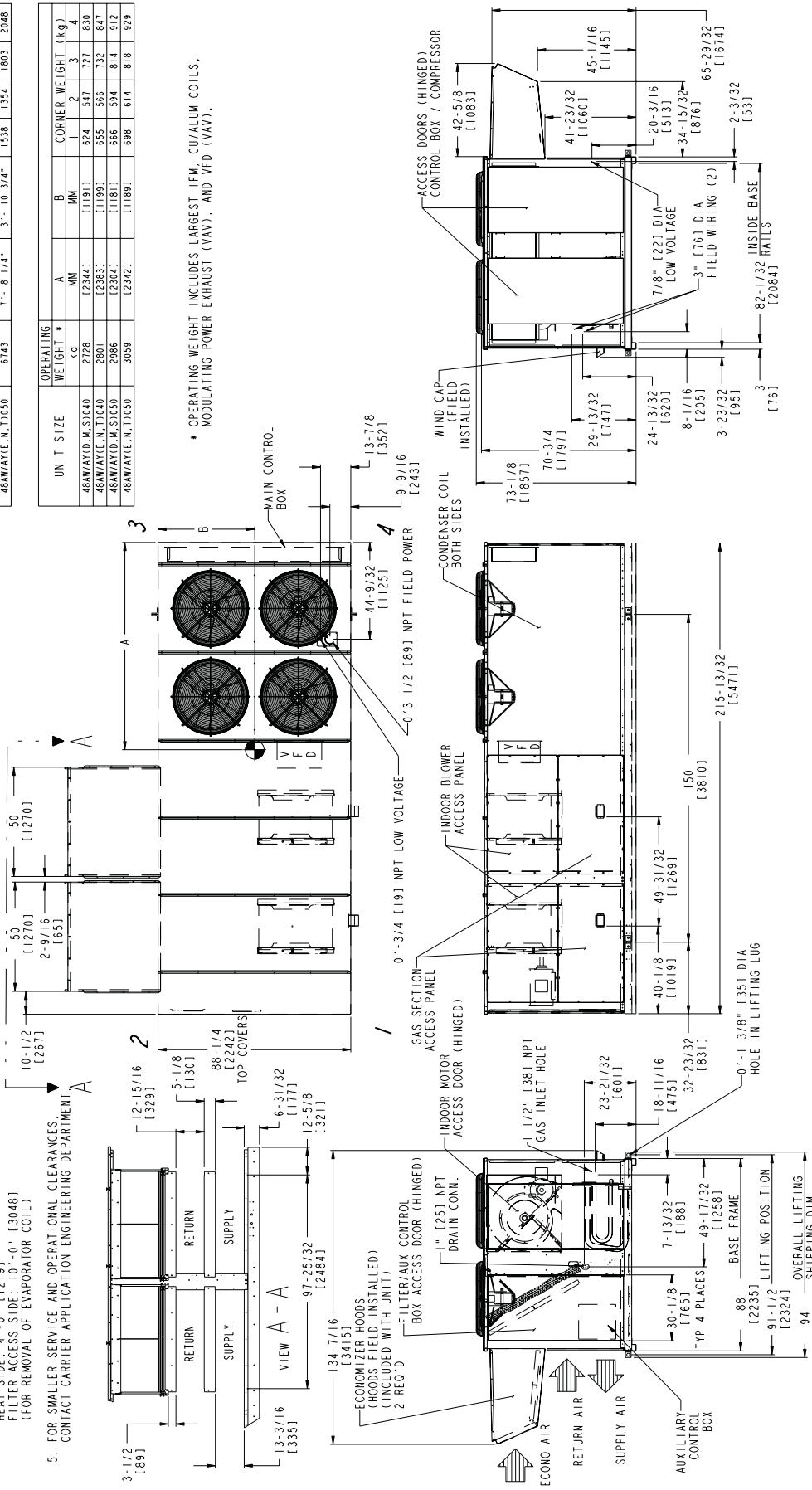
UNIT SIZE	OPERATING WEIGHT		CORNER WEIGHT (kg)	
	kg	MM	A	B
48AW/AYC.D.M.S1040	2728	[3244]	[1181]	524
48AW/AYC.E.N.S1040	2801	[3383]	[1199]	554
48AW/AYC.D.M.S1050	2986	[3304]	[1181]	668
48AW/AYC.E.N.S1050	3059	[3382]	[1189]	698

\* OPERATING WEIGHT INCLUDES LARGEST I.F.M. CU/ALUM COILS, MODULATING POWER EXHAUST (YAV), AND VFD (YAV).

- NOTES:  
 1. WEIGHTS INCLUDE ECONOMIZER.  
 2. CENTER OF GRAVITY.  
 3. FOR MULTIPLE UNIT APPLICATIONS SEE LITERATURE.  
 4. UNIT CLEARANCES:

- TOP OF UNITS: NO OVERHANG  
 CONDENSER COIL: 4'-0" [1219]  
 ECONOMIZER SIDE: 6'-0" [1829]  
 HEAT SIDE: 4'-0" [1219]  
 FILTER ACCESS SIDE: 10'-0" [3048]  
 (FOR REMOVAL OF EVAPORATOR COIL)

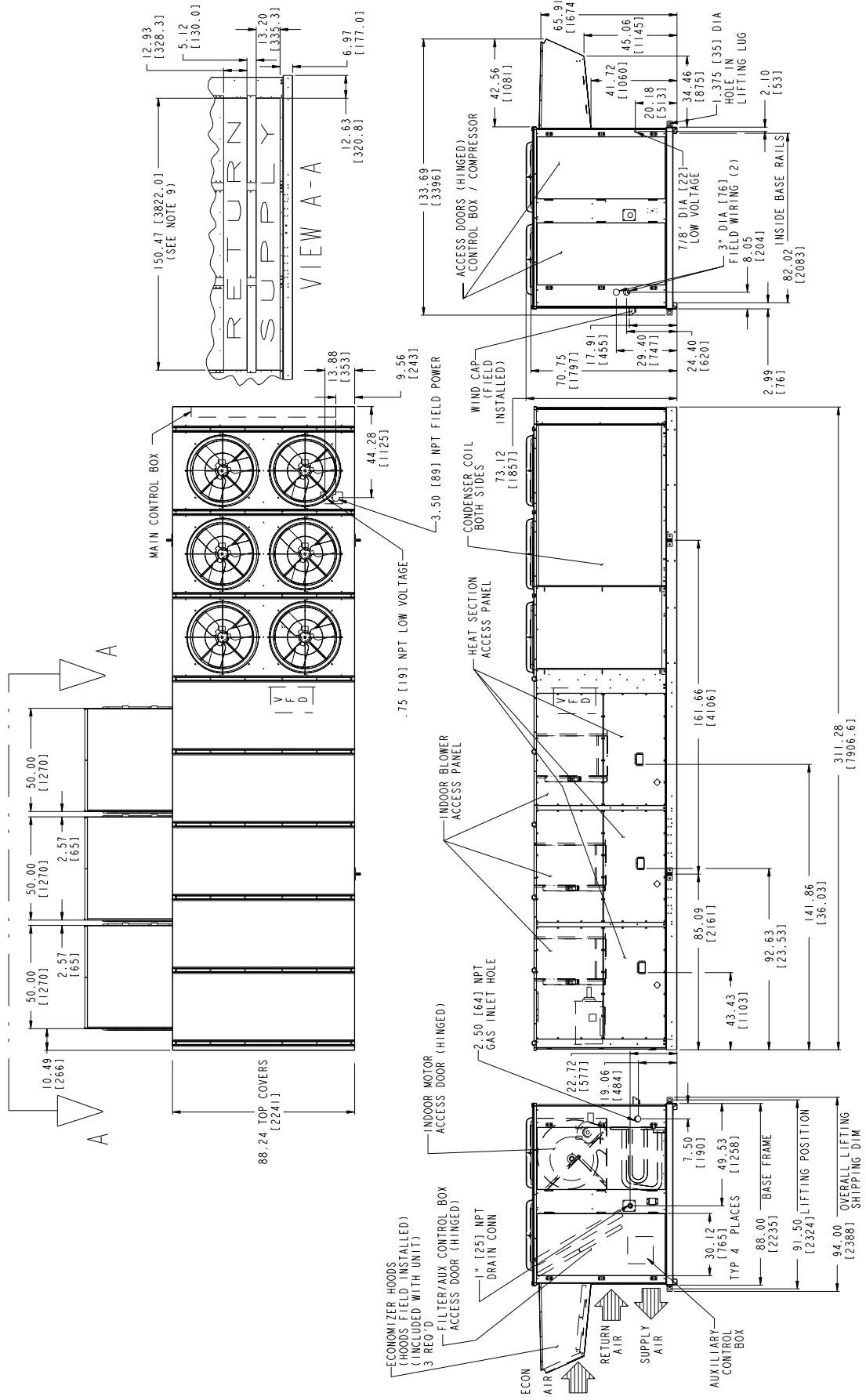
5. FOR SMALLER SERVICE AND OPERATIONAL CLEARANCES, CONTACT CARRIER APPLICATION ENGINEERING DEPARTMENT.



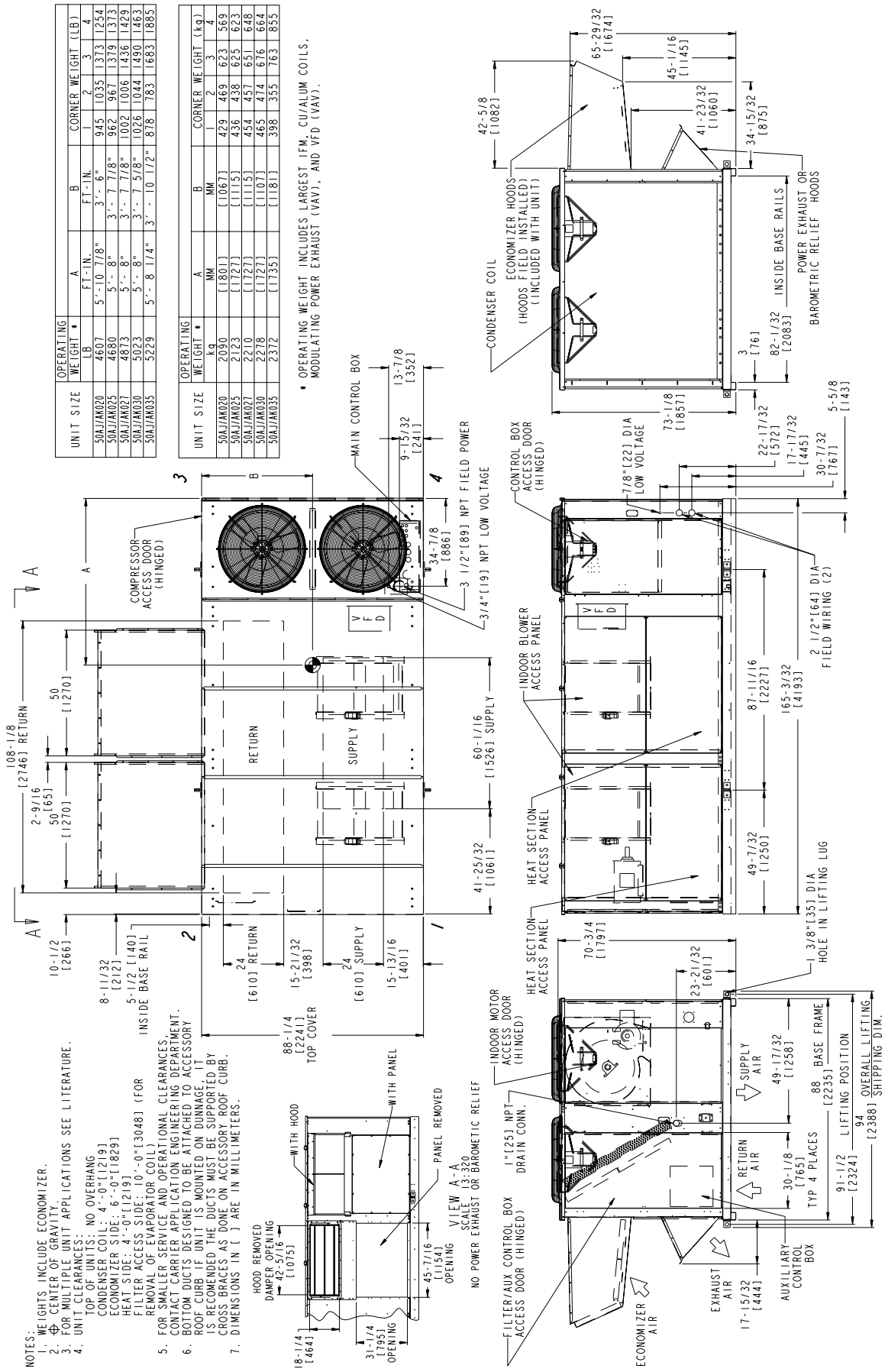
# Base unit dimensions, 48AW,AY060



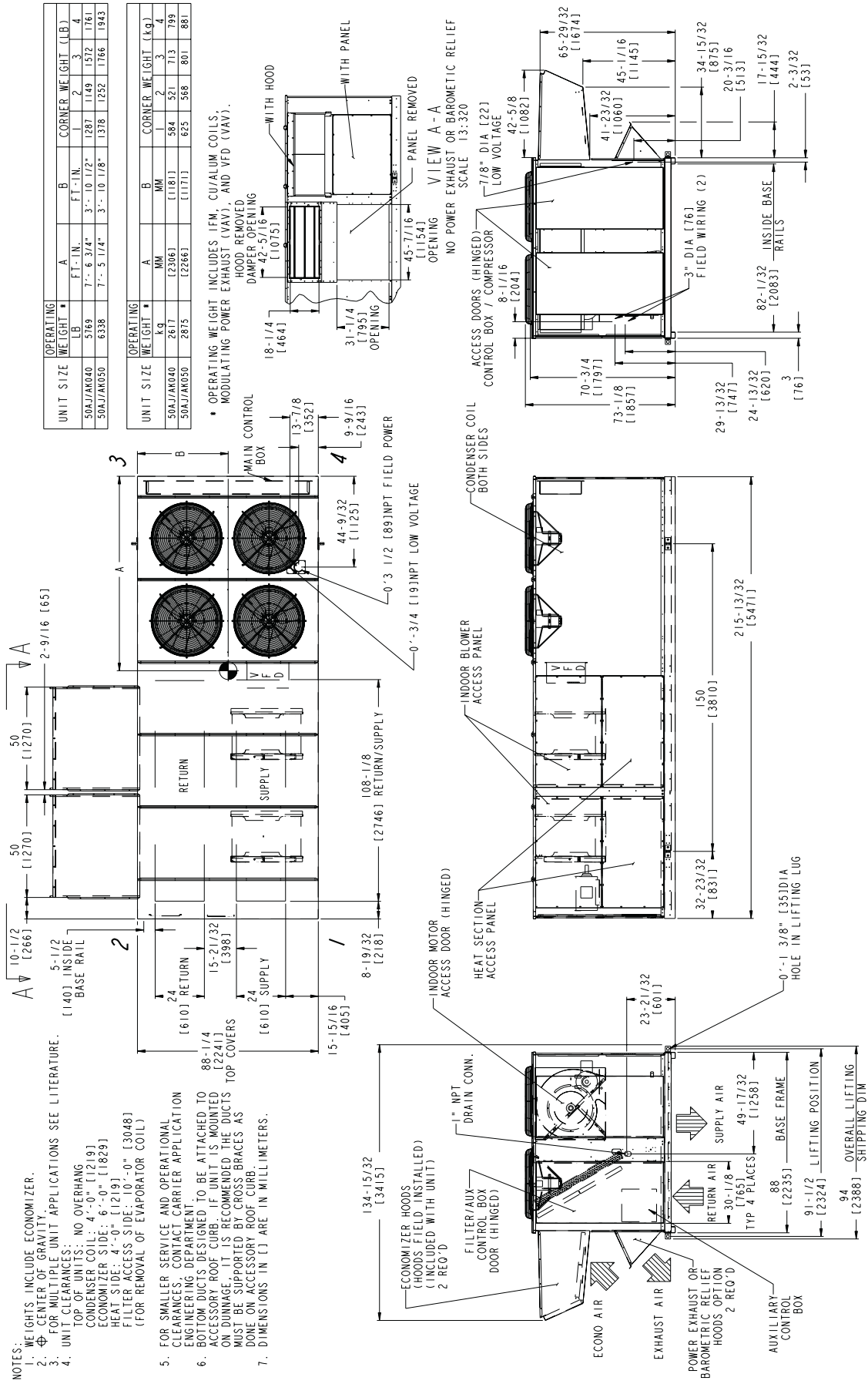
- NOTES:**
- Weights include economizer or outdoor air damper.
  - Center of Gravity.
  - For multiple unit applications see literature.
  - Unit clearances:  
Top of Units: No Overhang  
Condenser Coil: 4'-0" [1219]  
Economizer Side: 6'-0" [1219]  
Heat Side: 4'-0" [1219]  
Filter Access Side: 15'-0" [4572]  
(For Removal of Evaporator Coil)
  - For smaller service and operational clearance, contact Carrier Application Engineering Department.
  - Bottom ducts designed to be attached to accessory roof curb. If unit is mounted on downpipe, it is recommended the ducts must be supported by cross braces as done on accessory roof curb.
  - Base unit weights include outdoor air hoods and filters indoor fan motor (is not included). Add indoor motor, FROPS and accessories for total operating weight.
  - VAV motor weights include indoor motor, VFD, VFD transformer and associated wiring.
  - Dimensions in [ ] are in millimeters, kilograms or kilowatts.
  - For side-supply/return applications, a single return and supply ductwork connection is recommended for covering all three return and all three supply openings. The entire area around the duct openings is available for a 1.5" duct flange attachment.



# Base unit dimensions, 50AJ,AK020-035



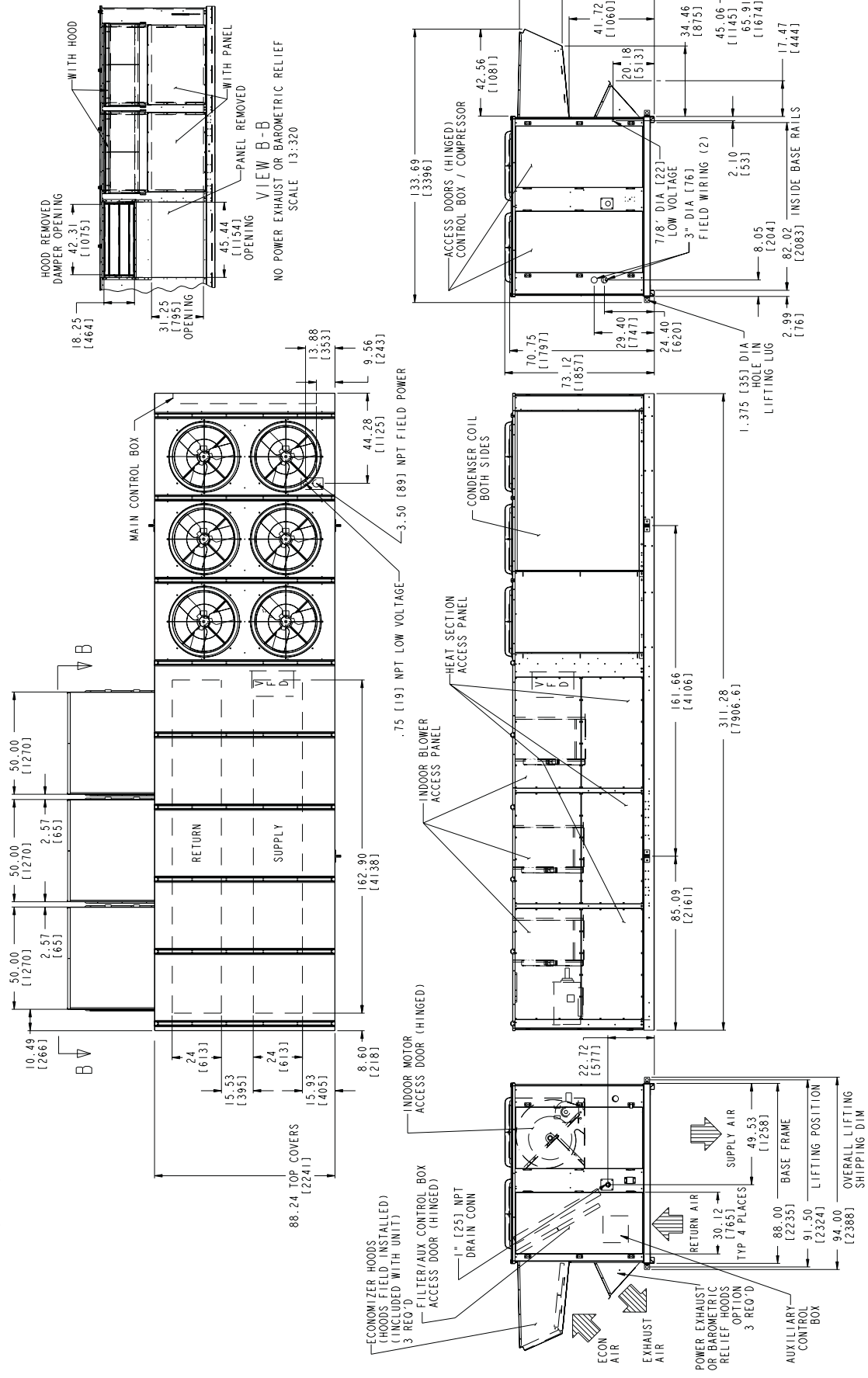
# Base unit dimensions, 50AJ,AK040-050



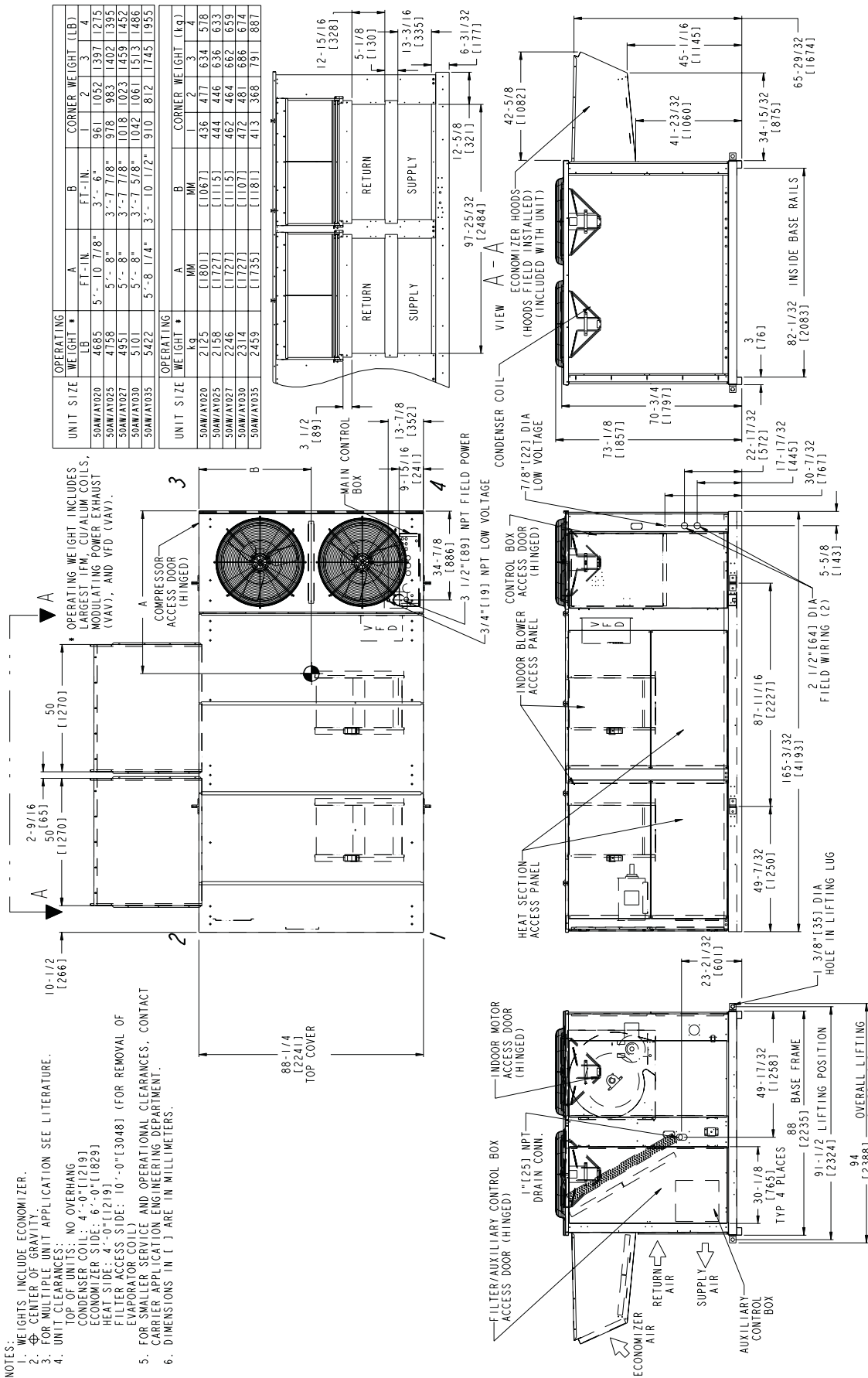
# Base unit dimensions, 50AJ,AK060



- NOTES:**
- Weights include economizer or outdoor air damper.
  - Center of Gravity.
  - For multiple unit applications see literature.
  - Unit clearances:  
 Top of Units: No Overhang  
 Condenser Coil: 4'-0" [1219]  
 Economizer Side: 6'-0" [1829]  
 Heat Side: 4'-0" [1219]  
 Filter Access Side: 15'-0" [4572]  
 (For Removal of Evaporator Coil)
  - For smaller, service, and operational clearance, contact Carrier Application Engineering Department.
  - Bottom ducts designed to be attached to, accessory, roof curb if unit is mounted on downpipe. It is recommended the ducts must be supported by cross braces as done on accessory roof curb.
  - Base unit weights include outdoor air hoods and filters (indoor fan motor is not included). Add indoor motor, FIOPs and accessories for total operating weight.
  - VAV motor weights include indoor motor, VFD, VFD transformer and associated wiring.
  - Dimensions in [ ] are in millimeters, kilograms or kilowatts.
  - For side-supply/return applications, a single return and supply ductwork connection is recommended for covering all three return and all three supply openings. The entire area around the duct openings is available for a 1.5" duct flange attachment.



# Base unit dimensions, 50AW,AY020-035



# Base unit dimensions, 50AW,AY040-050

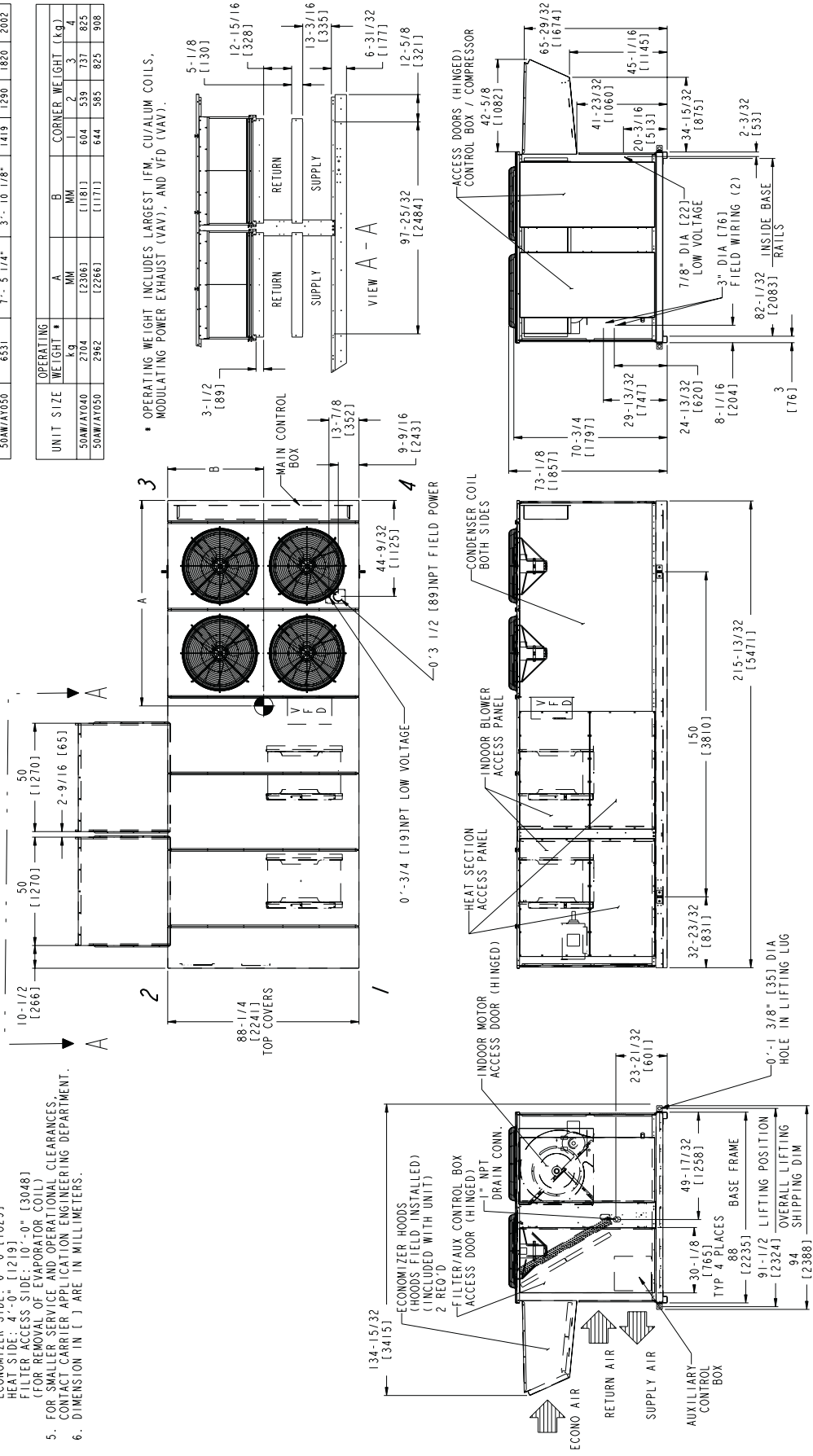


- NOTES:
- WEIGHTS INCLUDE ECONOMIZER.
  - ⊕ CENTER OF GRAVITY.
  - FOR MULTIPLE UNIT APPLICATION SEE LITERATURE.
  - UNIT CLEARANCES:  
TOP OF UNITS: NO OVERHANG  
CONDENSER COIL: 4'-0" [1219]  
ECONOMIZER SIDE: 6'-0" [1829]  
HEAT SIDE: 4'-0" [1219]  
FILTER ACCESS SIDE: 10'-0" [3048]  
(FOR REMOVAL OF EVAPORATOR COIL)  
5. FOR SMALLER SERVICE AND OPERATIONAL CLEARANCES,  
CONTACT CARRIER APPLICATION ENGINEERING DEPARTMENT.
  - DIMENSION IN [ ] ARE IN MILLIMETERS.

UNIT SIZE	OPERATING WEIGHT * LB.	A FT.-IN.	B FT.-IN.	CORNER WEIGHT (LB.)
50AW/AY040	5862	7'-6 3/4"	3'-10 1/2"	3
50AW/AY050	6531	7'-5 1/4"	3'-10 1/8"	4

UNIT SIZE	OPERATING WEIGHT * KG.	A MM.	B MM.	CORNER WEIGHT (kg)
50AW/AY040	2704	2303	1181	3
50AW/AY050	2962	2260	1171	4

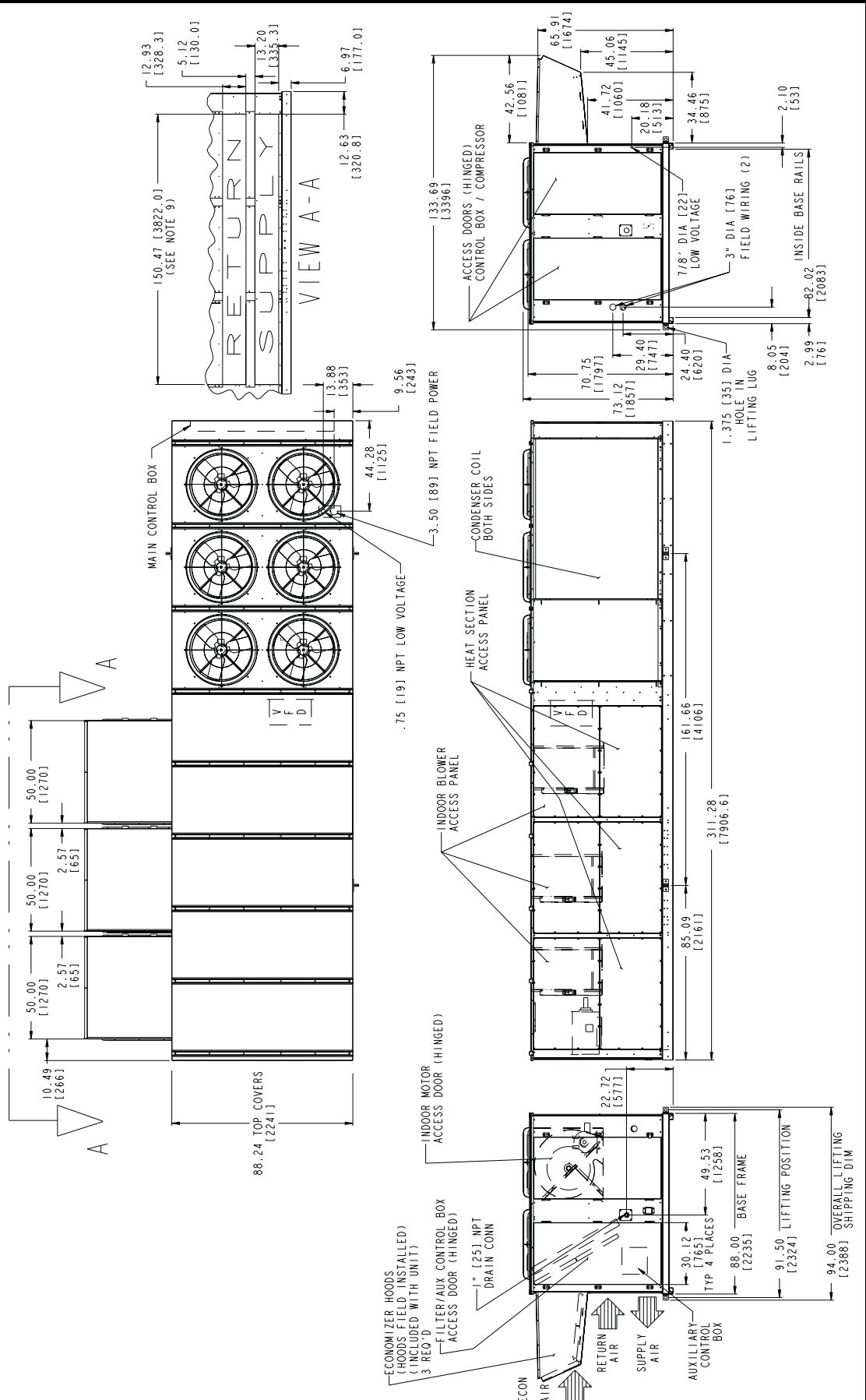
\* OPERATING WEIGHT INCLUDES LARGEST I.E.W. CU/ALUM COILS, MODULATING POWER EXHAUST (VAV), AND VFD (VAV).



# Base unit dimensions, 50AW,AY060



- NOTES:**
- Weights include economizer or outdoor air damper.
  - Center of Gravity.
  - For multiple unit applications see literature.
  - Unit clearances:  
Top of Units: No Overhang  
Condenser Coil: 4'-0" [1219]  
Economizer Side: 6'-0" [1219]  
Heat Side: 4'-0" [1219]  
Filter Access Side: 15'-0" [4572]  
(For Removal of Evaporator Coil)
  - For smaller service and operational clearance, contact Carrier Application Engineering Department.
  - Bottom ducts designed to be attached to accessory roof curb. If unit is mounted on downpipe, it is recommended the ducts must be supported by cross braces as done on accessory roof curb.
  - Base unit weights include outdoor air hoods and filters indoor fan motor (is not included). Add indoor motor, FROPS and accessories for total operating weight.
  - VAV motor weights include indoor motor, VFD, VFD transformer and associated wiring.
  - Dimensions in [ ] are in millimeters, kilograms or kilowatts.
  - For side-supply/return applications, a single return and supply ductwork connection is recommended for covering all three return and all three supply openings. The entire area around the duct openings is available for a 1.5" duct flange attachment.



# Accessory dimensions

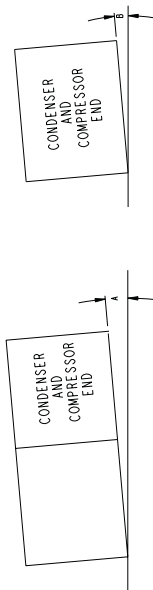


## ROOF CURB SIZES 020-035

**NOTE:**

1. UNLESS OTHERWISE SPECIFIED ALL DIM ARE TO OUTSIDE OF PART.
2. ROOFCURB ACCESSORY CRRCURB005A00 IS SHIPPED DISASSEMBLED.
3. ALL ROOFCURB PARTS ARE TO BE 14 GA GALVANIZED STL.
4. UNITS WITH ELECTRIC HEAT MUST BE INSTALLED WITH 90° ELBOW ON THE SUPPLY DUCT PRIOR TO ANY SUPPLY TAKE-OFFS OR BRANCHES.
5. DIMENSIONS IN ( ) ARE MILLIMETERS.

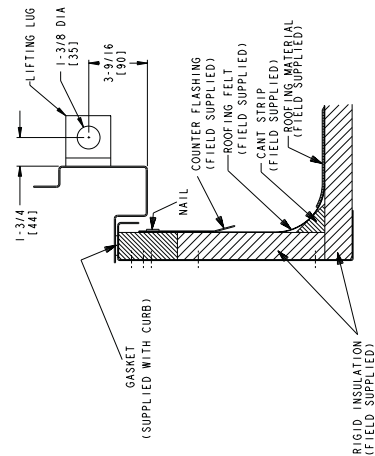
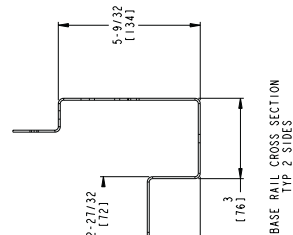
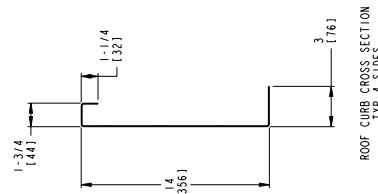
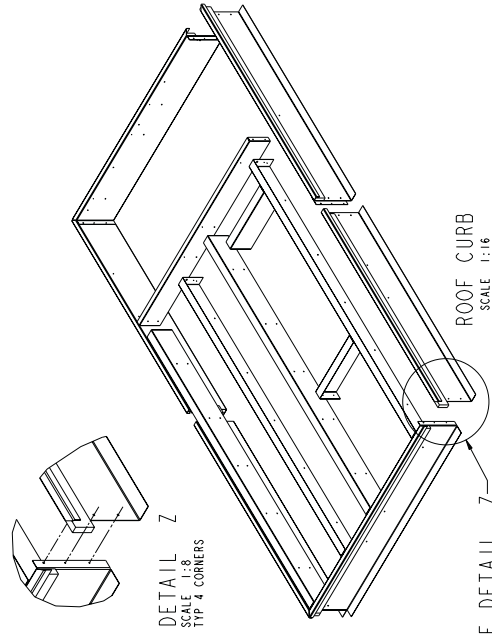
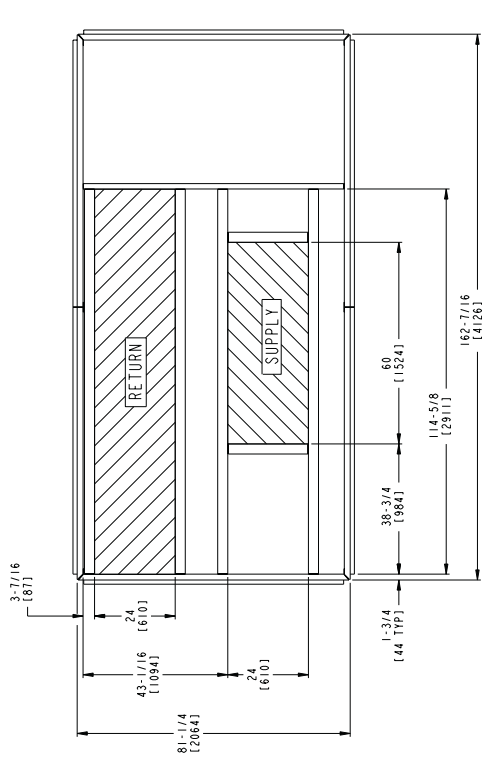
NOTE:  
TO PREVENT STANDING WATER IN THE DRAIN PAN OF THE INDOOR SECTION, AND THE HEAT EXCHANGERS UNIT CAN ONLY BE PITCHED AS SHOWN.



**DIMENSIONS**  
(DEGREES AND INCHES)

A		B	
DEG.	IN.	DEG.	IN.
L.0	2.9	.73	.50
			.75
			.19

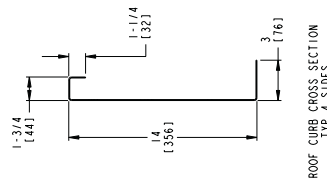
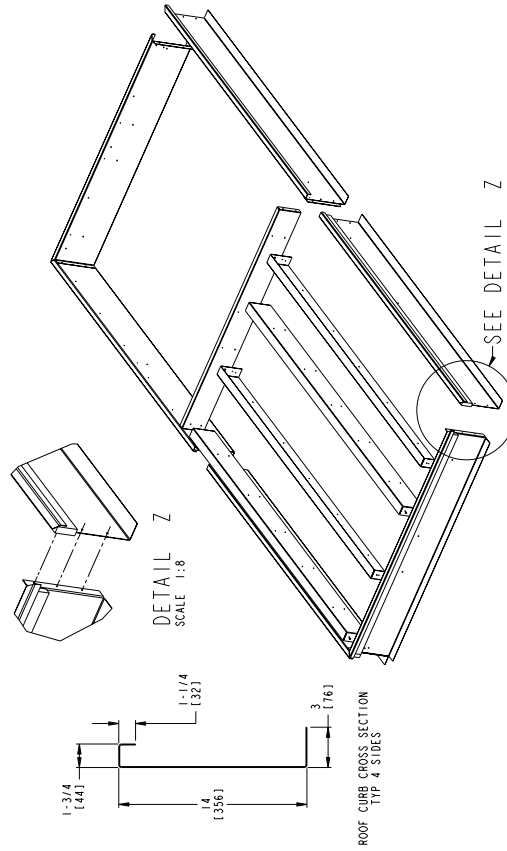
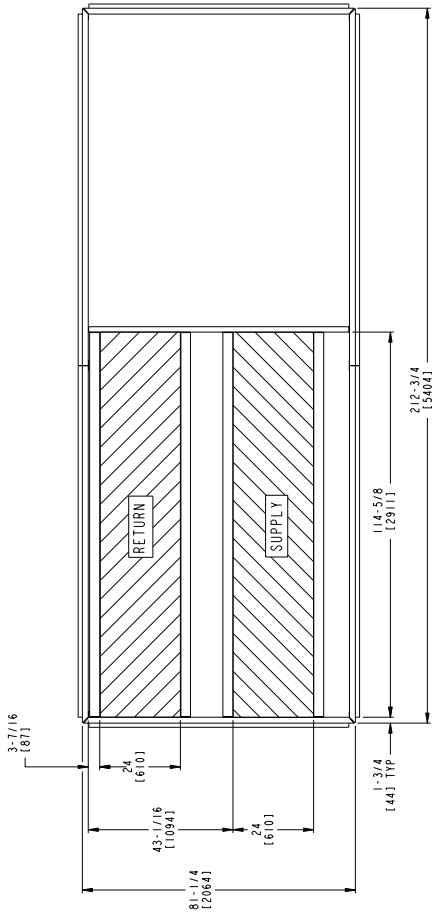
**UNIT LEVELING TOLERANCES**  
\*FROM EDGE OF UNIT TO HORIZONTAL



# Accessory dimensions (cont)



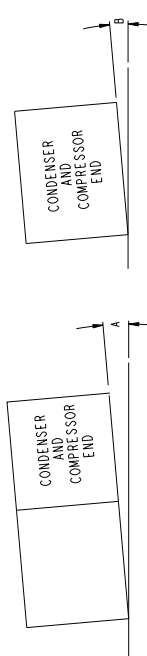
## ROOF CURB SIZES 040-050



ROOF CURB CROSS SECTION  
TYP (2) SIDES

- NOTE:**
1. UNLESS OTHERWISE SPECIFIED ALL DIM ARE TO OUTSIDE OF PART.
  2. ROOFCURB ACCESSORY CRRCUR006000 IS SHIPPED DISASSEMBLED.
  3. ALL ROOFCURB PARTS: 14 GA GALVANIZED STL.
  4. UNITS WITH ELECTRIC HEAT MUST BE INSTALLED WITH 90° ELBOW ON THE SUPPLY DUCT PRIOR TO ANY SUPPLY TAKE OFFS OR BRANCHES.
  5. DIMENSIONS IN ( ) ARE MILLIMETERS.

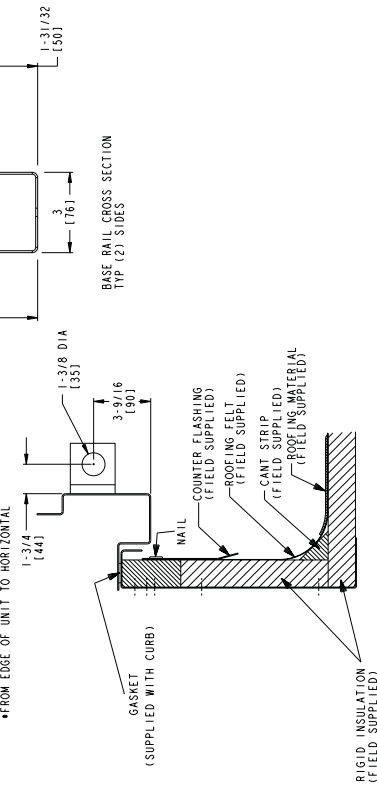
NOTE: EXISTING STANDING WATER IN THE DRAIN PAN OF THE INDOOR SECTION AND THE HEAT EXCHANGERS UNIT CAN ONLY BE PITCHED AS SHOWN.



DIMENSIONS  
(DEGREES AND INCHES)

A		B	
DEG.	IN.	DEG.	IN.
T.0	2.9	73	.50
			.75
			1.9

UNIT LEVELING TOLERANCES  
\*FROM EDGE OF UNIT TO HORIZONTAL



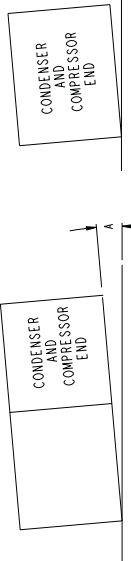
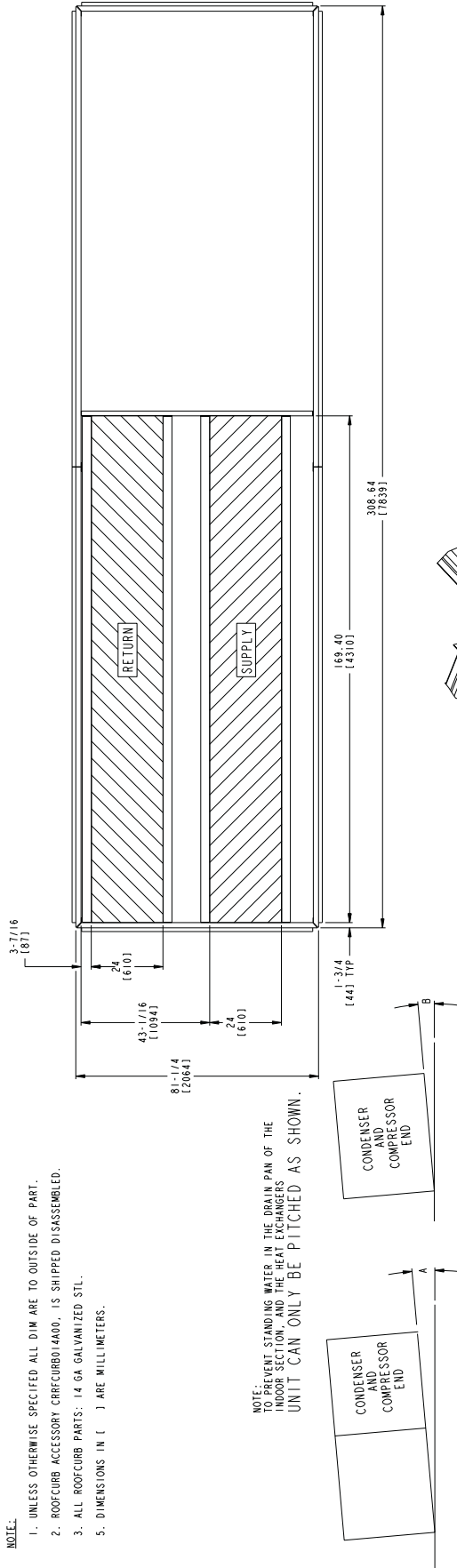
BASE RAIL CROSS SECTION  
TYP (2) SIDES

# ROOF CURB 48AJ,AK060/UNIT SUPPORT 48/50AW,AY060

**NOTE:**

1. UNLESS OTHERWISE SPECIFIED ALL DIM ARE TO OUTSIDE OF PART.
2. ROOFCURB ACCESSORY CRFCURB014A00, IS SHIPPED DISASSEMBLED.
3. ALL ROOFCURB PARTS: 14 GA GALVANIZED STL.
5. DIMENSIONS IN ( ) ARE MILLIMETERS.

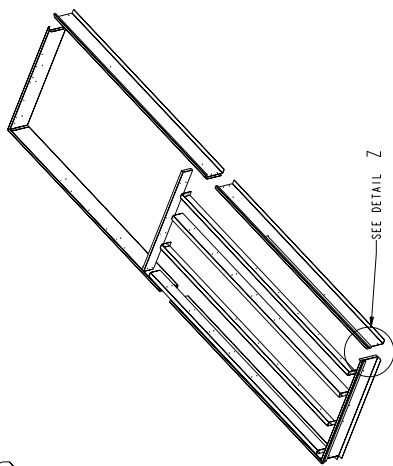
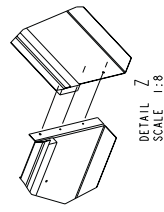
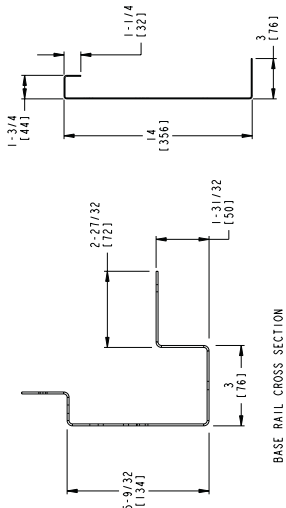
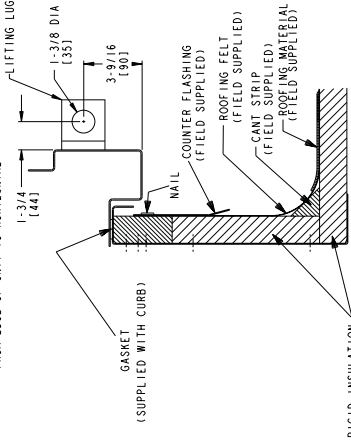
NOTE: PREVENT STANDING WATER IN THE DRAIN PAN OF THE CONDENSER OR HEAT EXCHANGERS. UNIT CAN ONLY BE PITCHED AS SHOWN.



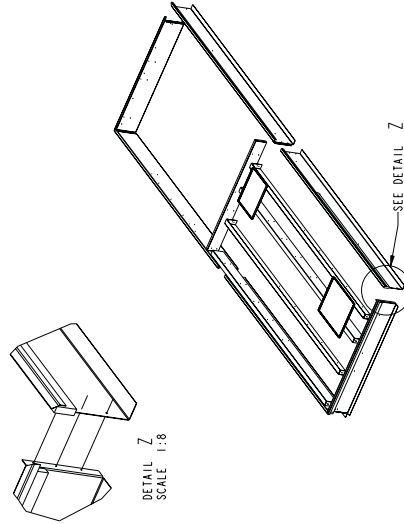
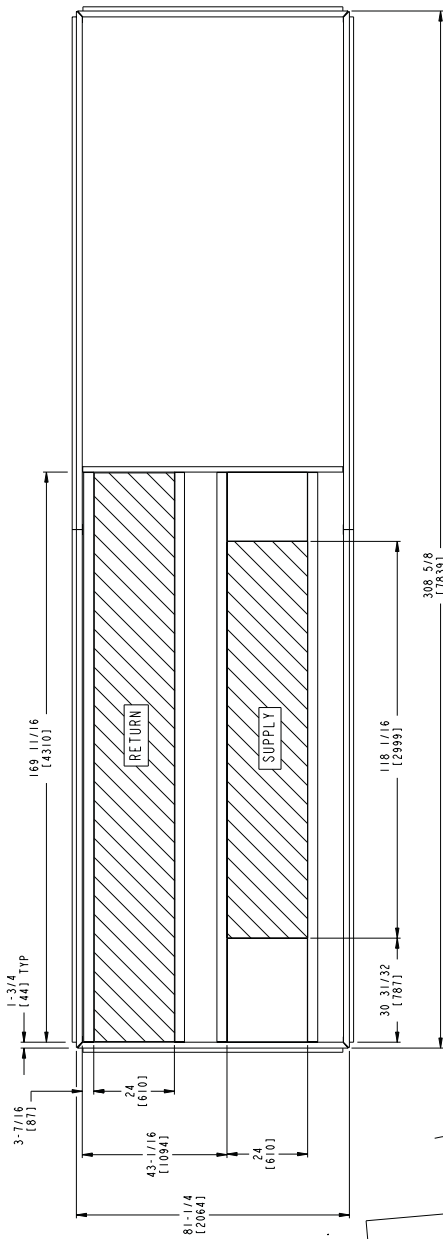
**DIMENSIONS (DEGREES AND INCHES)**

A		B	
DEG.	IN.	DEG.	IN.
1.0	5.43	.50	.75
			19

**UNIT LEVELING TOLERANCES**  
\*FROM EDGE OF UNIT TO HORIZONTAL

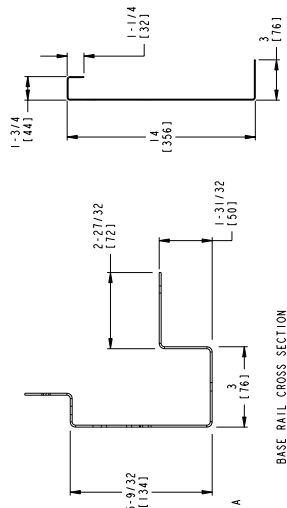
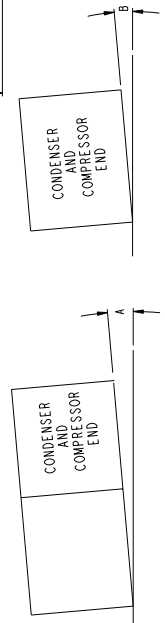


## ROOF CURB 50AJ, AK060



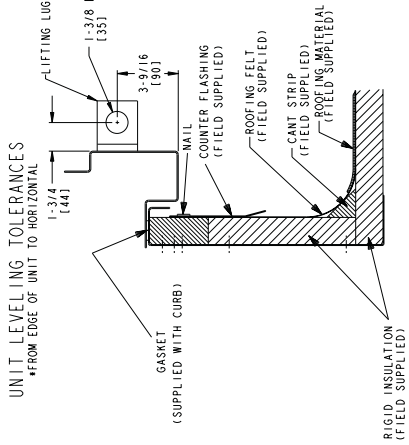
- NOTE:**
- UNLESS OTHERWISE SPECIFIED ALL DIM ARE TO OUTSIDE OF PART.
  - ROOF CURB ACCESSORY CRFCURB009400 IS SHIPPED DISASSEMBLED.
  - ALL ROOF CURB PARTS: 14 GA GALVANIZED STL.
  - UNITS WITH ELECTRIC HEAT MUST BE INSTALLED WITH 90° ELBOW ON THE SUPPLY DUCT PRIOR TO ANY SUPPLY TAKE OFFS OR BRANCHES.
  - DIMENSIONS IN ( ) ARE MILLIMETERS.

**NOTE:**  
TO PREVENT STANDING WATER IN THE DRAIN PAN OF THE INDOOR SECTION, AND THE HEAT EXCHANGERS UNIT CAN ONLY BE PITCHED AS SHOWN.

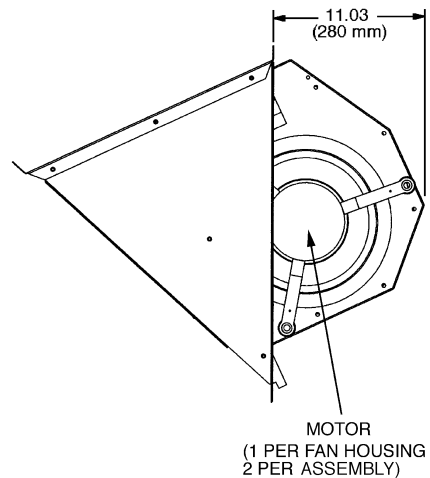
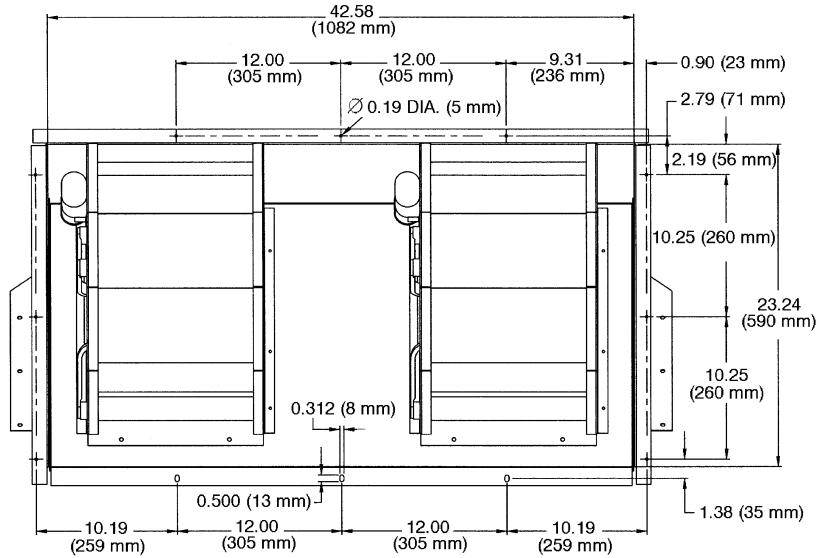


**DIMENSIONS (DEGREES AND INCHES)**

A		B	
DEG.	IN.	DEG.	IN.
1.0	5.43	1.38	.50
			.75
			1.9



### POWER EXHAUST AND BAROMETRIC RELIEF



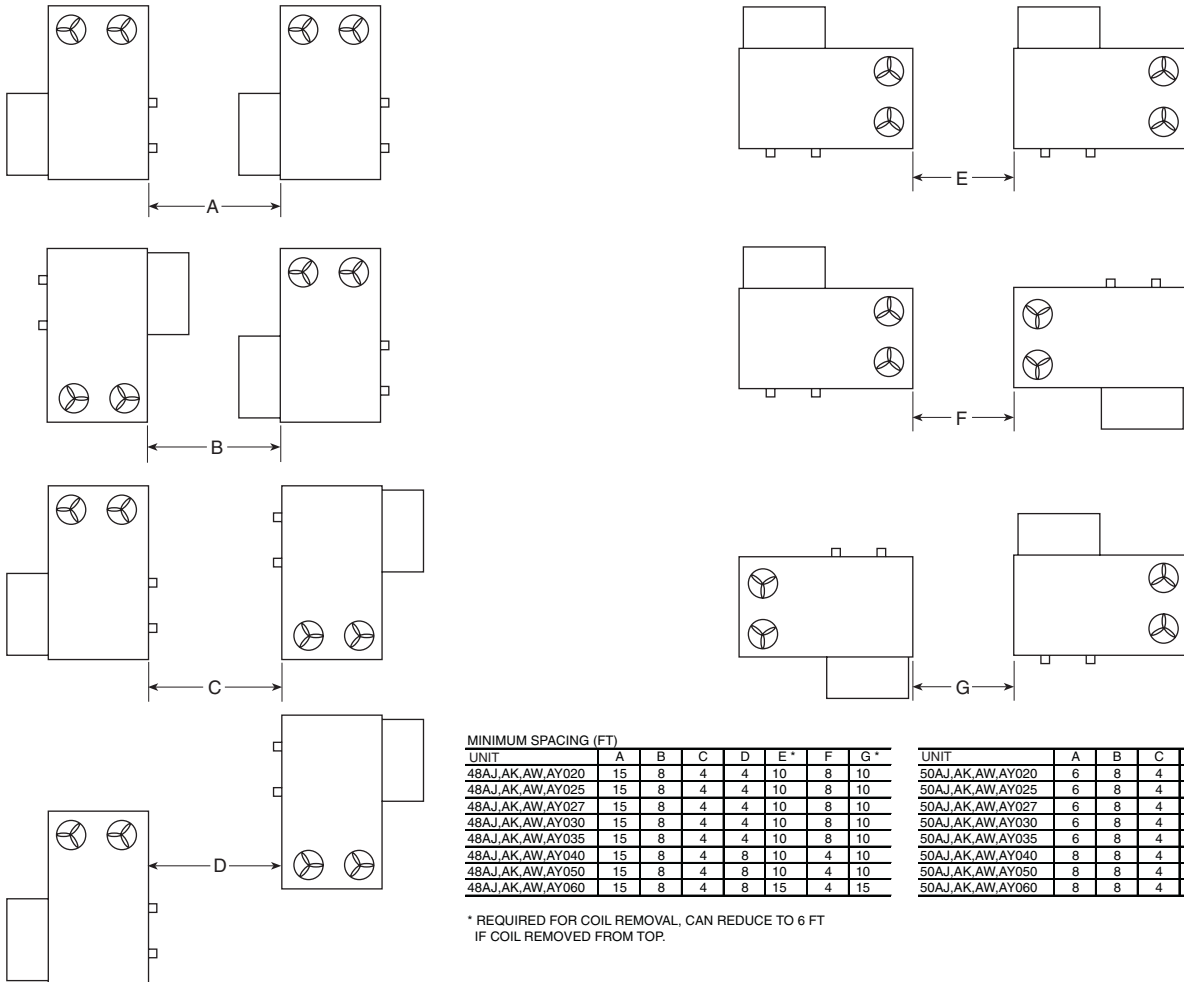
**LEGEND**

∅ — Diameter

**NOTES:**

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

### MULTIPLE UNIT APPLICATION SPACING



**MINIMUM SPACING (FT)**

UNIT	A	B	C	D	E*	F	G*
48AJ,AK,AW,AY020	15	8	4	4	10	8	10
48AJ,AK,AW,AY025	15	8	4	4	10	8	10
48AJ,AK,AW,AY027	15	8	4	4	10	8	10
48AJ,AK,AW,AY030	15	8	4	4	10	8	10
48AJ,AK,AW,AY035	15	8	4	4	10	8	10
48AJ,AK,AW,AY040	15	8	4	8	10	4	10
48AJ,AK,AW,AY050	15	8	4	8	10	4	10
48AJ,AK,AW,AY060	15	8	4	8	15	4	15

UNIT	A	B	C	D	E*	F	G*
50AJ,AK,AW,AY020	6	8	4	4	10	8	10
50AJ,AK,AW,AY025	6	8	4	4	10	8	10
50AJ,AK,AW,AY027	6	8	4	4	10	8	10
50AJ,AK,AW,AY030	6	8	4	4	10	8	10
50AJ,AK,AW,AY035	6	8	4	4	10	8	10
50AJ,AK,AW,AY040	8	8	4	8	10	4	10
50AJ,AK,AW,AY050	8	8	4	8	10	4	10
50AJ,AK,AW,AY060	8	8	4	8	15	4	15

\* REQUIRED FOR COIL REMOVAL, CAN REDUCE TO 6 FT IF COIL REMOVED FROM TOP.

# Selection procedure (with example)



## I Determine cooling and heat requirements at design conditions.

Given:

Type Application . . . . . VAV  
Required Cooling Capacity (TC) . . . . 480,000 Btuh  
Sensible Heat Capacity (SHC) . . . . 338,000 Btuh  
Required Heating Capacity . . . . . 300,000 Btuh  
Design Outdoor Air db Temperature . . . . . 95 F  
Design Outdoor Air wb Temperature . . . . . 67 F  
Climate Type (as per ASHRAE 90.1 Table D) . . Dry  
Indoor-Air Temperature . . . . . 80 F EDB, 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 the unit based on required cooling capacity.

Entering Cooling Capacity table at air condenser entering temperature of 95 F. Unit 48AKD040 at 16,000 cfm and 67 F ewb will provide the total capacity of 484,000 Btuh and a SHC of 360,000 Btuh. Calculate SHC correction, if required, using notes under cooling capacity table.

## III Select heat capacity of unit to provide design condition requirements.

In the Gas Heating Capacities and Efficiencies table note that unit 48AKD040 will provide 328,000 Btuh with an input of 400,000 Btuh.

## IV Select supply fan to provide design condition requirements.

Tabulated fan performance includes 2-in. throw-away 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 48AKD040 Fan Performance table for vertical applications. Find that the fan speed is 1063 rpm and the power required is 19.06 bhp. Refer to the Motor Limitations table which shows the 20 hp motor is required.

## V Select unit that corresponds to the power source available.

The electrical data table shows that a 460-3-60 unit is available.

## VI Select the options and accessories.

As per the ASHRAE 90.1 requirements this unit is located in a dry climate and therefore is required to have an economizer. As this is a dry climate either differential dry bulb changeover, outdoor air changeover or differential enthalpy should be used. Outside air enthalpy can not be used.

Select the options and model number using the options summary and model number charts in the price pages.

Note as an alternative a computerized selection program, *RTUBuilder*, is available for use in selecting and optimizing the unit for your application.

# Performance data



## COOLING CAPACITIES

### 48/50AJ,AK,AW,AY020 (20 TONS)

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF															
		4000/0.181				5000/0.189				6000/0.207				7000/0.236			
		Evaporator Air — Ewb (F)															
		60	62	67	72	60	62	67	72	60	62	67	72	60	62	67	72
75	TC	203	211	224	252	216	224	245	269	225	230	251	279	234	241	258	286
	SHC	162	155	134	117	180	173	151	128	197	186	162	137	209	203	173	144
	kW	14.1	14.3	14.4	14.8	14.4	14.5	14.8	15.2	14.5	14.4	14.6	15.3	14.7	14.8	14.7	15.4
85	TC	199	207	219	255	212	220	241	264	221	230	251	274	230	237	258	281
	SHC	160	153	144	160	178	171	149	127	195	187	162	135	207	201	173	142
	kW	15.8	16.1	15.6	18.3	16.1	16.3	16.6	17.0	16.4	16.6	16.9	17.2	16.6	16.7	17.1	17.4
95	TC	194	202	222	245	206	214	237	260	215	225	246	269	225	230	252	275
	SHC	157	151	134	115	176	168	148	125	191	184	160	133	201	197	171	140
	kW	17.6	17.8	18.2	18.7	17.9	18.1	18.8	19.3	18.1	18.5	18.9	19.6	18.3	18.5	19.0	19.4
105	TC	190	196	218	239	201	210	229	252	210	217	240	261	220	224	246	267
	SHC	155	148	132	113	173	166	144	122	188	180	157	130	196	194	168	137
	kW	19.5	19.6	20.4	20.8	19.8	20.3	20.5	21.0	20.0	20.2	20.9	21.2	20.3	20.4	21.2	21.4
115	TC	184	191	210	249	195	202	224	246	204	210	231	253	216	216	237	259
	SHC	152	145	128	158	170	162	142	120	183	177	153	127	192	189	164	134
	kW	21.5	21.6	22.2	20.3	21.8	22.0	22.6	23.2	22.1	22.2	22.8	23.4	22.4	22.4	23.0	23.6
120	TC	182	189	208	228	192	199	219	241	201	207	227	248	211	213	233	255
	SHC	151	144	127	109	168	161	140	118	181	175	152	125	186	187	163	133
	kW	22.4	22.6	23.2	23.8	22.8	23.1	23.6	24.2	23.0	23.3	24.0	24.5	23.4	23.5	24.2	24.7

### 48/50AJ,AK,AW,AY020 (20 TONS) (cont)

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF											
		8000/0.271				9000/0.307				10,000/0.334			
		Evaporator Air — Ewb (F)											
		60	62	67	72	60	62	67	72	60	62	67	72
75	TC	244	243	269	291	253	252	273	296	260	260	277	299
	SHC	215	212	185	151	218	223	196	158	221	228	205	164
	kW	14.8	14.6	15.3	15.5	15.0	15.0	15.3	15.6	15.1	15.1	15.4	15.7
85	TC	240	242	263	286	249	248	268	290	256	255	272	294
	SHC	212	213	184	149	215	222	193	156	218	225	203	162
	kW	16.8	16.8	17.1	17.5	16.9	16.9	17.2	17.6	17.1	17.1	17.3	17.7
95	TC	236	236	257	280	244	243	262	285	251	251	266	289
	SHC	207	208	181	147	212	216	191	154	212	220	201	160
	kW	18.8	18.6	19.0	19.5	18.8	18.8	19.2	20.0	19.0	19.1	19.4	20.1
105	TC	231	230	250	273	239	237	254	276	245	245	258	280
	SHC	201	204	178	145	203	209	188	151	205	213	197	157
	kW	20.7	20.5	21.0	21.8	20.8	20.7	21.2	21.7	20.9	21.0	21.3	21.8
115	TC	224	224	243	265	232	231	247	267	239	238	249	271
	SHC	193	200	175	142	196	205	185	148	199	205	194	154
	kW	22.7	22.6	23.2	23.8	22.9	22.8	23.3	23.8	23.3	23.1	23.4	23.9
120	TC	222	220	238	260	229	228	242	263	235	235	245	266
	SHC	191	195	173	140	193	200	183	146	195	201	192	152
	kW	23.7	23.7	24.2	24.9	23.9	23.9	24.4	25.0	24.1	24.1	24.5	25.1

#### 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:

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

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

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

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

3. The 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 =  $1.10 \times (1 - \text{BF}) \times (\text{edb} - 80)$ .

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.

# Performance data (cont)



## COOLING CAPACITIES (cont)

### 48/50AJ,AK,AW,AY025 (25 TONS)

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF															
		5000/0.191				6250/0.204				7500/0.227				8750/0.260			
		Evaporator Air — Ewb (F)															
		60	62	67	72	60	62	67	72	60	62	67	72	60	62	67	72
75	TC	240	250	271	301	272	265	288	321	266	271	304	333	277	282	312	342
	SHC	194	186	163	141	216	207	180	154	235	224	196	164	247	241	210	173
	kW	15.9	16.0	16.2	16.5	17.8	16.2	16.4	17.0	16.3	16.0	16.8	17.2	16.4	16.3	16.9	17.4
85	TC	235	244	269	297	251	259	285	313	260	268	297	327	272	278	305	334
	SHC	191	183	162	139	214	204	179	151	231	222	194	162	242	239	207	170
	kW	17.7	17.9	18.3	18.7	17.3	18.1	18.5	19.0	18.1	19.0	20.1	20.1	18.3	18.4	19.1	19.7
95	TC	230	238	264	291	243	253	279	306	253	263	289	316	266	270	297	324
	SHC	188	180	160	137	210	201	176	148	226	220	190	158	237	235	204	167
	kW	19.7	19.9	20.4	20.9	20.0	20.1	20.8	21.3	20.2	20.3	20.8	21.3	20.4	20.5	21.1	21.4
105	TC	224	232	256	282	236	246	271	297	247	255	280	307	261	263	287	314
	SHC	185	177	156	134	206	197	173	145	221	215	187	155	230	230	200	163
	kW	21.9	22.0	22.5	23.0	22.1	22.3	23.0	23.3	22.4	22.5	23.0	23.5	22.7	22.7	23.2	23.7
115	TC	217	225	249	275	229	238	262	288	241	247	271	299	254	254	278	304
	SHC	182	174	153	131	202	194	169	142	216	211	183	151	222	224	196	160
	kW	24.2	24.4	24.9	25.5	24.5	24.7	25.2	25.8	24.8	24.9	25.4	26.2	25.1	25.1	25.6	26.1
120	TC	214	222	245	281	226	235	258	283	238	247	267	292	251	251	274	300
	SHC	180	172	151	158	200	192	167	140	212	211	181	149	219	222	194	158
	kW	25.3	25.6	26.1	24.8	25.7	26.0	26.5	27.1	26.0	22.7	26.7	27.3	26.3	26.4	26.9	27.4

### 48/50AJ,AK,AW,AY025 (25 TONS) (cont)

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF											
		10,000/0.298				11,250/0.336				12,500/0.370			
		Evaporator Air — Ewb (F)											
		60	62	67	72	60	62	67	72	60	62	67	72
75	TC	290	289	319	348	299	297	324	354	308	309	329	358
	SHC	254	254	223	181	257	263	235	189	259	270	246	197
	kW	16.6	16.4	17.0	17.5	16.5	16.5	17.1	17.6	16.7	16.9	17.2	17.6
85	TC	285	285	311	340	295	293	317	344	303	302	321	349
	SHC	249	251	219	179	253	260	232	186	255	265	243	194
	kW	18.8	18.6	19.0	19.8	19.0	18.7	19.2	19.5	18.9	18.9	19.5	19.6
95	TC	278	278	302	330	289	287	307	335	297	295	311	340
	SHC	241	246	216	175	246	253	228	183	249	256	239	191
	kW	20.6	20.6	21.1	21.6	21.0	20.8	21.2	21.7	21.1	21.0	21.3	22.0
105	TC	272	271	293	321	281	280	298	325	289	288	302	329
	SHC	234	240	212	172	238	246	224	179	240	248	235	187
	kW	22.9	22.9	23.3	24.1	23.1	23.1	23.4	23.9	23.2	23.2	23.5	24.0
115	TC	265	263	284	310	274	273	288	314	282	281	292	318
	SHC	226	234	208	168	230	237	220	175	234	239	231	183
	kW	25.3	25.3	25.7	26.3	25.5	25.5	25.9	26.4	25.7	25.7	25.9	26.5
120	TC	262	260	279	304	271	269	283	309	278	277	286	312
	SHC	223	231	206	166	227	233	218	174	229	236	229	181
	kW	26.6	26.5	27.0	27.6	26.8	26.8	27.2	27.7	27.0	27.0	27.2	27.8

#### 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. The 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)**

**48/50AJ,AK,AW,AY027 (27 TONS)**

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF															
		5500/0.165				6875/0.178				8250/0.200				9625/0.239			
		Evaporator Air — Ewb (F)															
		60	62	67	72	60	62	67	72	60	62	67	72	60	62	67	72
75	TC	262	265	295	329	278	284	315	345	289	299	327	358	303	307	335	367
	SHC	213	200	178	154	239	225	198	166	261	249	215	178	270	268	230	188
	kW	17.2	16.9	17.5	18.3	17.5	17.4	18.1	18.6	17.7	17.8	18.3	18.8	17.9	18.0	18.5	19.0
85	TC	256	265	292	321	271	281	308	337	283	291	318	352	298	300	327	357
	SHC	210	201	176	151	235	223	195	163	257	245	211	175	263	264	227	185
	kW	19.3	19.3	19.7	20.3	19.4	19.6	20.1	20.6	19.6	19.8	20.3	21.9	19.9	20.0	20.5	21.1
95	TC	249	259	284	313	264	273	300	329	278	283	311	339	291	291	320	348
	SHC	207	198	173	148	231	220	192	160	253	241	208	171	256	260	224	181
	kW	21.1	21.4	21.8	22.4	21.4	21.7	22.4	23.0	22.1	21.9	22.6	23.0	22.0	22.0	23.0	23.2
105	TC	244	252	278	304	258	265	291	319	269	275	301	329	285	283	308	338
	SHC	204	194	170	144	229	216	187	156	242	238	204	167	248	255	219	178
	kW	23.4	23.6	24.3	24.7	23.8	23.9	24.4	25.1	24.0	24.1	24.7	25.3	24.3	24.3	24.9	25.7
115	TC	235	244	269	295	249	258	281	309	263	267	291	319	277	275	299	326
	SHC	199	190	166	141	224	213	183	152	236	233	200	163	240	249	216	173
	kW	25.8	26.0	26.6	27.2	26.1	26.3	27.0	27.6	26.5	26.6	27.2	27.8	26.8	26.8	27.4	28.0
120	TC	231	241	264	291	245	253	278	304	260	262	287	314	274	270	293	321
	SHC	197	188	164	139	221	211	182	151	232	231	198	161	236	244	213	171
	kW	27.0	27.2	27.9	28.6	27.3	27.6	28.2	28.9	27.8	27.9	28.5	29.3	28.1	28.1	28.7	29.4

**48/50AJ,AK,AW,AY027 (27 TONS) (cont)**

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF											
		11,000/0.283				12,375/0.325				13,750/0.359			
		Evaporator Air — Ewb (F)											
		60	62	67	72	60	62	67	72	60	62	67	72
75	TC	317	312	342	374	328	323	348	380	337	333	352	380
	SHC	275	281	245	198	278	285	260	207	281	288	273	215
	kW	18.2	17.8	18.6	19.1	18.4	18.0	18.7	19.2	18.5	18.2	18.8	19.0
85	TC	310	308	334	364	321	319	339	370	329	328	343	374
	SHC	268	278	242	194	271	280	256	204	275	283	269	213
	kW	20.1	20.1	20.9	21.1	20.3	20.4	20.7	21.3	20.5	20.7	20.8	21.4
95	TC	303	300	324	354	314	311	329	359	323	321	333	364
	SHC	260	270	238	191	262	272	252	200	266	275	265	209
	kW	22.3	22.2	22.7	23.3	22.6	22.4	22.9	23.4	22.8	22.7	22.9	23.8
105	TC	297	293	314	343	306	304	319	348	314	313	322	352
	SHC	251	261	234	187	254	264	248	196	257	267	260	205
	kW	24.6	24.5	25.0	25.7	24.8	24.9	25.3	25.8	25.0	25.1	25.2	25.9
115	TC	288	286	303	332	298	296	307	336	306	304	310	339
	SHC	243	252	229	183	245	254	243	192	248	256	255	200
	kW	27.1	27.1	27.5	28.2	27.4	27.3	27.6	28.3	27.6	27.5	27.7	28.4
120	TC	286	282	299	326	294	292	302	331	301	300	305	334
	SHC	240	246	228	181	241	251	241	190	243	253	252	199
	kW	28.4	28.4	28.8	29.5	28.7	28.6	29.0	29.8	28.9	28.9	29.1	29.8

**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:

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

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

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

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

3. The 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)

### 48/50AJ,AK,AW,AY030 (30 TONS)

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF															
		6000/0.148				7500/0.157				9000/0.186				10,500/0.223			
		Evaporator Air — Ewb (F)															
		60	62	67	72	60	62	67	72	60	62	67	72	60	62	67	72
75	TC	294	305	333	366	311	318	352	384	322	330	364	397	340	344	374	407
	SHC	241	230	202	173	270	254	223	187	291	278	241	200	304	302	259	211
	kW	19.5	19.8	20.4	21.1	20.0	20.0	20.9	21.5	20.0	20.2	21.2	21.8	20.6	20.7	21.4	22.1
85	TC	289	299	327	358	305	315	345	378	317	327	356	391	334	337	366	398
	SHC	238	228	199	170	266	253	219	185	290	277	238	197	298	298	255	208
	kW	22.0	22.4	22.9	23.6	22.3	22.6	23.3	24.8	22.7	22.9	23.6	25.2	23.1	23.2	23.9	24.6
95	TC	281	291	319	350	298	308	336	367	311	319	348	379	327	328	356	388
	SHC	234	224	196	167	262	250	216	181	283	273	234	193	290	294	251	204
	kW	24.3	24.6	25.4	26.2	24.9	25.1	25.9	26.7	25.2	25.5	26.2	27.2	25.7	25.7	26.5	27.3
105	TC	276	284	312	343	289	299	327	357	304	310	338	369	321	319	346	377
	SHC	232	220	193	164	258	245	214	177	275	269	230	189	283	288	247	200
	kW	27.0	27.3	28.1	29.0	27.4	27.7	28.4	29.5	27.9	28.1	28.9	29.8	28.5	28.4	29.2	30.1
115	TC	266	276	302	331	281	290	319	346	297	301	328	359	312	310	335	365
	SHC	227	216	188	160	253	241	209	173	267	264	226	185	273	281	243	196
	kW	29.7	30.1	31.0	31.9	30.3	30.6	31.5	32.4	30.8	31.0	31.9	33.1	31.3	31.3	32.2	33.1
120	TC	262	272	298	326	277	286	312	342	294	297	323	351	308	306	330	360
	SHC	225	214	186	158	252	239	205	171	263	262	224	183	268	277	241	194
	kW	31.2	31.5	32.5	33.4	31.7	32.1	33.0	33.9	32.3	32.4	33.3	34.4	32.9	32.8	33.7	34.7

### 48/50AJ,AK,AW,AY030 (30 TONS) (cont)

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF											
		12,000/0.268				13,500/0.309				15,000/0.342			
		Evaporator Air — Ewb (F)											
		60	62	67	72	60	62	67	72	60	62	67	72
75	TC	352	351	381	415	367	360	387	421	375	375	392	423
	SHC	306	314	275	222	313	316	291	232	313	326	306	241
	kW	20.7	20.6	21.6	22.2	21.2	20.5	21.7	22.4	21.1	21.4	21.8	22.2
85	TC	348	346	373	406	360	358	378	412	370	368	383	416
	SHC	303	313	272	219	306	316	287	229	309	322	303	239
	kW	23.4	23.4	24.1	24.8	23.7	23.7	24.2	25.4	24.1	24.0	24.4	25.1
95	TC	342	338	363	395	352	350	369	401	362	360	373	405
	SHC	293	305	268	215	298	307	284	225	301	311	298	235
	kW	26.1	26.0	26.7	27.5	26.4	26.3	27.0	27.7	26.7	26.6	27.0	27.8
105	TC	333	331	353	384	344	342	357	389	353	351	361	393
	SHC	286	295	264	211	289	298	279	221	293	301	293	231
	kW	28.8	28.7	29.4	30.3	29.1	29.1	29.6	30.5	29.5	29.4	29.7	30.6
115	TC	325	322	341	371	335	335	346	376	343	343	349	379
	SHC	276	285	259	206	280	290	274	217	282	293	288	226
	kW	31.8	31.7	32.4	33.3	32.1	32.1	32.5	33.5	32.4	32.4	32.6	33.6
120	TC	321	318	336	365	331	328	341	369	338	337	344	373
	SHC	273	281	257	204	276	283	273	214	277	286	286	224
	kW	33.3	33.1	33.9	34.9	33.6	33.6	34.1	35.0	34.0	33.9	34.2	35.2

#### 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:

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

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

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

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

- The 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)**

**48/50AJ,AK,AW,AY035 (35 TONS)**

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF															
		7000/0.111				8750/0.125				10,500/0.152				12,250/0.191			
		Evaporator Air — Ewb (F)															
		60	62	67	72	60	62	67	72	60	62	67	72	60	62	67	72
75	TC	344	356	389	425	365	378	411	448	384	393	427	464	404	405	439	476
	SHC	287	273	239	204	324	306	264	221	349	338	285	237	359	363	308	252
	kW	23.8	24.0	24.8	25.7	24.3	24.6	25.4	26.3	24.7	25.0	25.8	26.7	25.2	25.3	26.1	27.0
85	TC	336	348	380	417	356	368	402	437	375	383	417	453	396	396	428	464
	SHC	283	269	235	201	320	302	260	217	342	334	281	233	353	356	304	248
	kW	26.4	26.7	27.5	28.8	26.9	27.2	28.1	29.0	27.4	27.7	28.6	29.5	27.9	28.0	28.9	29.9
95	TC	328	341	371	406	347	359	391	426	367	373	408	441	387	386	416	454
	SHC	279	267	231	196	315	297	254	213	334	329	278	228	342	349	299	244
	kW	29.2	29.6	30.4	31.4	29.8	30.1	31.0	32.0	30.3	30.5	31.8	32.5	30.9	30.9	31.9	33.3
105	TC	321	330	361	395	338	349	380	414	359	362	393	428	378	376	403	438
	SHC	276	261	227	192	308	293	249	208	324	323	272	224	332	340	294	238
	kW	32.3	32.7	33.6	34.6	32.9	33.3	34.2	35.3	33.5	33.7	34.7	35.8	34.1	34.1	35.1	36.2
115	TC	309	320	350	383	329	338	368	401	350	351	381	414	367	366	389	424
	SHC	270	257	222	187	301	288	244	203	314	315	267	218	321	329	289	233
	kW	35.5	36.0	37.0	38.1	36.3	36.6	37.7	38.8	37.0	37.1	38.2	39.4	37.6	37.6	38.6	39.7

**48/50AJ,AK,AW,AY035 (35 TONS) (cont)**

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF											
		14,000/0.232				15,750/0.271				17,500/0.305			
		Evaporator Air — Ewb (F)											
		60	62	67	72	60	62	67	72	60	62	67	72
75	TC	421	420	447	485	436	434	454	492	448	447	460	498
	SHC	367	376	331	266	372	381	353	281	376	384	373	294
	kW	25.7	25.6	26.4	27.3	26.0	26.0	26.5	27.4	26.4	26.3	26.7	27.6
85	TC	412	411	436	473	426	425	442	479	438	437	447	485
	SHC	358	368	326	262	363	372	348	276	367	375	368	290
	kW	28.4	28.4	29.1	30.1	28.8	28.8	29.3	30.3	29.2	29.1	29.5	30.5
95	TC	403	402	423	460	417	415	429	466	428	427	435	471
	SHC	348	358	323	257	353	362	343	271	356	365	362	285
	kW	31.4	31.4	32.1	33.1	31.9	31.8	32.3	33.4	32.2	32.2	32.5	33.6
105	TC	395	392	410	448	406	405	416	451	416	416	421	456
	SHC	340	346	317	253	344	351	337	266	346	354	356	279
	kW	34.7	34.6	35.3	36.7	35.1	35.1	35.6	36.7	35.4	35.5	35.7	36.9
115	TC	382	381	396	430	395	394	402	436	405	404	406	440
	SHC	327	336	311	247	331	339	331	261	334	342	350	274
	kW	38.2	38.2	38.9	40.0	38.7	38.6	39.1	40.3	39.0	39.0	39.2	40.5

**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:**

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

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

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

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

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

3. The 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)

### 48/50AJ,AK,AW,AY040 (40 TONS)

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF															
		8000/0.153				10,000/0.162				12,000/0.162				14,000/0.216			
		Evaporator Air — Ewb (F)															
		60	62	67	72	60	62	67	72	60	62	67	72	60	62	67	72
75	TC	397	404	449	484	418	433	472	516	435	449	489	533	454	461	502	542
	SHC	322	304	272	230	360	342	299	251	391	375	324	268	409	404	348	283
	kW	26.1	26.1	27.2	27.2	26.7	26.9	27.6	28.4	27.0	27.2	27.9	28.7	27.3	27.5	28.2	28.5
85	TC	388	401	439	480	408	423	461	503	425	438	477	520	445	450	490	532
	SHC	317	303	267	229	354	337	294	246	387	370	319	263	399	398	344	279
	kW	29.4	29.6	30.3	31.1	29.7	30.0	30.7	31.5	30.1	30.4	31.1	31.9	30.5	30.6	32.0	32.2
95	TC	378	392	428	468	398	413	449	491	415	426	465	506	435	438	475	517
	SHC	312	299	262	224	349	332	289	242	378	364	314	258	387	391	337	274
	kW	32.7	33.1	33.7	34.6	33.1	33.4	34.2	35.1	33.5	33.8	34.6	35.4	33.9	34.0	34.8	35.6
105	TC	368	381	417	455	388	401	437	477	406	414	451	492	426	426	461	501
	SHC	307	292	257	219	343	327	284	236	368	358	309	253	375	383	331	268
	kW	36.3	36.6	37.4	38.3	36.7	37.1	37.9	38.8	37.2	37.4	38.3	39.2	37.7	37.7	38.5	39.4
115	TC	357	370	406	442	377	388	424	462	395	404	437	476	416	414	446	485
	SHC	302	287	252	214	337	324	278	231	357	352	302	247	362	373	325	262
	kW	40.4	40.6	41.2	42.4	40.9	41.2	42.1	42.9	41.3	41.4	42.2	43.3	41.6	41.8	42.6	43.5
120	TC	351	365	398	435	371	382	418	455	390	395	431	467	409	407	439	477
	SHC	299	284	249	211	333	318	276	228	351	348	300	244	358	370	322	259
	kW	42.4	42.7	43.7	44.3	43.0	43.3	44.0	45.2	43.4	43.7	44.6	45.5	44.0	44.0	44.6	45.8

### 48/50AJ,AK,AW,AY040 (40 TONS) (cont)

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF											
		16,000/0.258				18,000/0.296				20,000/0.334			
		Evaporator Air — Ewb (F)											
		60	62	67	72	60	62	67	72	60	62	67	72
75	TC	473	472	511	555	489	486	518	556	502	500	515	570
	SHC	415	426	371	298	421	436	392	311	426	440	408	327
	kW	27.6	27.7	28.4	29.1	27.9	27.9	28.5	28.7	28.2	28.2	27.9	29.4
85	TC	463	462	498	541	479	476	504	549	492	488	509	555
	SHC	404	417	365	293	410	424	393	308	414	428	405	322
	kW	30.8	30.8	31.5	32.4	31.2	31.1	31.7	32.5	31.4	31.3	31.8	32.6
95	TC	454	451	484	526	468	466	490	533	480	477	495	539
	SHC	393	406	360	288	400	410	380	303	402	416	399	316
	kW	34.3	34.3	35.0	35.9	34.7	34.6	35.1	36.0	34.9	34.8	35.3	36.2
105	TC	443	440	469	510	457	454	474	517	468	466	480	523
	SHC	381	392	353	282	385	399	380	297	389	402	393	311
	kW	38.1	38.0	38.7	39.6	38.4	38.3	38.9	39.8	38.7	38.6	39.0	40.0
115	TC	431	428	453	493	444	443	459	499	456	454	465	505
	SHC	368	385	353	276	377	383	366	291	378	390	386	304
	kW	42.2	42.4	42.8	43.7	42.5	42.4	43.0	43.9	42.7	42.6	43.2	44.1
120	TC	425	422	445	485	438	435	452	491	448	446	456	496
	SHC	361	374	343	274	365	378	364	288	369	380	382	301
	kW	44.4	44.4	45.0	46.0	44.8	44.7	45.0	46.0	45.1	45.0	45.4	46.1

#### 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.

- The 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 =  $1.10 \times (1 - \text{BF}) \times (\text{edb} - 80)$ .

- 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)

#### 48/50AJ,AK,AW,AY050 (50 TONS)

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF															
		10,000/0.134				12,500/0.143				15,000/0.163				17,500/0.198			
		Evaporator Air — Ewb (F)															
		60	62	67	72	60	62	67	72	60	62	67	72	60	62	67	72
75	TC	496	514	560	610	525	542	589	640	548	562	609	661	576	579	624	676
	SHC kW	408	389	340	292	457	434	376	314	499	476	409	337	515	515	441	358
85	TC	484	502	547	597	512	528	575	625	537	548	594	644	565	564	608	659
	SHC kW	401	383	335	287	452	427	368	308	490	470	403	331	501	508	434	351
95	TC	473	489	533	581	499	514	559	608	525	533	578	627	553	549	591	641
	SHC kW	397	376	329	280	445	421	361	302	477	462	396	323	487	498	426	345
105	TC	459	475	519	565	485	500	543	591	513	518	561	611	540	535	573	621
	SHC kW	389	368	322	274	438	413	355	295	463	455	386	318	472	486	419	338
115	TC	446	460	505	548	471	485	527	572	500	502	542	589	524	520	554	600
	SHC kW	383	361	316	267	430	407	347	288	449	447	380	310	462	471	412	330
120	TC	438	453	495	539	464	477	518	562	493	493	534	579	518	513	543	589
	SHC kW	379	357	311	263	424	404	343	285	440	443	378	306	450	465	408	326

#### 48/50AJ,AK,AW,AY050 (50 TONS) (cont)

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF											
		20,000/0.243				22,500/0.284				25,000/0.316			
		Evaporator Air — Ewb (F)											
		60	62	67	72	60	62	67	72	60	62	67	72
75	TC	599	595	634	689	620	616	643	698	636	633	650	705
	SHC kW	524	540	470	378	530	547	500	397	535	552	527	417
85	TC	588	583	617	670	607	603	626	679	623	619	632	686
	SHC kW	509	526	463	371	515	533	493	390	521	536	520	409
95	TC	574	570	600	651	592	590	608	659	608	604	614	666
	SHC kW	496	509	456	364	500	520	485	383	505	521	511	402
105	TC	561	556	582	633	578	574	589	639	592	589	595	645
	SHC kW	480	495	449	358	483	500	477	376	489	504	504	395
115	TC	544	541	562	609	561	558	569	619	575	572	575	622
	SHC kW	465	477	441	350	467	482	470	369	473	486	496	389
120	TC	537	533	552	599	553	549	559	605	566	563	565	611
	SHC kW	456	469	437	346	459	473	465	364	464	477	492	385

#### 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. The 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)

### 48/50AJ,AK,AW,AY060 (60 TONS)

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF															
		12,000/0.114				15,000/0.129				18,000/0.157				21,000/0.202			
		Evaporator Air — Ewb (F)															
		60	62	67	72	60	62	67	72	60	62	67	72	60	62	67	72
75	TC	597	607	678	727	634	656	708	782	667	674	742	808	699	704	763	827
	SHC	495	467	415	349	557	527	454	385	600	574	497	410	627	628	535	434
	kW	40.8	40.6	43.3	43.2	42.6	43.4	43.0	46.6	43.1	41.4	44.4	47.2	43.9	43.9	45.3	43.7
85	TC	579	598	643	717	621	626	695	757	649	656	720	780	689	693	738	804
	SHC	486	465	400	346	546	521	449	375	585	574	488	400	595	612	526	426
	kW	45.9	46.1	46.2	48.8	46.8	46.9	48.4	49.8	47.2	47.6	49.5	50.3	48.1	48.3	51.4	52.6
95	TC	562	584	637	697	594	615	671	728	632	638	694	754	668	666	713	774
	SHC	477	455	396	337	537	508	439	366	568	560	477	390	578	589	514	415
	kW	50.3	50.9	52.2	53.7	51.2	51.7	53.0	54.5	52.2	52.4	54.8	56.0	53.1	53.0	55.2	56.7
105	TC	543	566	617	674	571	594	646	706	604	613	674	728	648	641	685	742
	SHC	467	445	387	325	523	498	427	352	558	548	468	380	557	570	503	405
	kW	55.4	56.1	58.0	59.1	56.3	56.8	58.3	59.9	57.3	57.6	59.2	60.9	58.5	58.1	59.4	61.4
115	TC	523	539	590	649	555	570	621	680	598	591	641	703	622	614	659	711
	SHC	457	433	375	317	501	489	416	345	517	537	455	371	542	557	494	398
	kW	60.5	61.7	63.2	64.9	62.1	62.7	63.9	65.8	63.1	63.1	64.7	66.9	64.3	64.0	65.3	66.8
120	TC	511	529	580	637	542	555	609	663	580	575	628	686	610	602	641	700
	SHC	452	428	371	312	501	480	412	339	517	529	448	364	539	545	486	389
	kW	63.7	64.4	66.0	67.9	65.2	65.9	67.2	68.7	66.5	66.2	67.7	69.5	67.1	67.3	68.2	69.8

### 48/50AJ,AK,AW,AY060 (60 TONS) (cont)

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm / BF							
		24,000/0.243				27,000/0.279			
		Evaporator Air — Ewb (F)							
		60	62	67	72	60	62	67	72
75	TC	724	728	778	843	757	756	787	840
	SHC	626	649	571	458	647	663	606	477
	kW	42.5	45.2	45.5	47.9	45.2	45.6	45.7	44.7
85	TC	705	712	747	817	736	726	755	828
	SHC	617	625	565	449	624	657	593	472
	kW	50.4	48.6	49.8	51.0	49.5	49.0	50.5	51.5
95	TC	694	697	725	787	716	716	735	797
	SHC	595	596	549	439	605	605	585	463
	kW	54.8	53.8	54.5	56.1	55.4	55.3	54.9	56.3
105	TC	669	670	691	756	693	680	707	766
	SHC	590	582	536	429	579	609	573	451
	kW	59.5	59.1	59.8	61.2	60.0	59.3	60.2	61.5
115	TC	646	638	670	730	668	658	676	740
	SHC	550	574	528	418	572	582	560	440
	kW	64.9	64.5	65.9	67.5	65.9	65.3	65.7	68.0
120	TC	634	628	653	712	652	654	662	721
	SHC	549	564	522	412	561	559	555	435
	kW	68.0	67.8	68.6	70.3	68.6	68.4	68.9	70.6

#### 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:

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

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

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

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

3. The 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.



## FAN PERFORMANCE — VERTICAL DISCHARGE UNITS

**48AJ,AK020,025 (20 THRU 25 TONS)**

Cfm	Available External Static Pressure (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4,000	394	1.06	413	1.15	478	1.51	536	1.89	588	2.29	635	2.69	679	3.11	720	3.53	758	3.96	794	4.39
5,000	388	1.26	448	1.58	509	1.96	563	2.36	613	2.77	659	3.20	702	3.63	742	4.08	780	4.53	816	4.99
6,000	427	1.76	489	2.15	544	2.54	595	2.96	642	3.38	686	3.83	727	4.28	766	4.74	804	5.21	839	5.69
7,000	476	2.44	534	2.86	584	3.28	631	3.70	675	4.15	717	4.60	756	5.07	794	5.54	830	6.03	865	6.53
7,500	502	2.83	557	3.27	606	3.70	651	4.14	694	4.59	734	5.05	772	5.52	809	6.01	845	6.50	878	7.00
8,000	527	3.26	580	3.72	628	4.16	671	4.61	713	5.07	752	5.54	789	6.02	825	6.51	860	7.01	893	7.51
9,000	580	4.25	629	4.74	674	5.21	715	5.68	753	6.16	790	6.65	826	7.14	860	7.65	893	8.16	925	8.67
10,000	633	5.40	679	5.93	721	6.43	760	6.93	796	7.43	831	7.94	865	8.45	897	8.96	929	9.49	959	10.02
11,000	687	6.74	731	7.30	770	7.84	807	8.36	842	8.89	875	9.41	907	9.94	937	10.47	967	11.01	997	11.55
12,000	741	8.26	783	8.86	820	9.43	855	9.98	888	10.53	920	11.08	950	11.62	980	12.18	1008	12.73	1036	13.29
12,500	768	9.10	809	9.71	846	10.30	880	10.87	912	11.43	943	11.99	973	12.54	1002	13.10	1030	13.67	1057	14.23
13,000	796	9.98	835	10.62	871	11.22	905	11.80	936	12.38	966	12.95	996	13.51	1024	14.08	1051	14.65	1078	15.23

**48AJ,AK020,025 (20 THRU 25 TONS) (cont)**

Cfm	Available External Static Pressure (in. wg)																			
	2.2		2.4		2.6		2.8		3.0		3.2		3.4		3.6		3.8		4.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4,000	828	4.83	861	5.27	892	5.72	922	6.17	951	6.62	979	7.08	1006	7.54	1032	8.00	1058	8.47	1082	8.93
5,000	850	5.46	883	5.93	915	6.40	945	6.88	974	7.36	1002	7.85	1030	8.34	1056	8.83	1082	9.33	1107	9.82
6,000	873	6.18	906	6.67	937	7.17	967	7.67	997	8.18	1025	8.69	1052	9.20	1079	9.72	1105	10.24	1130	10.77
7,000	898	7.03	930	7.54	961	8.05	991	8.57	1020	9.10	1048	9.63	1075	10.16	1101	10.70	1127	11.25	1153	11.79
7,500	911	7.51	943	8.02	973	8.55	1003	9.08	1032	9.61	1060	10.15	1087	10.69	1113	11.24	1139	11.79	1164	12.35
8,000	925	8.03	956	8.55	986	9.08	1016	9.62	1044	10.16	1072	10.70	1099	11.26	1125	11.81	1150	12.37	1175	12.94
9,000	956	9.20	986	9.74	1015	10.28	1043	10.83	1071	11.38	1098	11.94	1124	12.50	1150	13.08	1175	13.65	1200	14.23
10,000	989	10.56	1018	11.10	1046	11.66	1073	12.21	1100	12.78	1126	13.35	1152	13.93	1177	14.51	—	—	—	—
11,000	1025	12.10	1053	12.66	1080	13.23	1106	13.80	1132	14.37	1158	14.95	1182	15.54	—	—	—	—	—	—
12,000	1063	13.85	1090	14.42	1116	15.00	1142	15.58	1166	16.17	1191	16.76	—	—	—	—	—	—	—	—
12,500	1083	14.80	1109	15.38	1135	15.96	1160	16.55	1185	17.14	—	—	—	—	—	—	—	—	—	—
13,000	1104	15.81	1129	16.39	1155	16.98	1179	17.57	—	—	—	—	—	—	—	—	—	—	—	—

**48AJ,AK027,030 (27 THRU 30 TONS)**

Cfm	Available External Static Pressure (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
5,500	408	1.50	473	1.88	530	2.27	582	2.67	631	3.10	675	3.53	717	3.98	757	4.43	795	4.89	830	5.36
6,000	433	1.80	495	2.18	549	2.58	600	3.00	646	3.43	690	3.87	731	4.32	770	4.79	807	5.26	843	5.74
7,000	484	2.49	540	2.91	591	3.33	637	3.76	681	4.21	722	4.66	761	5.13	799	5.61	835	6.09	869	6.59
8,000	537	3.34	589	3.79	635	4.23	678	4.69	719	5.15	758	5.62	795	6.10	831	6.59	865	7.09	898	7.60
8,250	550	3.57	601	4.03	647	4.49	689	4.94	729	5.41	768	5.88	804	6.37	840	6.86	874	7.37	906	7.88
9,000	590	4.35	638	4.83	682	5.31	723	5.78	761	6.26	798	6.75	833	7.24	867	7.75	899	8.26	931	8.78
10,000	645	5.53	690	6.05	731	6.56	769	7.05	805	7.55	840	8.06	873	8.57	905	9.09	936	9.61	967	10.15
11,000	700	6.90	742	7.46	781	7.99	817	8.51	851	9.04	884	9.56	916	10.09	946	10.62	976	11.16	1005	11.71
12,000	755	8.46	795	9.05	832	9.61	866	10.17	899	10.71	930	11.26	960	11.81	989	12.36	1018	12.91	1045	13.47
13,000	811	10.23	849	10.85	884	11.44	917	12.02	948	12.59	978	13.16	1006	13.73	1034	14.30	1061	14.87	1088	15.45
13,750	854	11.69	890	12.33	924	12.95	955	13.55	985	14.14	1014	14.72	1042	15.31	1069	15.89	1095	16.48	1121	17.07
14,000	868	12.20	904	12.86	937	13.48	968	14.08	998	14.68	1026	15.27	1054	15.86	1081	16.45	1107	17.05	1132	17.64
15,000	924	14.40	959	15.08	990	15.73	1020	16.37	1049	16.99	1076	17.61	1103	18.22	1128	18.83	1153	19.44	1178	20.05

**48AJ,AK027,030 (27 THRU 30 TONS) (cont)**

Cfm	Available External Static Pressure (in. wg)																			
	2.2		2.4		2.6		2.8		3.0		3.2		3.4		3.6		3.8		4.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
5,500	864	5.84	897	6.32	928	6.81	959	7.30	988	7.80	1016	8.30	1043	8.80	1070	9.31	1096	9.82	1121	10.33
6,000	876	6.23	909	6.72	940	7.22	970	7.72	999	8.23	1028	8.74	1055	9.25	1081	9.77	1107	10.29	1132	10.82
7,000	902	7.09	934	7.60	965	8.12	994	8.64	1023	9.17	1051	9.70	1078	10.23	1105	10.77	1131	11.32	1156	11.86
8,000	930	8.12	961	8.64	991	9.17	1020	9.71	1049	10.25	1076	10.80	1103	11.35	1129	11.90	1155	12.47	1180	13.03
8,250	938	8.40	969	8.92	998	9.46	1027	10.00	1055	10.54	1083	11.09	1109	11.65	1135	12.21	1161	12.78	1186	13.34
9,000	962	9.31	992	9.84	1021	10.39	1049	10.94	1076	11.49	1103	12.05	1130	12.62	1155	13.19	1180	13.76	—	—
10,000	996	10.69	1025	11.24	1053	11.79	1080	12.35	1107	12.92	1133	13.49	1158	14.07	1183	14.65	—	—	—	—
11,000	1033	12.26	1060	12.82	1087	13.39	1114	13.96	1139	14.54	1165	15.12	1189	15.71	—	—	—	—	—	—
12,000	1072	14.04	1099	14.61	1125	15.19	1150	15.77	1175	16.36	1199	16.96	—	—	—	—	—	—	—	—
13,000	1114	16.03	1139	16.62	1164	17.21	1188	17.80	—	—	—	—	—	—	—	—	—	—	—	—
13,750	1146	17.66	1171	18.26	1195	18.86	—	—	—	—	—	—	—	—	—	—	—	—	—	—
14,000	1157	18.23	1181	18.84	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
15,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Legend and Notes on page 45.

# Performance data (cont)



## FAN PERFORMANCE — VERTICAL DISCHARGE UNITS (cont)

### 48AJ,AK035 (35 TONS)

Cfm	Available External Static Pressure (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
7,000	549	2.97	598	3.40	644	3.83	687	4.28	728	4.73	767	5.20	805	5.68	840	6.17	874	6.67	907	7.17
8,000	606	3.95	651	4.40	694	4.85	734	5.32	772	5.79	808	6.28	844	6.77	878	7.27	910	7.79	942	8.31
9,000	664	5.11	706	5.58	745	6.06	783	6.55	818	7.04	853	7.54	886	8.05	918	8.56	949	9.09	979	9.62
10,000	723	6.46	762	6.96	799	7.46	833	7.97	867	8.48	899	8.99	931	9.52	961	10.05	991	10.59	1019	11.13
10,500	753	7.22	790	7.73	826	8.24	859	8.75	892	9.27	923	9.80	954	10.33	983	10.87	1012	11.42	1040	11.97
11,000	783	8.02	819	8.55	853	9.07	886	9.59	917	10.12	948	10.66	978	11.20	1006	11.74	1035	12.30	1062	12.86
12,000	843	9.79	877	10.34	909	10.88	940	11.43	969	11.98	998	12.53	1026	13.09	1054	13.65	1081	14.22	1107	14.79
13,000	903	11.78	935	12.35	965	12.92	994	13.49	1023	14.06	1050	14.63	1077	15.21	1103	15.79	1128	16.37	1154	16.96
14,000	964	14.00	994	14.60	1022	15.19	1050	15.78	1077	16.37	1103	16.96	1129	17.56	1153	18.15	1178	18.75	1202	19.35
15,000	1025	16.46	1053	17.08	1080	17.70	1106	18.31	1132	18.92	1157	19.53	1181	20.14	1205	20.76	1229	21.37	1251	21.99
16,000	1086	19.17	1112	19.81	1138	20.45	1163	21.08	1188	21.71	1212	22.35	1235	22.98	1258	23.61	1280	24.24	—	—
17,000	1147	22.13	1172	22.80	1197	23.45	1221	24.11	1244	24.76	1267	25.41	1290	26.06	—	—	—	—	—	—
17,500	1177	23.71	1202	24.39	1226	25.06	1250	25.72	1273	26.39	1295	27.04	—	—	—	—	—	—	—	—

### 48AJ,AK035 (35 TONS) (cont)

Cfm	Available External Static Pressure (in. wg)																			
	2.2		2.4		2.6		2.8		3.0		3.2		3.4		3.6		3.8		4.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
7,000	939	7.68	969	8.20	999	8.72	1028	9.25	1056	9.78	1083	10.32	1109	10.86	1135	11.40	1160	11.95	1184	12.50
8,000	972	8.83	1002	9.36	1031	9.90	1059	10.45	1086	11.00	1113	11.55	1139	12.11	1164	12.67	1188	13.24	1213	13.81
9,000	1009	10.16	1037	10.71	1065	11.26	1092	11.82	1119	12.38	1145	12.95	1170	13.53	1195	14.11	1219	14.69	1243	15.27
10,000	1048	11.69	1075	12.25	1102	12.81	1128	13.38	1154	13.96	1179	14.54	1203	15.13	1227	15.72	1251	16.32	1274	16.92
10,500	1068	12.53	1095	13.09	1121	13.66	1147	14.24	1172	14.83	1197	15.41	1221	16.01	1245	16.61	1268	17.21	1291	17.82
11,000	1089	13.42	1115	13.99	1141	14.57	1166	15.15	1191	15.74	1215	16.34	1239	16.94	1262	17.54	1285	18.15	—	—
12,000	1133	15.37	1158	15.96	1182	16.55	1207	17.14	1230	17.75	1254	18.35	1277	18.96	1299	19.58	—	—	—	—
13,000	1178	17.55	1202	18.15	1226	18.75	1249	19.36	1272	19.97	1295	20.59	—	—	—	—	—	—	—	—
14,000	1225	19.96	1248	20.57	1271	21.19	1294	21.81	—	—	—	—	—	—	—	—	—	—	—	—
15,000	1274	22.61	1296	23.24	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
16,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
17,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
17,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

### 48AJ,AK040 (40 TONS)

Cfm	Available External Static Pressure (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
8,000	502	2.90	550	3.30	596	3.71	639	4.12	680	4.54	720	4.97	759	5.40	796	5.85	832	6.31	867	6.77
9,000	552	3.81	595	4.24	637	4.67	677	5.11	715	5.55	752	6.00	788	6.45	823	6.92	857	7.39	890	7.87
10,000	602	4.89	642	5.34	680	5.80	717	6.26	752	6.73	787	7.20	821	7.67	854	8.16	886	8.64	917	9.14
11,000	653	6.15	689	6.62	725	7.11	759	7.59	792	8.08	825	8.58	856	9.07	887	9.57	918	10.08	947	10.59
12,000	704	7.60	738	8.09	771	8.60	803	9.11	834	9.63	865	10.14	895	10.66	924	11.18	952	11.71	980	12.24
13,000	756	9.24	788	9.76	818	10.29	848	10.83	878	11.36	906	11.90	935	12.44	962	12.99	989	13.53	1016	14.08
14,000	808	11.10	838	11.64	867	12.19	895	12.74	922	13.30	950	13.87	976	14.43	1002	15.00	1028	15.57	1053	16.14
15,000	861	13.18	888	13.74	915	14.31	942	14.88	968	15.46	994	16.05	1019	16.63	1044	17.22	1068	17.81	1093	18.40
16,000	914	15.49	940	16.06	965	16.65	990	17.24	1015	17.85	1039	18.45	1063	19.06	1087	19.67	1110	20.28	1133	20.89
17,000	967	18.03	991	18.62	1015	19.23	1039	19.85	1062	20.47	1086	21.09	1109	21.72	1131	22.35	1153	22.98	1175	23.61
18,000	1020	20.82	1043	21.43	1066	22.06	1088	22.69	1111	23.33	1133	23.97	1155	24.62	1176	25.27	1197	25.92	1219	26.58
19,000	1073	23.87	1095	24.50	1117	25.14	1138	25.79	1159	26.44	1180	27.11	1201	27.77	1222	28.45	1242	29.12	—	—
20,000	1127	27.18	1147	27.82	1168	28.48	1188	29.15	—	—	—	—	—	—	—	—	—	—	—	—

### 48AJ,AK040 (40 TONS) (cont)

Cfm	Available External Static Pressure (in. wg)																			
	2.2		2.4		2.6		2.8		3.0		3.2		3.4		3.6		3.8		4.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
8,000	901	7.24	933	7.72	965	8.20	995	8.69	1024	9.19	1053	9.69	1081	10.19	1108	10.70	1134	11.21	1159	11.73
9,000	923	8.35	954	8.85	985	9.35	1014	9.86	1043	10.37	1072	10.89	1099	11.41	1126	11.94	1152	12.47	1177	13.00
10,000	948	9.64	978	10.15	1007	10.66	1036	11.19	1064	11.71	1092	12.25	1119	12.78	1145	13.33	1171	13.88	1196	14.43
11,000	976	11.11	1005	11.63	1033	12.16	1061	12.70	1088	13.24	1114	13.79	1140	14.34	1166	14.90	1191	15.46	1216	16.03
12,000	1008	12.77	1035	13.31	1062	13.86	1088	14.41	1114	14.97	1139	15.53	1164	16.09	1189	16.67	1213	17.24	1237	17.83
13,000	1042	14.64	1068	15.19	1093	15.76	1118	16.32	1143	16.89	1167	17.47	1191	18.05	1215	18.64	1238	19.23	1262	19.82
14,000	1078	16.71	1103	17.28	1127	17.86	1151	18.45	1174	19.03	1198	19.63	1221	20.22	1244	20.82	1266	21.43	1288	22.04
15,000	1116	19.00	1140	19.59	1163	20.19	1186	20.79	1208	21.40	1230	22.00	1253	22.62	1274	23.23	1296	23.85	—	—
16,000	1156	21.51	1178	22.12	1200	22.74	1222	23.36	1244	23.98	1265	24.61	1286	25.24	—	—	—	—	—	—
17,000	1197	24.25	1218	24.89	1240	25.52	1261	26.17	1281	26.81	—	—	—	—	—	—	—	—	—	—
18,000	1239	27.24	1260	27.89	1280	28.55	—	—	—	—	—	—	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Legend and Notes on page 45.



## FAN PERFORMANCE — VERTICAL DISCHARGE UNITS (cont)

**48AJ,AK050 (50 TONS)**

Cfm	Available External Static Pressure (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
8,000	512	2.98	560	3.38	604	3.79	647	4.20	688	4.62	728	5.05	766	5.49	803	5.94	839	6.40	874	6.86
9,000	561	3.90	604	4.33	645	4.77	685	5.20	723	5.65	760	6.10	796	6.55	831	7.02	864	7.49	897	7.97
10,000	611	5.00	651	5.45	689	5.91	725	6.37	761	6.84	795	7.31	829	7.79	861	8.27	893	8.76	925	9.26
11,000	662	6.27	699	6.75	734	7.23	768	7.72	801	8.21	833	8.71	865	9.20	895	9.71	925	10.21	955	10.73
12,000	714	7.74	748	8.24	780	8.75	812	9.26	843	9.77	873	10.29	903	10.81	932	11.33	960	11.86	988	12.39
13,000	766	9.41	798	9.93	828	10.46	858	11.00	887	11.54	916	12.08	944	12.62	971	13.16	998	13.71	1024	14.26
14,000	819	11.29	848	11.84	877	12.39	905	12.95	932	13.51	959	14.07	986	14.63	1012	15.20	1037	15.77	1062	16.34
15,000	872	13.40	899	13.96	926	14.54	953	15.11	979	15.70	1004	16.28	1029	16.87	1054	17.46	1078	18.05	1102	18.64
16,000	925	15.74	951	16.32	976	16.91	1001	17.51	1026	18.12	1050	18.72	1074	19.33	1097	19.94	1121	20.55	1143	21.17
17,000	979	18.32	1003	18.92	1027	19.53	1051	20.15	1074	20.77	1097	21.40	1120	22.03	1142	22.66	1164	23.29	1186	23.93
18,000	1032	21.15	1055	21.77	1078	22.40	1100	23.04	1123	23.68	1145	24.33	1166	24.98	1188	25.63	1209	26.28	1230	26.93
19,000	1086	24.24	1108	24.88	1129	25.52	1151	26.18	1172	26.84	1193	27.51	1214	28.18	1234	28.85	1255	29.52	1275	30.19
20,000	1140	27.60	1161	28.25	1181	28.92	1202	29.59	1222	30.27	1242	30.95	1262	31.64	1281	32.33	—	—	—	—

**48AJ,AK050 (50 TONS) (cont)**

Cfm	Available External Static Pressure (in. wg)																			
	2.2		2.4		2.6		2.8		3.0		3.2		3.4		3.6		3.8		4.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
8,000	907	7.34	940	7.81	971	8.30	1001	8.79	1030	9.29	1059	9.79	1086	10.29	1113	10.80	1139	11.31	1164	11.83
9,000	930	8.46	961	8.95	991	9.46	1021	9.97	1050	10.48	1078	11.00	1105	11.52	1131	12.05	1157	12.58	1183	13.12
10,000	955	9.76	985	10.27	1014	10.79	1043	11.31	1071	11.84	1098	12.37	1125	12.91	1151	13.46	1177	14.01	1202	14.56
11,000	984	11.25	1012	11.77	1040	12.30	1068	12.84	1095	13.38	1121	13.93	1147	14.49	1172	15.05	1197	15.61	1222	16.18
12,000	1016	12.93	1043	13.47	1069	14.02	1095	14.57	1121	15.13	1147	15.69	1172	16.26	1196	16.83	1220	17.41	1244	18.00
13,000	1050	14.82	1076	15.38	1101	15.94	1126	16.51	1151	17.08	1175	17.66	1199	18.24	1223	18.83	1246	19.42	1269	20.02
14,000	1087	16.92	1111	17.49	1136	18.07	1159	18.66	1183	19.25	1206	19.84	1229	20.44	1252	21.04	1274	21.64	1296	22.25
15,000	1126	19.23	1149	19.83	1172	20.43	1195	21.03	1217	21.64	1239	22.25	1261	22.86	1283	23.48	—	—	—	—
16,000	1166	21.78	1188	22.40	1210	23.01	1232	23.64	1253	24.26	1275	24.89	1296	25.52	—	—	—	—	—	—
17,000	1208	24.56	1229	25.20	1250	25.84	1271	26.48	1291	27.12	—	—	—	—	—	—	—	—	—	—
18,000	1250	27.59	1271	28.25	1291	28.91	—	—	—	—	—	—	—	—	—	—	—	—	—	—
19,000	1294	30.87	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

**48AJ,AK060 (60 TONS)**

Cfm	Available External Static Pressure (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
12,000	476	4.33	534	5.04	585	5.78	632	6.56	674	7.39	714	8.24	751	9.12	786	10.02	819	10.93	851	11.85
14,000	536	6.19	588	6.96	636	7.74	680	8.56	720	9.41	758	10.30	793	11.21	827	12.15	859	13.11	890	14.08
15,000	566	7.28	617	8.09	662	8.90	704	9.73	744	10.59	781	11.50	816	12.42	849	13.38	881	14.36	911	15.35
16,000	597	8.48	645	9.34	689	10.17	730	11.02	768	11.90	804	12.82	839	13.76	871	14.73	902	15.72	932	16.73
17,000	628	9.80	674	10.71	717	11.58	756	12.45	793	13.34	829	14.27	862	15.23	894	16.21	925	17.21	954	18.24
18,000	659	11.25	704	12.21	745	13.11	783	14.00	819	14.91	853	15.85	886	16.82	918	17.82	948	18.84	977	19.88
19,000	691	12.82	734	13.84	773	14.77	810	15.69	845	16.62	879	17.58	911	18.56	942	19.57	971	20.60	1000	21.65
20,000	723	14.53	764	15.60	802	16.57	838	17.52	872	18.47	905	19.44	936	20.44	966	21.45	995	22.50	1023	23.57
21,000	755	16.37	794	17.49	831	18.51	866	19.49	899	20.47	931	21.46	961	22.47	991	23.50	1019	24.55	1047	25.63
22,000	787	18.35	825	19.53	861	20.59	894	21.60	927	22.61	958	23.62	987	24.64	1016	25.69	1044	26.76	1071	27.84
23,000	819	20.48	856	21.71	890	22.81	923	23.87	954	24.90	985	25.93	1014	26.97	1042	28.03	1069	29.11	1096	30.21
24,000	851	22.75	887	24.04	920	25.19	952	26.28	983	27.34	1012	28.40	1041	29.46	1068	30.54	1095	31.63	1121	32.74
25,000	883	25.17	918	26.52	951	27.72	982	28.84	1011	29.94	1040	31.02	1068	32.11	1095	33.21	1121	34.31	1147	35.44
26,000	916	27.76	950	29.15	981	30.40	1011	31.57	1040	32.70	1068	33.81	1095	34.92	1122	36.04	1147	37.16	1172	38.30
27,000	948	30.49	981	31.95	1012	33.24	1041	34.46	1070	35.62	1097	36.76	1123	37.90	1149	39.04	1174	40.18	1199	41.34

**48AJ,AK060 (60 TONS) (cont)**

Cfm	Available External Static Pressure (in. wg)																			
	2.2		2.4		2.6		2.8		3.0		3.2		3.4		3.6		3.8		4.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
12,000	881	12.78	911	13.72	939	14.67	967	15.62	993	16.58	1019	17.54	1045	18.51	1069	19.48	1093	20.45	1117	21.43
14,000	920	15.06	948	16.06	976	17.07	1003	18.08	1029	19.11	1054	20.13	1079	21.17	1103	22.21	1126	23.26	1149	24.31
15,000	940	16.36	968	17.38	996	18.41	1022	19.45	1048	20.50	1073	21.56	1097	22.63	1121	23.70	1144	24.78	1167	25.86
16,000	961	17.76	989	18.80	1016	19.86	1042	20.92	1067	22.00	1092	23.08	1116	24.17	1140	25.28	1162	26.38	1185	27.49
17,000	983	19.28	1010	20.34	1036	21.42	1062	22.51	1087	23.60	1112	24.71	1135	25.83	1159	26.95	1181	28.09	—	—
18,000	1005	20.94	1032	22.01	1058	23.11	1083	24.21	1108	25.33	1132	26.46	1156	27.60	1178	28.74	—	—	—	—
19,000	1027	22.72	1054	23.81	1080	24.92	1105	26.04	1129	27.18	1153	28.33	1176	29.48	1199	30.65	—	—	—	—
20,000	1050	24.65	1076	25.76	1102	26.88	1126	28.01	1151	29.17	1174	30.33	1197	31.50	—	—	—	—	—	—
21,000	1073	26.73	1099	27.84	1124	28.97	1149	30.13	1173	31.29	1196	32.47	—	—	—	—	—	—	—	—
22,000	1097	28.95	1123	30.08	1147	31.22	1172	32.39	1195	33.56	—	—	—	—	—	—	—	—	—	—
23,000	1122	31.33	1147	32.47	1171	33.63	1195	34.80	—	—	—	—	—	—	—	—	—	—	—	—
24,000	1146	33.87	1171	35.02	1195	36.19	—	—	—	—	—	—	—	—	—	—	—	—	—	—
25,000	1171	36.58	1196	37.74	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
26,000	1197	39.46	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
27,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

**LEGEND**

# Performance data (cont)



## FAN PERFORMANCE — VERTICAL DISCHARGE UNITS (cont)

50AJ,AK020,25 (20 THRU 25 TONS)

Cfm	Available External Static Pressure (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4,000	394	1.06	398	1.08	464	1.42	523	1.77	575	2.13	622	2.50	666	2.87	707	3.24	745	3.62	781	4.01
5,000	388	1.26	428	1.47	489	1.83	545	2.21	595	2.60	642	2.99	685	3.39	726	3.79	764	4.20	800	4.61
6,000	398	1.59	463	1.97	520	2.36	572	2.76	620	3.17	664	3.59	706	4.01	746	4.44	783	4.87	819	5.31
7,000	441	2.18	501	2.60	554	3.02	602	3.44	647	3.87	690	4.31	730	4.75	769	5.20	805	5.66	840	6.12
7,500	463	2.52	521	2.96	572	3.39	619	3.83	663	4.27	704	4.72	744	5.17	781	5.63	817	6.10	852	6.56
8,000	486	2.90	542	3.36	591	3.80	637	4.25	679	4.70	720	5.16	758	5.62	795	6.09	830	6.57	864	7.05
9,000	532	3.76	585	4.26	631	4.73	674	5.20	714	5.68	752	6.16	789	6.64	824	7.13	858	7.62	890	8.12
10,000	579	4.76	629	5.30	673	5.81	713	6.31	751	6.81	788	7.31	822	7.81	856	8.32	888	8.83	919	9.34
11,000	627	5.91	674	6.50	716	7.04	754	7.57	791	8.09	825	8.62	858	9.14	890	9.66	921	10.20	951	10.73
12,000	675	7.23	720	7.86	760	8.44	797	9.00	831	9.55	864	10.09	896	10.64	926	11.18	956	11.73	985	12.28
12,500	699	7.96	743	8.60	782	9.20	818	9.78	852	10.34	884	10.90	915	11.45	945	12.01	974	12.57	1003	13.13
13,000	724	8.72	767	9.39	805	10.00	840	10.60	873	11.17	905	11.74	935	12.31	965	12.88	993	13.45	1021	14.01

50AJ,AK020,25 (20 THRU 25 TONS) (cont)

Cfm	Available External Static Pressure (in. wg)																			
	2.2		2.4		2.6		2.8		3.0		3.2		3.4		3.6		3.8		4.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4,000	815	4.40	847	4.79	879	5.19	909	5.59	938	6.00	965	6.40	992	6.81	1019	7.23	1044	7.65	1069	8.07
5,000	834	5.03	867	5.45	898	5.87	929	6.30	958	6.73	986	7.16	1013	7.60	1040	8.04	1065	8.48	1090	8.92
6,000	853	5.75	886	6.20	918	6.64	948	7.10	977	7.55	1005	8.01	1033	8.47	1059	8.93	1085	9.39	1110	9.86
7,000	874	6.58	906	7.05	937	7.52	967	7.99	996	8.47	1025	8.95	1052	9.43	1079	9.92	1104	10.41	1130	10.90
7,500	885	7.04	917	7.52	948	8.00	978	8.48	1006	8.97	1035	9.46	1062	9.96	1088	10.45	1114	10.95	1139	11.45
8,000	897	7.53	928	8.02	959	8.51	988	9.01	1017	9.50	1045	10.01	1072	10.51	1098	11.02	1124	11.53	1149	12.04
9,000	922	8.62	952	9.13	982	9.64	1011	10.15	1039	10.67	1066	11.19	1093	11.72	1119	12.24	1145	12.77	1169	13.30
10,000	950	9.86	979	10.39	1008	10.92	1036	11.45	1063	11.98	1090	12.52	1116	13.06	1142	13.61	1167	14.15	1191	14.71
11,000	980	11.26	1009	11.81	1037	12.35	1064	12.90	1090	13.45	1116	14.01	1141	14.56	1166	15.13	1191	15.69	—	—
12,000	1013	12.84	1040	13.40	1067	13.96	1093	14.52	1119	15.09	1144	15.66	1169	16.23	1193	16.81	—	—	—	—
12,500	1030	13.69	1057	14.26	1083	14.83	1109	15.40	1134	15.97	1159	16.55	1183	17.14	—	—	—	—	—	—
13,000	1048	14.59	1074	15.16	1100	15.74	1125	16.32	1150	16.90	1174	17.49	—	—	—	—	—	—	—	—

50AJ,AK027,30 (27 THRU 30 TONS)

Cfm	Available External Static Pressure (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
5,500	394	1.42	450	1.74	508	2.11	562	2.50	611	2.90	656	3.31	699	3.72	739	4.14	776	4.56	812	4.98
6,000	404	1.62	468	2.01	525	2.40	576	2.80	624	3.21	668	3.63	710	4.05	750	4.48	787	4.91	823	5.35
7,000	449	2.23	508	2.65	560	3.07	608	3.49	653	3.92	695	4.36	736	4.81	774	5.26	810	5.72	845	6.18
8,000	496	2.98	550	3.43	599	3.88	644	4.32	686	4.78	726	5.24	764	5.70	801	6.17	836	6.65	869	7.13
8,250	508	3.18	561	3.65	609	4.10	653	4.55	695	5.01	734	5.47	772	5.95	808	6.42	843	6.90	876	7.38
9,000	544	3.86	595	4.35	640	4.83	682	5.30	722	5.77	760	6.25	796	6.74	831	7.23	864	7.72	897	8.22
10,000	592	4.90	640	5.43	683	5.93	723	6.43	760	6.93	796	7.43	830	7.93	864	8.44	896	8.95	927	9.47
11,000	641	6.09	687	6.66	727	7.19	765	7.72	801	8.24	835	8.76	867	9.29	899	9.82	930	10.35	959	10.88
12,000	691	7.45	734	8.06	772	8.62	808	9.18	842	9.73	875	10.27	906	10.82	936	11.36	966	11.91	994	12.47
13,000	741	8.98	782	9.63	819	10.23	853	10.81	886	11.39	917	11.96	947	12.52	976	13.09	1004	13.66	1031	14.23
13,750	779	10.25	818	10.92	854	11.55	887	12.16	919	12.75	949	13.34	978	13.93	1006	14.51	1033	15.09	1060	15.68
14,000	791	10.70	830	11.38	866	12.02	898	12.63	930	13.23	960	13.83	988	14.42	1016	15.01	1043	15.59	1070	16.18
15,000	842	12.60	879	13.32	913	13.99	945	14.63	975	15.26	1003	15.88	1031	16.50	1058	17.11	1084	17.72	1109	18.33

50AJ,AK027,30 (27 THRU 30 TONS) (cont)

Cfm	Available External Static Pressure (in. wg)																			
	2.2		2.4		2.6		2.8		3.0		3.2		3.4		3.6		3.8		4.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
5,500	846	5.41	879	5.85	910	6.28	941	6.72	970	7.16	998	7.61	1025	8.06	1052	8.51	1078	8.96	1103	9.42
6,000	857	5.79	889	6.24	921	6.69	951	7.14	980	7.59	1008	8.05	1035	8.51	1062	8.97	1088	9.44	1113	9.91
7,000	878	6.64	910	7.11	941	7.58	971	8.05	1000	8.53	1028	9.01	1055	9.50	1082	9.98	1108	10.47	1133	10.96
8,000	902	7.61	933	8.10	964	8.59	993	9.09	1022	9.59	1049	10.09	1076	10.59	1102	11.10	1128	11.61	1153	12.12
8,250	908	7.88	939	8.37	969	8.87	999	9.37	1027	9.87	1055	10.38	1082	10.89	1108	11.40	1133	11.91	1158	12.43
9,000	928	8.72	959	9.23	988	9.74	1017	10.26	1045	10.78	1072	11.30	1098	11.82	1124	12.35	1150	12.88	1174	13.41
10,000	957	9.99	986	10.52	1015	11.04	1043	11.58	1070	12.11	1097	12.65	1122	13.19	1148	13.74	1173	14.29	1197	14.84
11,000	988	11.42	1017	11.96	1044	12.51	1071	13.06	1098	13.61	1123	14.17	1149	14.73	1173	15.29	1198	15.85	—	—
12,000	1022	13.02	1049	13.58	1076	14.14	1102	14.71	1127	15.28	1152	15.85	1177	16.42	—	—	—	—	—	—
13,000	1058	14.80	1084	15.38	1110	15.96	1135	16.54	1159	17.13	1184	17.71	—	—	—	—	—	—	—	—
13,750	1086	16.26	1111	16.85	1136	17.44	1161	18.04	1185	18.63	—	—	—	—	—	—	—	—	—	—
14,000	1095	16.77	1120	17.37	1145	17.96	1169	18.56	1193	19.16	—	—	—	—	—	—	—	—	—	—
15,000	1134	18.94	1158	19.55	1182	20.16	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Legend and Notes on page 48.



### FAN PERFORMANCE — VERTICAL DISCHARGE UNITS (cont)

#### 50AJ,AK035 (35 TONS)

Cfm	Available External Static Pressure (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
7,000	517	2.72	568	3.14	616	3.56	660	3.99	702	4.43	742	4.88	779	5.33	815	5.79	850	6.25	883	6.71
8,000	569	3.59	616	4.04	660	4.49	701	4.94	740	5.40	778	5.87	814	6.34	848	6.82	881	7.30	913	7.79
9,000	622	4.63	665	5.10	706	5.58	744	6.05	781	6.54	816	7.02	851	7.52	883	8.01	915	8.51	946	9.02
10,000	675	5.84	716	6.34	754	6.84	790	7.34	824	7.84	858	8.35	890	8.86	921	9.37	952	9.89	981	10.42
10,500	702	6.51	741	7.02	778	7.53	813	8.04	847	8.56	879	9.07	910	9.59	941	10.12	971	10.65	999	11.18
11,000	729	7.23	767	7.75	803	8.27	837	8.80	869	9.32	901	9.85	931	10.38	961	10.91	990	11.45	1018	11.99
12,000	784	8.80	819	9.35	853	9.90	885	10.44	916	10.99	946	11.54	975	12.09	1003	12.64	1031	13.20	1058	13.76
13,000	839	10.57	872	11.15	904	11.72	934	12.29	964	12.86	992	13.42	1020	13.99	1047	14.56	1073	15.14	1099	15.72
14,000	894	12.54	925	13.15	955	13.74	984	14.33	1012	14.92	1039	15.51	1066	16.10	1092	16.69	1117	17.28	1142	17.88
15,000	949	14.73	979	15.36	1008	15.98	1035	16.59	1062	17.20	1088	17.81	1113	18.42	1138	19.03	1162	19.64	1186	20.25
16,000	1005	17.13	1033	17.78	1060	18.43	1087	19.06	1112	19.69	1137	20.32	1161	20.95	1185	21.58	1208	22.21	1231	22.84
17,000	1061	19.76	1088	20.43	1114	21.10	1139	21.76	1163	22.41	1187	23.06	1210	23.71	1233	24.36	1256	25.01	1277	25.66
17,500	1088	21.16	1115	21.84	1140	22.52	1165	23.19	1189	23.85	1212	24.52	1235	25.17	1257	25.83	1279	26.49	—	—

#### 50AJ,AK035 (35 TONS) (cont)

Cfm	Available External Static Pressure (in. wg)																			
	2.2		2.4		2.6		2.8		3.0		3.2		3.4		3.6		3.8		4.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
7,000	915	7.18	946	7.65	976	8.13	1005	8.61	1033	9.09	1060	9.57	1086	10.06	1112	10.54	1137	11.04	1161	11.53
8,000	944	8.28	974	8.77	1003	9.27	1032	9.77	1059	10.27	1086	10.78	1112	11.29	1137	11.80	1162	12.31	1186	12.82
9,000	976	9.53	1005	10.04	1033	10.56	1061	11.08	1088	11.61	1114	12.13	1139	12.66	1164	13.19	1189	13.72	1212	14.26
10,000	1010	10.95	1038	11.48	1065	12.02	1092	12.55	1118	13.09	1143	13.64	1168	14.19	1193	14.74	1216	15.29	1240	15.84
10,500	1028	11.72	1055	12.26	1082	12.81	1108	13.35	1134	13.90	1159	14.46	1183	15.02	1207	15.57	1231	16.14	1254	16.70
11,000	1046	12.54	1073	13.09	1099	13.64	1125	14.20	1150	14.76	1175	15.32	1199	15.89	1223	16.45	1246	17.03	1269	17.60
12,000	1084	14.32	1110	14.89	1135	15.46	1160	16.03	1185	16.61	1208	17.19	1232	17.77	1255	18.35	1278	18.94	1300	19.53
13,000	1124	16.30	1149	16.88	1173	17.47	1197	18.06	1221	18.65	1244	19.24	1267	19.84	1289	20.44	—	—	—	—
14,000	1166	18.48	1190	19.08	1213	19.68	1236	20.29	1259	20.89	1281	21.50	—	—	—	—	—	—	—	—
15,000	1209	20.87	1232	21.48	1255	22.10	1277	22.72	1299	23.35	—	—	—	—	—	—	—	—	—	—
16,000	1254	23.48	1276	24.11	1297	24.75	—	—	—	—	—	—	—	—	—	—	—	—	—	—
17,000	1299	26.31	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
17,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

#### 50AJ,AK040 (40 TONS)

Cfm	Available External Static Pressure (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
8,000	475	2.69	523	3.08	569	3.47	612	3.86	653	4.26	692	4.66	730	5.07	767	5.49	802	5.92	836	6.36
9,000	521	3.53	565	3.94	606	4.36	646	4.78	684	5.20	721	5.63	757	6.06	791	6.49	825	6.94	857	7.39
10,000	568	4.52	608	4.96	646	5.40	683	5.84	719	6.29	753	6.74	787	7.20	819	7.65	851	8.11	882	8.58
11,000	615	5.68	652	6.14	687	6.60	722	7.07	755	7.55	788	8.02	819	8.50	850	8.97	880	9.46	909	9.94
12,000	663	7.01	697	7.49	730	7.98	762	8.47	794	8.97	824	9.47	854	9.96	883	10.47	912	10.97	939	11.48
13,000	712	8.53	743	9.03	774	9.54	804	10.05	834	10.57	862	11.09	891	11.61	918	12.13	945	12.66	972	13.19
14,000	760	10.24	790	10.76	819	11.29	847	11.82	875	12.36	902	12.90	929	13.45	955	13.99	981	14.54	1006	15.09
15,000	809	12.15	837	12.69	864	13.24	891	13.79	917	14.35	943	14.91	968	15.48	993	16.04	1018	16.62	1042	17.18
16,000	859	14.27	885	14.83	910	15.40	936	15.97	960	16.55	985	17.13	1009	17.71	1033	18.30	1056	18.89	1079	19.48
17,000	908	16.61	933	17.19	957	17.77	981	18.36	1004	18.96	1028	19.56	1051	20.16	1073	20.77	1096	21.38	1118	21.99
18,000	958	19.18	981	19.77	1004	20.37	1027	20.98	1049	21.60	1071	22.22	1093	22.84	1115	23.46	1136	24.09	1157	24.72
19,000	1007	21.98	1030	22.59	1052	23.21	1073	23.84	1095	24.47	1116	25.10	1137	25.74	1157	26.39	1178	27.04	1198	27.68
20,000	1057	25.02	1079	25.65	1099	26.29	1120	26.93	1140	27.58	1161	28.23	1181	28.89	—	—	—	—	—	—

#### 50AJ,AK040 (40 TONS) (cont)

Cfm	Available External Static Pressure (in. wg)																			
	2.2		2.4		2.6		2.8		3.0		3.2		3.4		3.6		3.8		4.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
8,000	870	6.81	902	7.26	933	7.73	964	8.20	993	8.67	1022	9.16	1050	9.65	1077	10.14	1104	10.64	1129	11.15
9,000	889	7.85	920	8.31	950	8.79	979	9.27	1008	9.75	1036	10.25	1064	10.75	1090	11.26	1117	11.77	1142	12.29
10,000	912	9.05	941	9.53	970	10.02	998	10.51	1026	11.00	1053	11.51	1080	12.02	1106	12.54	1131	13.06	1157	13.59
11,000	938	10.43	966	10.92	993	11.42	1020	11.93	1047	12.44	1073	12.95	1099	13.47	1124	14.00	1149	14.53	1173	15.07
12,000	967	11.98	993	12.49	1020	13.01	1046	13.53	1071	14.05	1096	14.58	1121	15.11	1145	15.65	1169	16.19	1192	16.74
13,000	998	13.72	1023	14.25	1049	14.78	1073	15.32	1098	15.86	1121	16.40	1145	16.95	1168	17.50	1191	18.06	1214	18.62
14,000	1031	15.64	1055	16.19	1079	16.75	1103	17.30	1126	17.86	1149	18.42	1172	18.98	1195	19.55	1217	20.12	1239	20.69
15,000	1066	17.76	1089	18.33	1112	18.90	1135	19.48	1157	20.06	1179	20.63	1201	21.21	1223	21.80	1244	22.38	1265	22.97
16,000	1102	20.08	1124	20.67	1147	21.26	1168	21.86	1190	22.46	1211	23.06	1232	23.66	1253	24.26	1274	24.86	1294	25.46
17,000	1140	22.61	1161	23.22	1182	23.84	1203	24.45	1224	25.07	1245	25.69	1265	26.31	1285	26.93	—	—	—	—
18,000	1178	25.36	1199	25.99	1219	26.63	1240	27.26	1260	27.90	1279	28.54	1299	29.18	—	—	—	—	—	—
19,000	1218	28.34	1238	28.99	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Legend and Notes on page 48.





## FAN PERFORMANCE — HORIZONTAL DISCHARGE UNITS

**48AW,AY020,025 (20 THRU 25 TONS)**

Cfm	Available External Static Pressure (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4,000	394	1.06	422	1.20	486	1.56	542	1.94	594	2.34	640	2.74	683	3.15	724	3.57	762	4.00	797	4.42
5,000	394	1.29	461	1.66	520	2.04	573	2.44	622	2.85	667	3.28	709	3.72	749	4.16	786	4.61	822	5.07
6,000	445	1.87	505	2.26	559	2.66	609	3.08	655	3.51	698	3.95	738	4.41	777	4.87	813	5.35	848	5.82
7,000	498	2.59	553	3.01	603	3.44	649	3.87	692	4.32	732	4.78	771	5.25	808	5.73	843	6.22	877	6.72
7,500	526	3.02	578	3.45	626	3.89	670	4.33	712	4.79	751	5.26	789	5.74	825	6.22	859	6.72	893	7.22
8,000	554	3.48	604	3.93	650	4.38	692	4.84	733	5.30	771	5.78	808	6.26	843	6.76	877	7.26	909	7.77
9,000	610	4.55	657	5.03	699	5.51	739	5.98	777	6.47	813	6.96	848	7.46	881	7.97	913	8.48	944	9.01
10,000	668	5.80	711	6.31	751	6.82	788	7.32	824	7.82	858	8.33	891	8.85	922	9.37	953	9.90	983	10.44
11,000	727	7.25	766	7.79	804	8.32	839	8.85	872	9.37	905	9.90	936	10.44	966	10.98	995	11.52	1024	12.07
12,000	786	8.90	823	9.48	858	10.03	891	10.59	923	11.13	953	11.68	983	12.24	1012	12.79	1040	13.35	1067	13.92
12,500	816	9.81	852	10.40	885	10.97	918	11.53	949	12.09	978	12.66	1007	13.22	1035	13.78	1063	14.35	1089	14.93
13,000	846	10.77	880	11.38	913	11.96	944	12.54	975	13.11	1004	13.68	1032	14.25	1059	14.83	1086	15.41	1112	15.99

**48AW,AY020,025 (20 THRU 25 TONS) (cont)**

Cfm	Available External Static Pressure (in. wg)																			
	2.2		2.4		2.6		2.8		3.0		3.2		3.4		3.6		3.8		4.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4,000	832	4.86	864	5.29	895	5.74	925	6.18	954	6.63	982	7.08	1009	7.53	1035	7.99	1060	8.45	1085	8.91
5,000	856	5.53	889	6.00	920	6.47	950	6.95	979	7.42	1007	7.91	1034	8.39	1061	8.88	1086	9.37	1111	9.86
6,000	882	6.31	914	6.80	945	7.30	975	7.80	1004	8.30	1032	8.81	1059	9.32	1085	9.84	1111	10.35	1136	10.87
7,000	910	7.22	941	7.73	971	8.25	1001	8.77	1029	9.29	1057	9.82	1084	10.36	1110	10.89	1136	11.43	1161	11.98
7,500	925	7.73	956	8.25	986	8.78	1015	9.31	1043	9.84	1071	10.38	1097	10.92	1123	11.47	1149	12.02	1173	12.57
8,000	941	8.29	971	8.82	1001	9.35	1029	9.89	1057	10.43	1084	10.98	1111	11.53	1137	12.08	1162	12.64	1187	13.21
9,000	975	9.54	1004	10.08	1033	10.62	1061	11.18	1088	11.73	1114	12.30	1140	12.86	1165	13.44	1190	14.01	—	—
10,000	1012	10.98	1040	11.54	1068	12.09	1094	12.66	1121	13.23	1146	13.80	1171	14.38	1196	14.97	—	—	—	—
11,000	1052	12.63	1079	13.20	1105	13.76	1131	14.34	1156	14.92	1181	15.51	—	—	—	—	—	—	—	—
12,000	1094	14.49	1120	15.07	1145	15.65	1170	16.24	1194	16.83	—	—	—	—	—	—	—	—	—	—
12,500	1115	15.51	1141	16.09	1166	16.68	1190	17.27	—	—	—	—	—	—	—	—	—	—	—	—
13,000	1138	16.58	1163	17.16	1187	17.76	—	—	—	—	—	—	—	—	—	—	—	—	—	—

**48AW,AY027,030 (27 THRU 30 TONS)**

Cfm	Available External Static Pressure (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
5,500	424	1.59	487	1.97	543	2.36	594	2.77	641	3.20	685	3.63	726	4.08	765	4.54	802	5.00	838	5.47
6,000	451	1.90	511	2.29	564	2.70	613	3.12	659	3.55	702	4.00	742	4.45	780	4.92	817	5.39	851	5.87
7,000	506	2.65	560	3.07	609	3.49	654	3.93	697	4.38	737	4.84	776	5.31	813	5.79	848	6.28	881	6.78
8,000	562	3.56	612	4.01	657	4.46	699	4.91	739	5.38	777	5.86	814	6.34	848	6.84	882	7.35	914	7.86
8,250	577	3.81	625	4.27	669	4.73	711	5.19	750	5.66	788	6.14	824	6.63	858	7.13	891	7.64	923	8.15
9,000	620	4.65	666	5.13	707	5.60	747	6.08	784	6.57	820	7.06	855	7.56	888	8.07	920	8.59	951	9.12
10,000	679	5.93	721	6.44	760	6.94	797	7.44	832	7.94	866	8.45	898	8.97	930	9.50	960	10.03	990	10.57
11,000	738	7.40	777	7.94	814	8.47	849	9.00	882	9.52	914	10.05	944	10.59	974	11.13	1003	11.68	1032	12.23
12,000	798	9.09	835	9.66	869	10.22	902	10.77	933	11.32	963	11.86	993	12.42	1021	12.98	1049	13.54	1076	14.11
13,000	859	11.01	893	11.60	925	12.18	956	12.75	986	13.33	1015	13.90	1042	14.47	1070	15.04	1096	15.63	1122	16.21
13,750	905	12.59	937	13.20	968	13.80	997	14.39	1026	14.98	1054	15.57	1081	16.16	1107	16.75	1133	17.34	1158	17.94
14,000	920	13.14	952	13.76	982	14.37	1011	14.97	1040	15.56	1067	16.16	1094	16.75	1120	17.34	1145	17.94	1170	18.54
15,000	981	15.52	1011	16.17	1040	16.80	1068	17.42	1095	18.04	1121	18.65	1146	19.27	1171	19.88	1195	20.50	—	—

**48AW,AY027,030 (27 THRU 30 TONS) (cont)**

Cfm	Available External Static Pressure (in. wg)																			
	2.2		2.4		2.6		2.8		3.0		3.2		3.4		3.6		3.8		4.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
5,500	871	5.94	904	6.42	935	6.91	965	7.40	994	7.89	1022	8.39	1049	8.88	1075	9.39	1101	9.89	1126	10.40
6,000	885	6.36	917	6.85	948	7.34	978	7.85	1006	8.35	1034	8.86	1061	9.37	1088	9.88	1113	10.40	1138	10.92
7,000	914	7.29	945	7.80	975	8.31	1005	8.84	1033	9.36	1061	9.89	1087	10.42	1114	10.96	1139	11.50	1164	12.05
8,000	946	8.38	976	8.90	1005	9.44	1034	9.98	1062	10.52	1089	11.07	1115	11.62	1141	12.18	1166	12.74	1191	13.30
8,250	954	8.68	984	9.21	1013	9.74	1042	10.29	1069	10.83	1096	11.39	1122	11.94	1148	12.50	1173	13.07	1197	13.64
9,000	981	9.65	1010	10.19	1038	10.74	1066	11.29	1093	11.85	1119	12.41	1145	12.98	1170	13.55	1195	14.13	—	—
10,000	1019	11.12	1047	11.67	1074	12.23	1101	12.79	1127	13.37	1152	13.94	1177	14.52	—	—	—	—	—	—
11,000	1059	12.79	1086	13.36	1113	13.93	1138	14.51	1163	15.09	1188	15.68	—	—	—	—	—	—	—	—
12,000	1102	14.68	1128	15.26	1153	15.85	1178	16.43	—	—	—	—	—	—	—	—	—	—	—	—
13,000	1147	16.80	1172	17.39	1196	17.99	—	—	—	—	—	—	—	—	—	—	—	—	—	—
13,750	1182	18.54	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
14,000	1194	19.15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
15,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Legend and Notes on page 51.

# Performance data (cont)



## FAN PERFORMANCE — HORIZONTAL DISCHARGE UNITS (cont)

### 48AW,AY035 (35 TONS)

Cfm	Available External Static Pressure (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
7,000	568	3.13	616	3.56	661	4.00	704	4.45	744	4.91	782	5.39	818	5.87	853	6.36	886	6.86	919	7.37
8,000	629	4.17	673	4.62	714	5.08	753	5.55	791	6.03	826	6.52	861	7.02	894	7.53	926	8.05	957	8.57
9,000	690	5.40	731	5.88	769	6.36	805	6.85	840	7.35	874	7.86	907	8.37	938	8.90	968	9.43	998	9.96
10,000	753	6.85	790	7.35	826	7.85	860	8.36	892	8.88	924	9.40	955	9.93	985	10.47	1013	11.02	1042	11.57
10,500	784	7.65	820	8.16	855	8.68	887	9.20	919	9.72	950	10.25	980	10.79	1009	11.34	1037	11.89	1064	12.45
11,000	816	8.50	851	9.03	884	9.56	916	10.09	946	10.62	976	11.16	1005	11.71	1033	12.27	1061	12.82	1088	13.39
12,000	879	10.39	912	10.94	943	11.49	973	12.04	1002	12.60	1030	13.15	1057	13.72	1084	14.29	1110	14.86	1136	15.44
13,000	943	12.51	973	13.09	1003	13.66	1031	14.23	1058	14.81	1085	15.38	1111	15.96	1137	16.55	1162	17.14	1186	17.74
14,000	1007	14.89	1036	15.48	1063	16.07	1090	16.67	1116	17.26	1141	17.86	1166	18.46	1191	19.06	1214	19.67	1238	20.28
15,000	1072	17.52	1098	18.13	1125	18.75	1150	19.36	1175	19.97	1199	20.59	1222	21.21	1246	21.83	1268	22.45	1291	23.08
16,000	1136	20.41	1162	21.05	1186	21.68	1210	22.32	1234	22.95	1257	23.58	1280	24.22	—	—	—	—	—	—
17,000	1201	23.58	1225	24.24	1248	24.89	1271	25.55	1294	26.20	—	—	—	—	—	—	—	—	—	—
17,500	1233	25.27	1257	25.94	1280	26.60	—	—	—	—	—	—	—	—	—	—	—	—	—	—

### 48AW,AY035 (35 TONS) (cont)

Cfm	Available External Static Pressure (in. wg)																			
	2.2		2.4		2.6		2.8		3.0		3.2		3.4		3.6		3.8		4.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
7,000	950	7.88	980	8.39	1009	8.92	1037	9.44	1065	9.97	1092	10.51	1118	11.05	1143	11.59	1168	12.13	1192	12.68
8,000	987	9.10	1016	9.63	1044	10.17	1072	10.72	1099	11.27	1125	11.82	1150	12.38	1175	12.94	1199	13.51	1223	14.08
9,000	1027	10.51	1055	11.06	1082	11.62	1109	12.18	1135	12.74	1160	13.31	1185	13.89	1209	14.47	1233	15.05	1256	15.64
10,000	1069	12.13	1096	12.69	1122	13.26	1148	13.84	1173	14.42	1198	15.00	1222	15.59	1245	16.19	1268	16.79	1291	17.39
10,500	1091	13.02	1118	13.59	1143	14.16	1168	14.75	1193	15.33	1217	15.93	1241	16.53	1264	17.13	1287	17.73	—	—
11,000	1114	13.96	1140	14.54	1165	15.13	1190	15.72	1214	16.31	1238	16.91	1261	17.51	1284	18.12	—	—	—	—
12,000	1161	16.03	1186	16.62	1210	17.22	1234	17.82	1257	18.43	1280	19.04	—	—	—	—	—	—	—	—
13,000	1210	18.34	1234	18.94	1257	19.56	1280	20.17	—	—	—	—	—	—	—	—	—	—	—	—
14,000	1261	20.90	1283	21.52	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
15,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
16,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
17,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
17,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

### 48AW,AY040 (40 TONS)

Cfm	Available External Static Pressure (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
8,000	526	3.10	573	3.50	617	3.91	660	4.33	700	4.75	740	5.18	778	5.62	814	6.07	850	6.53	884	7.00
9,000	579	4.08	621	4.51	662	4.95	701	5.39	738	5.83	775	6.28	810	6.74	845	7.21	878	7.69	911	8.17
10,000	633	5.24	671	5.70	709	6.16	744	6.62	779	7.09	813	7.57	846	8.05	879	8.53	910	9.03	941	9.53
11,000	687	6.59	723	7.07	757	7.56	790	8.05	823	8.54	854	9.04	885	9.54	916	10.05	945	10.56	974	11.08
12,000	742	8.15	775	8.65	807	9.17	838	9.68	868	10.20	898	10.72	927	11.24	955	11.77	983	12.30	1011	12.84
13,000	797	9.92	827	10.45	857	10.98	887	11.52	915	12.07	943	12.61	970	13.15	997	13.70	1024	14.25	1050	14.81
14,000	852	11.92	881	12.47	909	13.03	936	13.59	963	14.15	990	14.72	1016	15.29	1041	15.86	1066	16.43	1091	17.01
15,000	908	14.15	935	14.72	961	15.31	987	15.89	1013	16.48	1038	17.06	1062	17.65	1086	18.25	1110	18.84	1134	19.44
16,000	964	16.63	989	17.23	1014	17.83	1039	18.43	1063	19.04	1086	19.65	1110	20.26	1133	20.88	1156	21.49	1178	22.11
17,000	1021	19.37	1044	19.98	1068	20.60	1091	21.23	1114	21.86	1136	22.49	1158	23.12	1180	23.76	1202	24.39	1223	25.03
18,000	1077	22.37	1099	23.01	1122	23.64	1144	24.29	1165	24.94	1187	25.59	1208	26.25	1229	26.90	1250	27.56	1270	28.22
19,000	1133	25.65	1155	26.30	1176	26.96	1197	27.62	1217	28.29	1238	28.96	—	—	—	—	—	—	—	—
20,000	1190	29.21	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

### 48AW,AY040 (40 TONS) (cont)

Cfm	Available External Static Pressure (in. wg)																			
	2.2		2.4		2.6		2.8		3.0		3.2		3.4		3.6		3.8		4.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
8,000	917	7.48	949	7.96	980	8.44	1010	8.94	1039	9.43	1067	9.93	1094	10.44	1121	10.95	1147	11.46	1172	11.98
9,000	942	8.66	973	9.16	1003	9.66	1033	10.17	1061	10.69	1089	11.21	1116	11.73	1142	12.26	1168	12.80	1193	13.33
10,000	971	10.03	1001	10.55	1030	11.06	1058	11.59	1086	12.12	1113	12.66	1139	13.20	1165	13.75	1190	14.30	1215	14.86
11,000	1003	11.60	1031	12.13	1059	12.67	1086	13.21	1112	13.75	1139	14.31	1164	14.86	1189	15.43	1214	15.99	1238	16.56
12,000	1038	13.38	1065	13.92	1091	14.47	1117	15.03	1142	15.59	1167	16.16	1192	16.73	1216	17.31	1240	17.89	1264	18.48
13,000	1075	15.37	1101	15.93	1126	16.50	1150	17.07	1175	17.65	1199	18.23	1222	18.82	1246	19.41	1269	20.00	1291	20.61
14,000	1115	17.59	1139	18.17	1163	18.75	1186	19.34	1210	19.94	1232	20.53	1255	21.14	1277	21.74	1300	22.35	—	—
15,000	1157	20.04	1180	20.64	1202	21.24	1225	21.85	1247	22.46	1269	23.07	1290	23.69	—	—	—	—	—	—
16,000	1200	22.73	1222	23.35	1243	23.97	1265	24.60	1286	25.23	—	—	—	—	—	—	—	—	—	—
17,000	1245	25.67	1266	26.32	1286	26.96	—	—	—	—	—	—	—	—	—	—	—	—	—	—
18,000	1290	28.88	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Legend and Notes on page 51.



FAN PERFORMANCE — HORIZONTAL DISCHARGE UNITS (cont)

48AW,AY050 (50 TONS)

Cfm	Available External Static Pressure (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
8,000	536	3.18	582	3.58	626	3.99	668	4.41	708	4.83	747	5.27	785	5.71	821	6.16	857	6.63	891	7.09
9,000	588	4.17	630	4.60	670	5.04	709	5.48	746	5.93	782	6.38	818	6.84	852	7.31	885	7.79	918	8.28
10,000	642	5.35	680	5.80	717	6.27	753	6.73	787	7.20	821	7.68	854	8.16	886	8.65	917	9.14	948	9.65
11,000	696	6.72	732	7.20	766	7.69	799	8.18	831	8.67	863	9.17	893	9.68	923	10.18	953	10.70	982	11.21
12,000	751	8.29	784	8.80	816	9.32	847	9.83	877	10.35	906	10.87	935	11.40	964	11.92	991	12.46	1019	12.99
13,000	807	10.09	837	10.62	867	11.16	896	11.70	924	12.24	952	12.78	979	13.33	1006	13.88	1032	14.43	1058	14.99
14,000	863	12.12	891	12.67	919	13.23	946	13.79	973	14.36	999	14.92	1025	15.49	1050	16.06	1075	16.64	1100	17.21
15,000	919	14.38	946	14.96	972	15.54	997	16.12	1023	16.71	1047	17.30	1072	17.89	1096	18.48	1120	19.08	1143	19.68
16,000	975	16.90	1000	17.49	1025	18.09	1049	18.70	1073	19.31	1097	19.92	1120	20.53	1143	21.15	1165	21.76	1188	22.38
17,000	1032	19.67	1056	20.29	1079	20.91	1102	21.54	1125	22.17	1147	22.80	1169	23.44	1191	24.07	1213	24.71	1234	25.35
18,000	1089	22.71	1111	23.35	1134	23.99	1155	24.64	1177	25.29	1198	25.95	1219	26.60	1240	27.26	1261	27.92	1281	28.58
19,000	1146	26.04	1167	26.69	1188	27.35	1209	28.02	1230	28.69	1250	29.37	1270	30.04	1290	30.72	—	—	—	—
20,000	1203	29.65	1224	30.32	1244	31.00	1263	31.69	1283	32.38	—	—	—	—	—	—	—	—	—	—

48AW,AY050 (50 TONS) (cont)

Cfm	Available External Static Pressure (in. wg)																			
	2.2		2.4		2.6		2.8		3.0		3.2		3.4		3.6		3.8		4.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
8,000	923	7.57	955	8.05	986	8.54	1016	9.03	1045	9.53	1073	10.03	1100	10.54	1126	11.05	1152	11.56	1177	12.08
9,000	949	8.77	980	9.27	1010	9.77	1039	10.28	1067	10.80	1095	11.32	1122	11.85	1148	12.38	1174	12.91	1199	13.45
10,000	978	10.15	1008	10.67	1036	11.19	1064	11.72	1092	12.25	1119	12.79	1145	13.33	1171	13.88	1196	14.43	1221	14.99
11,000	1010	11.74	1038	12.27	1066	12.81	1093	13.35	1119	13.90	1145	14.45	1171	15.01	1196	15.57	1220	16.14	1245	16.72
12,000	1046	13.53	1072	14.08	1098	14.63	1124	15.19	1149	15.76	1174	16.32	1199	16.90	1223	17.48	1247	18.06	1270	18.65
13,000	1084	15.55	1109	16.11	1134	16.68	1158	17.26	1182	17.84	1206	18.42	1230	19.01	1253	19.60	1276	20.20	1299	20.80
14,000	1124	17.79	1148	18.38	1171	18.97	1195	19.55	1218	20.15	1241	20.75	1263	21.35	1285	21.96	—	—	—	—
15,000	1166	20.27	1189	20.88	1211	21.49	1234	22.09	1256	22.71	1277	23.32	1299	23.94	—	—	—	—	—	—
16,000	1210	23.00	1231	23.62	1253	24.25	1274	24.88	1295	25.51	—	—	—	—	—	—	—	—	—	—
17,000	1255	25.99	1276	26.63	1296	27.27	—	—	—	—	—	—	—	—	—	—	—	—	—	—
18,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

48AW,AY060 (60 TONS)

Cfm	Available External Static Pressure (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
12,000	516	4.81	569	5.54	617	6.30	660	7.10	701	7.93	739	8.79	774	9.68	808	10.59	841	11.52	872	12.46
14,000	584	6.90	632	7.69	676	8.50	716	9.33	754	10.20	790	11.10	824	12.02	857	12.97	888	13.94	917	14.92
15,000	619	8.13	664	8.96	706	9.79	745	10.65	782	11.53	817	12.44	850	13.38	882	14.35	912	15.33	941	16.34
16,000	654	9.49	697	10.36	737	11.22	775	12.10	811	13.00	845	13.93	877	14.88	908	15.86	938	16.86	966	17.88
17,000	689	10.99	730	11.90	769	12.79	806	13.69	840	14.61	873	15.56	904	16.53	935	17.52	964	18.54	992	19.58
18,000	725	12.64	764	13.58	801	14.51	837	15.43	870	16.38	902	17.34	933	18.32	962	19.33	990	20.36	1018	21.41
19,000	760	14.43	798	15.41	834	16.37	868	17.32	900	18.29	932	19.27	961	20.27	990	21.29	1018	22.34	1045	23.40
20,000	796	16.37	833	17.39	867	18.39	900	19.37	931	20.36	962	21.36	991	22.38	1019	23.42	1046	24.48	1072	25.56
21,000	832	18.47	867	19.54	901	20.56	932	21.57	963	22.59	992	23.61	1020	24.65	1048	25.71	1074	26.78	1100	27.87
22,000	869	20.74	902	21.84	934	22.90	965	23.94	995	24.98	1023	26.03	1051	27.09	1077	28.17	1103	29.26	1129	30.36
23,000	905	23.17	937	24.31	968	25.40	998	26.48	1027	27.55	1055	28.62	1081	29.70	1107	30.79	1133	31.90	1157	33.02
24,000	942	25.78	973	26.95	1003	28.08	1032	29.18	1059	30.28	1086	31.38	1113	32.48	1138	33.59	1163	34.72	1187	35.86
25,000	978	28.56	1008	29.77	1037	30.93	1065	32.07	1092	33.20	1119	34.32	1144	35.44	1169	36.58	1193	37.72	—	—
26,000	1015	31.52	1044	32.76	1072	33.96	1099	35.13	1125	36.29	1151	37.44	1176	38.59	—	—	—	—	—	—
27,000	1052	34.66	1080	35.94	1107	37.18	1133	38.38	1159	39.57	1184	40.75	—	—	—	—	—	—	—	—

48AW,AY060 (60 TONS) (cont)

Cfm	Available External Static Pressure (in. wg)																			
	2.2		2.4		2.6		2.8		3.0		3.2		3.4		3.6		3.8		4.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
12,000	901	13.42	930	14.38	958	15.36	985	16.34	1011	17.33	1036	18.33	1061	19.33	1085	20.34	1108	21.35	1131	22.36
14,000	946	15.92	974	16.94	1001	17.97	1027	19.01	1052	20.06	1077	21.12	1101	22.18	1125	23.25	1148	24.33	1170	25.42
15,000	970	17.36	997	18.40	1024	19.45	1049	20.51	1074	21.58	1099	22.67	1122	23.76	1146	24.86	1168	25.97	1191	27.08
16,000	994	18.93	1021	19.98	1047	21.05	1072	22.14	1097	23.23	1121	24.34	1144	25.45	1167	26.58	1190	27.71	—	—
17,000	1019	20.63	1045	21.70	1071	22.79	1096	23.89	1120	25.01	1144	26.13	1167	27.27	1190	28.42	—	—	—	—
18,000	1045	22.48	1070	23.57	1096	24.67	1120	25.79	1144	26.93	1167	28.07	1190	29.23	—	—	—	—	—	—
19,000	1071	24.49	1096	25.59	1121	26.71	1145	27.84	1169	28.99	1192	30.16	—	—	—	—	—	—	—	—
20,000	1098	26.66	1123	27.77	1147	28.90	1171	30.05	1194	31.21	—	—	—	—	—	—	—	—	—	—
21,000	1125	28.99	1150	30.12	1173	31.26	1197	32.42	—	—	—	—	—	—	—	—	—	—	—	—
22,000	1153	31.49	1177	32.63	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
23,000	1181	34.16	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
24,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
26,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
27,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

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 c

# Performance data (cont)



## FAN PERFORMANCE — HORIZONTAL DISCHARGE UNITS (cont)

50AW,AY020,025 (20 THRU 25 TONS)																				
Cfm	Available External Static Pressure (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4,000	394	1.06	409	1.13	473	1.47	530	1.82	581	2.18	629	2.55	673	2.93	714	3.31	752	3.70	789	4.10
5,000	388	1.26	445	1.57	504	1.93	557	2.30	606	2.68	651	3.07	694	3.47	734	3.88	772	4.29	808	4.71
6,000	421	1.72	485	2.12	540	2.52	590	2.92	636	3.32	679	3.73	719	4.15	757	4.57	794	5.00	829	5.44
7,000	471	2.38	528	2.80	580	3.24	627	3.67	670	4.10	711	4.53	749	4.97	786	5.41	821	5.86	855	6.31
8,000	522	3.19	573	3.64	621	4.10	666	4.56	707	5.02	746	5.48	783	5.94	818	6.40	852	6.87	884	7.34
9,000	575	4.16	621	4.63	666	5.11	708	5.60	747	6.09	784	6.58	820	7.07	853	7.56	886	8.05	917	8.54
10,000	629	5.30	671	5.79	712	6.30	751	6.81	789	7.32	824	7.84	858	8.35	891	8.87	922	9.38	952	9.90
11,000	683	6.62	723	7.14	761	7.66	797	8.19	832	8.73	866	9.27	899	9.81	930	10.35	960	10.89	989	11.43
12,000	739	8.12	776	8.67	811	9.21	845	9.76	878	10.32	910	10.88	941	11.45	971	12.01	1000	12.58	1028	13.14
13,000	794	9.82	829	10.40	862	10.97	893	11.53	925	12.11	955	12.69	985	13.28	1013	13.86	1041	14.45	1069	15.04
14,000	850	11.73	883	12.34	914	12.92	944	13.51	973	14.10	1002	14.70	1030	15.30	1057	15.91	1084	16.52	1111	17.13
15,000	906	13.85	938	14.48	967	15.09	995	15.70	1023	16.31	1050	16.92	1077	17.54	—	—	—	—	—	—

50AW,AY020,025 (20 THRU 25 TONS) (cont)																				
Cfm	Available External Static Pressure (in. wg)																			
	2.2		2.4		2.6		2.8		3.0		3.2		3.4		3.6		3.8		4.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4,000	823	4.50	856	4.90	887	5.30	917	5.71	946	6.12	974	6.53	1001	6.95	1027	7.36	1052	7.78	1076	8.21
5,000	843	5.14	876	5.57	908	6.00	938	6.44	968	6.88	996	7.32	1024	7.77	1050	8.22	1076	8.67	1101	9.12
6,000	863	5.88	896	6.34	927	6.79	958	7.25	987	7.71	1016	8.18	1043	8.65	1070	9.13	1096	9.60	1122	10.08
7,000	887	6.77	919	7.24	949	7.71	979	8.18	1008	8.66	1036	9.15	1063	9.64	1090	10.13	1116	10.63	1141	11.13
8,000	915	7.82	946	8.30	975	8.78	1004	9.27	1032	9.77	1059	10.27	1086	10.77	1112	11.28	1137	11.80	1162	12.31
9,000	947	9.03	976	9.53	1004	10.03	1032	10.54	1059	11.05	1085	11.56	1111	12.08	1136	12.60	1161	13.13	1186	13.66
10,000	981	10.42	1009	10.93	1037	11.45	1063	11.98	1089	12.50	1115	13.03	1140	13.56	1164	14.10	1188	14.64	—	—
11,000	1017	11.97	1045	12.51	1071	13.05	1097	13.60	1122	14.14	1147	14.69	1171	15.24	1195	15.79	—	—	—	—
12,000	1055	13.71	1082	14.27	1108	14.84	1133	15.40	1157	15.96	1181	16.53	—	—	—	—	—	—	—	—
13,000	1095	15.63	1121	16.22	1146	16.80	1170	17.39	1194	17.98	—	—	—	—	—	—	—	—	—	—
14,000	1136	17.74	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
15,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

50AW,AY027,030 (27 THRU 30 TONS)																				
Cfm	Available External Static Pressure (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
5,500	398	1.45	465	1.83	522	2.21	573	2.60	620	2.99	664	3.39	706	3.79	745	4.21	783	4.63	819	5.06
6,000	422	1.72	485	2.12	541	2.52	590	2.92	636	3.32	679	3.73	719	4.15	758	4.57	794	5.01	830	5.44
7,000	471	2.38	528	2.81	580	3.24	627	3.67	671	4.10	711	4.53	750	4.97	786	5.41	821	5.86	855	6.32
8,000	522	3.19	574	3.64	622	4.10	666	4.56	708	5.02	747	5.48	783	5.94	818	6.41	852	6.87	884	7.35
8,250	536	3.42	585	3.87	633	4.34	676	4.81	717	5.27	756	5.74	792	6.21	827	6.68	860	7.15	892	7.63
9,000	575	4.16	622	4.63	666	5.11	708	5.60	747	6.09	784	6.58	820	7.07	853	7.56	886	8.05	917	8.54
10,000	629	5.30	671	5.79	712	6.30	751	6.81	789	7.32	824	7.84	858	8.35	891	8.87	922	9.38	952	9.90
11,000	683	6.62	723	7.13	760	7.66	797	8.19	832	8.72	866	9.26	898	9.81	930	10.35	960	10.89	989	11.43
12,000	738	8.11	775	8.66	810	9.20	844	9.75	877	10.31	909	10.87	940	11.44	970	12.00	999	12.57	1028	13.13
13,000	793	9.80	828	10.38	861	10.95	892	11.51	924	12.09	954	12.67	984	13.26	1012	13.84	1040	14.43	1068	15.02
13,750	834	11.21	868	11.81	899	12.39	930	12.97	959	13.56	989	14.15	1017	14.75	1045	15.35	1072	15.96	1099	16.56
14,000	848	11.70	881	12.31	912	12.89	942	13.48	972	14.07	1000	14.67	1029	15.27	1056	15.88	1083	16.49	1109	17.10
15,000	904	13.80	936	14.44	965	15.05	993	15.66	1021	16.27	1048	16.88	1075	17.50	1101	18.13	1127	18.76	1152	19.38

50AW,AY027,030 (27 THRU 30 TONS) (cont)																				
Cfm	Available External Static Pressure (in. wg)																			
	2.2		2.4		2.6		2.8		3.0		3.2		3.4		3.6		3.8		4.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
5,500	853	5.50	886	5.94	918	6.39	948	6.83	978	7.29	1006	7.74	1034	8.20	1061	8.66	1087	9.13	1112	9.59
6,000	864	5.89	896	6.34	928	6.79	958	7.25	988	7.72	1016	8.19	1044	8.66	1071	9.13	1097	9.61	1122	10.09
7,000	888	6.78	919	7.24	950	7.71	979	8.19	1008	8.67	1036	9.16	1064	9.65	1090	10.14	1116	10.64	1142	11.14
8,000	915	7.82	946	8.30	975	8.79	1004	9.28	1032	9.77	1059	10.27	1086	10.78	1112	11.29	1137	11.80	1162	12.32
8,250	923	8.11	953	8.59	982	9.08	1011	9.58	1038	10.08	1065	10.58	1092	11.09	1118	11.60	1143	12.12	1168	12.64
9,000	947	9.03	976	9.53	1004	10.03	1032	10.54	1059	11.05	1085	11.56	1111	12.08	1137	12.60	1161	13.13	1186	13.66
10,000	981	10.42	1009	10.93	1036	11.45	1063	11.98	1089	12.50	1115	13.03	1140	13.56	1164	14.10	1188	14.64	—	—
11,000	1017	11.97	1044	12.51	1071	13.05	1097	13.59	1122	14.14	1147	14.68	1171	15.23	1195	15.78	—	—	—	—
12,000	1055	13.70	1081	14.26	1107	14.83	1132	15.39	1157	15.95	1181	16.52	—	—	—	—	—	—	—	—
13,000	1094	15.61	1120	16.20	1145	16.78	1170	17.37	1193	17.96	—	—	—	—	—	—	—	—	—	—
13,750	1125	17.17	1150	17.77	1174	18.38	1198	18.98	—	—	—	—	—	—	—	—	—	—	—	—
14,000	1135	17.71	1160	18.32	1184	18.93	—	—	—	—	—	—	—	—	—	—	—	—	—	—
15,000	1177	20.02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Legend and Notes on page 54.



FAN PERFORMANCE — HORIZONTAL DISCHARGE UNITS (cont)

50AW,AY035 (35 TONS)

Cfm	Available External Static Pressure (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
7,000	537	2.87	588	3.31	634	3.74	677	4.17	717	4.60	755	5.04	792	5.48	827	5.93	860	6.39	893	6.85
8,000	592	3.81	638	4.27	682	4.73	722	5.19	760	5.65	796	6.11	831	6.58	864	7.05	896	7.52	927	8.00
9,000	648	4.91	691	5.40	731	5.89	769	6.38	805	6.87	840	7.36	872	7.84	904	8.34	934	8.83	964	9.33
10,000	705	6.20	744	6.71	782	7.23	818	7.74	852	8.26	885	8.77	916	9.29	946	9.80	976	10.32	1004	10.84
10,500	734	6.92	771	7.44	808	7.97	843	8.50	876	9.03	908	9.55	939	10.08	968	10.61	997	11.14	1025	11.66
11,000	762	7.69	799	8.22	834	8.76	868	9.30	900	9.84	932	10.38	962	10.92	991	11.46	1019	12.00	1046	12.54
12,000	821	9.38	854	9.93	887	10.49	919	11.05	950	11.61	980	12.18	1008	12.75	1036	13.31	1063	13.87	1090	14.44
13,000	879	11.28	911	11.85	941	12.43	971	13.01	1001	13.60	1029	14.18	1056	14.77	1083	15.36	1109	15.95	1135	16.54
14,000	938	13.40	968	13.99	996	14.59	1025	15.19	1052	15.80	1079	16.40	1106	17.02	1131	17.63	1156	18.24	1181	18.85
15,000	997	15.75	1025	16.36	1052	16.98	1079	17.59	1105	18.22	1131	18.85	1156	19.48	1180	20.11	1205	20.74	1228	21.38
16,000	1057	18.34	1083	18.97	1108	19.60	1134	20.24	1159	20.88	1183	21.53	1207	22.17	1231	22.83	1254	23.48	1277	24.13
17,000	1116	21.17	1141	21.82	1165	22.47	1189	23.12	1213	23.78	1236	24.44	1259	25.11	1282	25.78	—	—	—	—
17,500	1146	22.68	1170	23.34	1194	24.00	1217	24.66	1240	25.33	1263	26.00	1285	26.67	—	—	—	—	—	—

50AW,AY035 (35 TONS) (cont)

Cfm	Available External Static Pressure (in. wg)																			
	2.2		2.4		2.6		2.8		3.0		3.2		3.4		3.6		3.8		4.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
7,000	924	7.31	954	7.79	984	8.26	1013	8.75	1041	9.23	1068	9.72	1094	10.22	1120	10.71	1146	11.21	1170	11.72
8,000	957	8.48	986	8.97	1014	9.46	1042	9.96	1069	10.46	1095	10.96	1121	11.48	1147	11.99	1171	12.51	1196	13.03
9,000	993	9.83	1021	10.33	1048	10.84	1075	11.35	1101	11.86	1126	12.38	1151	12.91	1176	13.44	1200	13.97	1223	14.51
10,000	1032	11.36	1058	11.88	1085	12.41	1110	12.93	1135	13.46	1160	14.00	1184	14.54	1207	15.08	1231	15.63	1254	16.18
10,500	1052	12.20	1078	12.73	1104	13.26	1129	13.80	1153	14.34	1178	14.88	1201	15.43	1225	15.98	1247	16.53	1270	17.09
11,000	1072	13.08	1098	13.62	1124	14.17	1148	14.72	1172	15.26	1196	15.82	1219	16.37	1242	16.93	1265	17.49	1287	18.05
12,000	1115	15.00	1140	15.57	1165	16.13	1188	16.70	1212	17.27	1235	17.84	1257	18.41	1279	18.98	—	—	—	—
13,000	1159	17.12	1183	17.71	1207	18.30	1230	18.89	1253	19.47	1275	20.06	1297	20.65	—	—	—	—	—	—
14,000	1205	19.46	1228	20.07	1251	20.68	1273	21.28	1295	21.90	—	—	—	—	—	—	—	—	—	—
15,000	1251	22.01	1274	22.64	1296	23.27	—	—	—	—	—	—	—	—	—	—	—	—	—	—
16,000	1299	24.79	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
17,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
17,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

50AW,AY040 (40 TONS)

Cfm	Available External Static Pressure (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
8,000	499	2.88	546	3.27	590	3.66	632	4.06	672	4.46	711	4.87	748	5.28	784	5.70	819	6.14	853	6.58
9,000	548	3.78	591	4.20	631	4.62	670	5.04	708	5.47	744	5.90	778	6.33	812	6.77	845	7.22	877	7.67
10,000	599	4.86	637	5.30	675	5.74	711	6.19	746	6.64	779	7.09	812	7.55	844	8.01	875	8.47	905	8.94
11,000	649	6.11	685	6.57	720	7.04	753	7.51	786	7.99	817	8.47	848	8.94	878	9.43	907	9.91	936	10.40
12,000	701	7.54	734	8.03	766	8.52	797	9.02	828	9.52	857	10.02	886	10.52	915	11.03	943	11.53	970	12.04
13,000	753	9.18	783	9.69	813	10.21	842	10.72	871	11.25	899	11.77	927	12.30	953	12.82	980	13.35	1006	13.88
14,000	805	11.03	833	11.56	861	12.09	889	12.63	916	13.18	942	13.73	968	14.27	994	14.82	1019	15.37	1044	15.92
15,000	857	13.09	884	13.64	910	14.20	936	14.76	962	15.32	987	15.89	1011	16.46	1036	17.03	1060	17.61	1083	18.18
16,000	910	15.38	935	15.95	960	16.53	984	17.11	1008	17.69	1032	18.28	1056	18.87	1079	19.47	1101	20.06	1124	20.66
17,000	963	17.91	986	18.50	1010	19.09	1033	19.69	1056	20.30	1078	20.91	1101	21.52	1123	22.13	1145	22.75	1166	23.36
18,000	1016	20.68	1038	21.29	1060	21.90	1082	22.52	1104	23.15	1126	23.77	1147	24.41	1168	25.04	1189	25.67	1209	26.31
19,000	1069	23.71	1090	24.33	1111	24.96	1132	25.60	1153	26.25	1173	26.89	1194	27.54	1214	28.19	1234	28.85	—	—
20,000	1122	26.99	1142	27.64	1162	28.29	1182	28.95	—	—	—	—	—	—	—	—	—	—	—	—

50AW,AY040 (40 TONS) (cont)

Cfm	Available External Static Pressure (in. wg)																			
	2.2		2.4		2.6		2.8		3.0		3.2		3.4		3.6		3.8		4.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
8,000	885	7.03	917	7.48	948	7.95	978	8.42	1007	8.90	1036	9.39	1063	9.88	1090	10.38	1116	10.88	1142	11.39
9,000	908	8.13	939	8.60	968	9.08	997	9.56	1026	10.05	1053	10.55	1080	11.05	1107	11.56	1133	12.08	1158	12.60
10,000	934	9.42	963	9.90	992	10.39	1020	10.89	1047	11.39	1073	11.89	1100	12.41	1125	12.93	1151	13.45	1175	13.99
11,000	964	10.89	992	11.39	1019	11.89	1045	12.40	1071	12.91	1097	13.43	1122	13.96	1147	14.49	1171	15.02	1195	15.56
12,000	996	12.55	1023	13.07	1048	13.59	1074	14.11	1099	14.64	1123	15.17	1147	15.71	1171	16.25	1195	16.80	1218	17.35
13,000	1031	14.41	1056	14.95	1081	15.48	1105	16.03	1129	16.57	1152	17.12	1175	17.67	1198	18.22	1221	18.78	1243	19.35
14,000	1068	16.48	1092	17.03	1115	17.59	1138	18.15	1161	18.71	1184	19.27	1206	19.84	1228	20.41	1250	20.99	1271	21.56
15,000	1106	18.75	1129	19.33	1151	19.91	1174	20.48	1196	21.07	1217	21.65	1239	22.23	1260	22.82	1280	23.41	—	—
16,000	1146	21.25	1168	21.85	1189	22.45	1211	23.04	1232	23.64	1253	24.25	1273	24.85	1293	25.45	—	—	—	—
17,000	1187	23.98	1208	24.60	1229	25.21	1249	25.83	1270	26.46	1289	27.07	—	—	—	—	—	—	—	—
18,000	1230	26.95	1250	27.58	1269	28.22	1289	28.86	—	—	—	—	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Legend and Notes on page 54.





## MOTOR LIMITATIONS

### HIGH-EFFICIENCY MOTORS

Nominal		Maximum		Maximum Amps			Maximum Watts	Maximum Efficiency
Bhp	BkW	Bhp	BkW	230 v	460 v	575 v		
5	3.73	5.9	4.40	14.6	7.9	6.0	5,030	87.5
10	7.46	10.2	7.61	28.0	—	—	8,502	89.5
		11.8	8.80	—	14.6	12.0	9,836	89.5
15	11.19	15.3	11.41	43.8	—	-	12,543	91.0
		18.0	13.43	—	21.9	19.0	14,756	91.0
20	14.92	22.4	16.71	62.0	—	—	18,363	91.0
		23.4	17.46	—	28.7	23.0	19,183	91.0
25	18.65	28.9	21.56	72.0	—	—	23,511	91.7
		29.4	21.93	—	37.4	31.0	23,918	91.7
30	22.38	35.6	26.56	95.0	—	—	28,742	92.4
		34.7	25.89	—	48.0	47.0	28,015	92.4
40	29.84	42.0	31.33	110.0	55.0	48.8	33,690	93.0

### PREMIUM-EFFICIENCY MOTORS

Nominal		Maximum		Maximum Amps		Maximum Watts	Maximum Efficiency
Bhp	BkW	Bhp	BkW	230 v	460 v		
5	3.73	5.9	4.40	15.8	7.9	4,918	89.5
10	7.46	10.2	7.61	28.0	—	8,298	91.7
		11.8	8.80	—	15.0	9,600	91.7
15	11.19	15.3	11.41	43.8	—	12,273	93.0
		18.0	13.43	—	21.9	14,439	93.0
20	14.92	22.4	16.71	58.2	—	17,853	93.6
		23.4	17.46	—	28.7	18,650	93.6
25	18.65	28.9	21.56	73.0	—	23,034	93.6
		29.4	21.93	—	36.3	23,432	93.6
30	22.38	35.6	26.56	82.6	—	28,374	93.6
		34.7	25.89	—	41.7	27,656	93.6
40	29.84	42.0	31.33	110.0	55.0	33,156	94.5

**LEGEND**

**Bhp** — Brake Horsepower  
**BkW** — Brake Kilowatts

**NOTES:**

1. 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 in the Motor Limitations table will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
2. All motors comply with Energy Policy Act (EPACT) Standards effective October 24, 1997.

# Electrical data



→ 48AJ,AK,AW,AY UNITS

UNIT SIZE 48A	VOLTAGE 3 PH, 60 Hz	VOLTAGE RANGE		COMPRESSOR								CONDENSER FAN MOTOR		EVAPORATOR FAN MOTOR		POWER EXHAUST	POWER SUPPLY	
				Cir A, No. 1		Cir A, No. 2		Cir B, No. 1		Cir B, No. 2								
				Min	Max	RLA	LRA	RLA	LRA	RLA	LRA							
020	208	187	229	23	184	23	184	23	184	—	—	2	6.5 (ea)	5	16.7	— 23.6	104.5 128.1	125 150
														10	30.8	— 23.6	120.5 144.1	150 150
														15	46.2	— 23.6	139.8 163.4	175 200
	230	207	253	23	184	23	184	23	184	—	—	2	6.6 (ea)	5	15.2	— 23.6	103.2 126.8	125 150
														10	28.0	— 23.6	117.2 140.8	125 150
														15	42.0	— 23.6	134.7 158.3	175 200
	460	414	508	10.2	90	10.2	90	10.2	90	—	—	2	3.3 (ea)	5	7.6	— 12.6	47.4 60.0	50 70
														10	14.0	— 12.6	54.7 67.3	60 80
														15	21.0	— 12.6	63.5 76.1	80 90
	575	518	632	9	73	9	73	9	73	—	—	2	2.6 (ea)	5	6.1	— 9.6	40.6 50.2	50 60
														10	11.0	— 9.6	46.0 55.6	50 60
														15	17.0	— 9.6	53.5 63.1	70 80
025	208	187	229	21.8	184	25.6	190	25.6	190	—	—	2	6.5 (ea)	5	16.7	— 23.6	109.1 132.7	125 150
														10	30.8	— 23.6	124.5 148.1	150 175
														15	46.2	— 23.6	143.8 167.4	175 200
	230	207	253	21.8	184	25.6	190	25.6	190	—	—	2	6.6 (ea)	5	15.2	— 23.6	107.8 131.4	125 150
														10	28.0	— 23.6	121.2 144.8	125 150
														15	42.0	— 23.6	138.7 162.3	175 200
	460	414	508	11	90	13.5	95	13.5	95	—	—	2	3.3 (ea)	5	7.6	— 12.6	55.6 68.2	60 80
														10	14.0	— 12.6	62.1 74.7	70 80
														15	21.0	— 12.6	70.9 83.5	90 100
	575	518	632	9	73	10.2	75	10.2	75	—	—	2	2.6 (ea)	5	6.1	— 9.6	43.3 52.9	50 60
														10	11.0	— 9.6	48.4 58.0	50 60
														15	17.0	— 9.6	55.9 65.5	70 80
027	208	187	229	25.6	190	25.6	190	25.6	190	—	—	2	6.5 (ea)	10	30.8	— 23.6	128.3 151.9	150 175
														15	46.2	— 23.6	147.6 171.2	175 200
														20	59.4	— 23.6	164.1 187.7	200 225
	230	207	253	25.6	190	25.6	190	25.6	190	—	—	2	6.6 (ea)	10	28.0	— 23.6	125.0 148.6	150 175
														15	42.0	— 23.6	142.5 166.1	175 200
														20	54.0	— 23.6	157.5 181.1	200 225
	460	414	508	13.5	95	13.5	95	13.5	95	—	—	2	3.3 (ea)	10	14.0	— 12.6	64.6 77.2	70 90
														15	21.0	— 12.6	73.4 86.0	90 100
														20	27.0	— 12.6	80.9 93.5	100 110
	575	518	632	10.2	75	10.2	75	10.2	75	—	—	2	2.6 (ea)	10	11.0	— 12.6	49.6 62.6	60 70
														15	17.0	— 12.6	57.1 69.7	70 80
														20	22.0	— 12.6	63.3 75.9	80 90

See Legend and Notes on page 67.



→ 48AJ,AK,AW,AY UNITS (cont)

UNIT SIZE 48A	VOLTAGE 3 PH, 60 Hz	VOLTAGE RANGE		COMPRESSOR								CONDENSER FAN MOTOR		EVAPORATOR FAN MOTOR		POWER EXHAUST	POWER SUPPLY	
				Cir A, No. 1		Cir A, No. 2		Cir B, No. 1		Cir B, No. 2								
				Min	Max	RLA	LRA	RLA	LRA	RLA	LRA							
030	208	187	229	23	184	23	184	21.8	184	21.8	184	2	6.5 (ea)	10	30.8	— 23.6	141.1 164.7	150 175
														15	46.2	— 23.6	160.4 184.0	200 225
														20	59.4	— 23.6	176.9 200.5	225 250
	230	207	253	23	184	23	184	21.8	184	21.8	184	2	6.6 (ea)	10	28.0	— 23.6	137.8 161.4	150 175
														15	42.0	— 23.6	155.3 178.9	175 200
														20	54.0	— 23.6	170.5 193.9	200 225
	460	414	508	10.2	90	10.2	90	11	90	11	90	2	3.3 (ea)	10	14	— 12.6	66.5 79.1	80 90
														15	21	— 12.6	75.3 87.9	90 100
														20	27	— 12.6	82.8 95.4	100 110
	575	518	632	9	73	9	73	9	73	9	73	2	2.6 (ea)	10	11	— 12.6	55.0 68.0	60 80
														15	17	— 12.6	62.5 75.1	70 90
														20	22	— 12.6	68.7 81.3	90 100
035	208	187	229	21.8	184	25.6	190	25.6	190	25.6	190	2	6.5 (ea)	15	46.2	— 23.6	169.4 193.6	200 225
														20	59.4	— 23.6	185.9 209.5	225 250
														25	74.8	— 23.6	205.1 228.7	250 300
	230	207	253	21.8	184	25.6	190	25.6	190	25.6	190	2	6.6 (ea)	15	42.0	— 23.6	164.3 187.9	200 225
														20	54.0	— 23.6	179.3 202.9	225 250
														25	68.0	— 23.6	196.8 220.4	250 250
	460	414	508	11	90	13.5	95	13.5	95	13.5	95	2	3.3 (ea)	15	21.0	— 12.6	84.4 97.0	100 110
														20	27.0	— 12.6	91.9 104.5	110 125
														25	34.0	— 12.6	100.6 113.2	125 125
	575	518	632	9	73	10.2	75	10.2	75	10.2	75	2	2.6 (ea)	15	17.0	— 12.6	66.1 78.7	80 90
														20	22.0	— 12.6	72.3 84.9	90 100
														25	27.0	— 12.6	78.6 91.2	100 110
040	208	187	229	25.6	190	25.6	190	34.3	265	34.3	265	4	6.5 (ea)	15	46.2	— 23.6	203.6 227.2	225 250
														20	59.4	— 23.6	220.1 243.7	250 300
														25	74.8	— 23.6	239.3 262.4	300 300
	230	207	253	25.6	190	25.6	190	34.3	265	34.3	265	4	6.6 (ea)	15	42.0	— 23.6	198.7 222.3	225 250
														20	54.0	— 23.6	213.7 237.3	250 250
														25	68.0	— 23.6	231.2 254.8	250 300
	460	414	508	13.5	95	13.5	95	16	120	16	120	4	3.3 (ea)	15	21.0	— 12.6	98.5 111.1	110 125
														20	27.0	— 12.6	106.0 118.6	125 125
														25	34.0	— 12.6	114.7 127.3	125 150
	575	518	632	10.2	75	10.2	75	12.9	80	12.9	80	4	2.6 (ea)	15	17.0	— 12.6	77.9 90.5	90 100
														20	22.0	— 12.6	84.1 96.7	100 110
														25	27.0	— 12.6	90.4 103.0	110 125

See Legend and Notes on page 67.

# Electrical data (cont)



→ 48AJ,AK,AW,AY UNITS (cont)

UNIT SIZE 48A	VOLTAGE 3 PH, 60 Hz	VOLTAGE RANGE		COMPRESSOR								CONDENSER FAN MOTOR		EVAPORATOR FAN MOTOR		POWER EXHAUST	POWER SUPPLY	
		Min	Max	Cir A, No. 1		Cir A, No. 2		Cir B, No. 1		Cir B, No. 2		Qty	FLA	Hp	FLA	FLA (total)	MCA	MOCP*
				RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA							
050	208	187	229	34.3	265	34.3	265	34.3	265	47	380	4	6.5 (ea)	20	59.4	— 23.6	250.2 273.8	300 300
														25	74.8	— 23.6	269.4 293.0	300 350
														30	88.0	— 23.6	285.9 309.5	350 350
	230	207	253	34.3	265	34.3	265	34.3	265	47	380	4	6.6 (ea)	20	54.0	— 23.6	243.8 267.4	250 300
														25	68.0	— 23.6	261.3 284.9	300 300
														30	80.0	— 23.6	276.3 299.9	350 350
	460	414	508	16	120	16	120	16	120	22.4	175	4	3.3 (ea)	20	27.0	— 12.6	117.4 130.0	125 150
														25	34.0	— 12.6	126.1 138.7	150 150
														30	40.0	— 12.6	133.6 146.2	150 175
	575	518	632	12.9	80	12.9	80	12.9	80	18.6	140	4	2.6 (ea)	20	22.0	— 12.6	95.2 107.8	110 125
														25	27.0	— 12.6	101.5 114.1	125 125
														30	32.0	— 12.6	107.7 120.3	125 150
060	208	187	229	40.8	265	47	380	40.8	265	47	380	6	6.5 (ea)	25	75.0	— 35.4	308.1 343.5	350 400
														30	88.0	— 35.4	324.6 360.0	400 400
														40	114.0	— 35.4	357.1 392.5	450 450
	230	207	253	40.8	265	47	380	40.8	265	47	380	6	6.6 (ea)	25	68.0	— 35.4	300.2 335.6	350 350
														30	80.0	— 35.4	315.2 350.6	350 400
														40	104.0	— 35.4	345.2 380.6	400 450
	460	414	508	20.2	135	22.4	175	20.2	135	22.4	175	6	3.3 (ea)	25	34.0	— 18.9	147.5 166.4	175 175
														30	40.0	— 18.9	155.0 173.9	175 200
														40	52.0	— 18.9	170.0 188.9	200 225
	575	518	632	16.6	120	18.6	140	16.6	120	18.6	140	6	2.6 (ea)	25	27.0	— 18.9	119.8 138.7	125 150
														30	32.0	— 18.9	126.0 144.9	150 175
														40	41.0	— 18.9	137.3 156.2	175 175

See Legend and Notes on page 67.



→ 50AJ,AK,AW,AY UNITS

UNIT SIZE 50A	VOLTAGE 3 PH, 60 Hz	VOLTAGE RANGE		COMPRESSOR								CONDENSER FAN MOTOR		EVAPORATOR FAN MOTOR		POWER EXHAUST	OPTIONAL ELECTRIC HEAT		POWER SUPPLY	
		Min	Max	Cir A, No. 1		Cir A, No. 2		Cir B, No. 1		Cir B, No. 2		Qty	FLA	Hp	FLA	FLA (total)	FLA	kW	MCA	MOCP*
				FLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA									
020	208	187	229	23	184	23	184	23	184	—	—	2	5.3 (ea)	5	16.7	—	75.1	27	104.5	125
																—	150.1	54	114.8	125
																23.6	75.1	27	128.1	150
																—	150.1	54	144.3	150
																—	150.1	54	200.5	225
																—	150.1	54	200.5	225
	230	207	253	23	184	23	184	23	184	—	—	2	5.3 (ea)	5	15.2	—	86.6	36	103.2	125
																—	173.2	72	127.3	150
																23.6	86.6	36	126.8	150
																—	173.2	72	156.8	175
																—	173.2	72	221.7	225
																—	173.2	72	221.7	225
	460	414	508	10.2	90	10.2	90	10.2	90	—	—	2	2.7 (ea)	5	7.6	—	43.3	36	47.4	50
																—	86.6	72	63.6	70
																12.6	43.3	36	60.0	70
																—	86.6	72	79.4	80
																—	86.6	72	111.9	125
																—	86.6	72	111.9	125
	575	518	632	9	73	9	73	9	73	—	—	2	2.4 (ea)	5	6.1	—	34.6	36	40.6	50
																—	69.3	72	50.9	60
																9.6	34.6	36	50.2	60
																—	69.3	72	66.6	70
																—	69.3	72	92.7	100
																—	69.3	72	92.7	100

See Legend and Notes on page 67.

# Electrical data (cont)



→ 50AJ,AK,AW,AY UNITS (cont)

UNIT SIZE 50A	VOLTAGE 3 PH, 60 Hz	VOLTAGE RANGE		COMPRESSOR								CONDENSER FAN MOTOR		EVAPORATOR FAN MOTOR		POWER EXHAUST	OPTIONAL ELECTRIC HEAT		POWER SUPPLY	
		Min	Max	Cir A, No. 1		Cir A, No. 2		Cir B, No. 1		Cir B, No. 2		Qty	FLA	Hp	FLA	FLA (total)	FLA	kW	MCA	MOCP*
				FLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA									
025	208	187	229	21.8	184	25.6	190	25.6	190	—	—	2	5.3 (ea)	5	16.7	—	75.1	27	109.1	125
																150.1	54	114.8	125	
																23.6	75.1	27	132.7	150
																150.1	54	144.3	150	
																—	75.1	27	124.5	150
																150.1	54	188.6	200	
	10	30.8	—	75.1	27	132.4	150													
			150.1	54	148.1	175														
			23.6	75.1	27	161.9	175													
			150.1	54	218.1	225														
			—	75.1	27	143.8	175													
			150.1	54	207.9	250														
15	46.2	—	75.1	27	151.6	175														
		150.1	54	167.4	200															
		23.6	75.1	27	181.1	200														
		150.1	54	237.4	250															
		—	86.6	36	107.8	125														
		173.2	72	127.3	150															
230	207	253	21.8	184	25.6	190	25.6	190	—	—	2	5.3 (ea)	5	15.2	—	86.6	36	107.8	125	
															173.2	72	127.3	150		
															23.6	86.6	36	131.4	150	
															173.2	72	221.7	225		
															—	86.6	36	121.2	125	
															173.2	72	143.3	150		
10	28.0	—	86.6	36	143.3	150														
		173.2	72	208.2	225															
		23.6	86.6	36	144.8	150														
		173.2	72	172.8	175															
		—	86.6	36	138.7	175														
		173.2	72	160.8	175															
15	42.0	—	86.6	36	160.8	175														
		173.2	72	225.7	250															
		23.6	86.6	36	162.3	200														
		173.2	72	190.3	200															
		—	43.3	36	55.6	60														
		86.6	72	63.6	70															
460	414	508	11	90	13.5	95	13.5	95	—	—	2	2.7 (ea)	5	7.6	—	43.3	36	55.6	60	
															86.6	72	96.1	110		
															12.6	43.3	36	68.2	80	
															86.6	72	79.4	80		
															—	43.3	36	62.1	70	
															86.6	72	71.6	80		
10	14.0	—	43.3	36	62.1	70														
		86.6	72	104.1	110															
		12.6	43.3	36	74.7	80														
		86.6	72	87.4	90															
		—	43.3	36	70.9	90														
		86.6	72	80.4	90															
15	21.0	—	43.3	36	80.4	90														
		86.6	72	112.9	125															
		12.6	43.3	36	83.5	100														
		86.6	72	96.1	100															
		—	34.6	36	43.3	50														
		69.3	72	50.9	60															
575	518	632	9	73	10.2	75	10.2	75	—	—	2	2.4 (ea)	5	6.1	—	34.6	36	43.3	50	
															69.3	72	76.9	80		
															9.6	34.6	36	52.9	60	
															69.3	72	62.9	70		
															—	34.6	36	48.4	50	
															69.3	72	57.0	60		
10	11.0	—	34.6	36	48.4	50														
		69.3	72	83.1	90															
		9.6	34.6	36	58.0	70														
		69.3	72	69.0	70															
		—	34.6	36	55.9	70														
		69.3	72	69.0	70															
15	17.0	—	34.6	36	55.9	70														
		69.3	72	95.1	100															
		9.6	34.6	36	65.5	80														
		69.3	72	76.5	80															
		—	34.6	36	102.6	110														
		69.3	72	102.6	110															

See Legend and Notes on page 67.



→ 50AJ,AK,AW,AY UNITS (cont)

UNIT SIZE 50A	VOLTAGE 3 PH, 60 Hz	VOLTAGE RANGE		COMPRESSOR								CONDENSER FAN MOTOR		EVAPORATOR FAN MOTOR		POWER EXHAUST	OPTIONAL ELECTRIC HEAT		POWER SUPPLY	
		Min	Max	Cir A, No. 1		Cir A, No. 2		Cir B, No. 1		Cir B, No. 2		Qty	FLA	Hp	FLA	FLA (total)	FLA	kW	MCA	MOCP*
				FLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA									
027	208	187	229	25.6	190	25.6	190	25.6	190	—	—	2	5.3 (ea)	10	30.8	—	75.1	27	128.3	150
																—	150.1	54	132.4	150
																23.6	75.1	27	151.9	175
																—	150.1	54	161.9	175
																—	150.1	54	188.6	200
																—	150.1	54	218.1	225
	15	46.2	—	75.1	27	147.6	175													
			—	150.1	54	151.6	175													
			23.6	75.1	27	161.9	175													
			—	150.1	54	171.2	200													
			—	150.1	54	181.1	200													
			—	150.1	54	207.9	250													
20	59.4	—	75.1	27	164.1	200														
		—	150.1	54	168.1	200														
		23.6	75.1	27	197.6	225														
		—	150.1	54	224.4	250														
		—	150.1	54	187.7	225														
		—	150.1	54	197.6	225														
027	230	207	253	25.6	190	25.6	190	25.6	190	—	—	2	5.3 (ea)	10	28.0	—	86.6	36	125.0	150
																—	173.2	72	143.3	150
																23.6	86.6	36	148.6	150
																—	173.2	72	172.8	175
																—	173.2	72	208.2	225
																—	173.2	72	237.7	250
	15	42.0	—	86.6	36	142.5	175													
			—	173.2	72	160.8	175													
			23.6	86.6	36	166.1	200													
			—	173.2	72	190.3	200													
			—	173.2	72	225.7	250													
			—	173.2	72	255.2	300													
20	54.0	—	86.6	36	157.5	200														
		—	173.2	72	175.8	200														
		23.6	86.6	36	175.8	200														
		—	173.2	72	240.7	250														
		—	173.2	72	181.1	225														
		—	173.2	72	205.3	225														
027	460	414	508	13.5	85	13.5	85	13.5	95	—	—	2	2.7 (ea)	10	14.0	—	43.3	36	64.6	70
																—	86.6	72	71.6	80
																12.6	43.3	36	77.2	90
																—	86.6	72	87.4	90
																—	86.6	72	119.9	125
																—	86.6	72	119.9	125
	15	21.0	—	43.3	36	73.4	90													
			—	86.6	72	80.4	90													
			12.6	43.3	36	86.0	100													
			—	86.6	72	96.1	100													
			—	86.6	72	128.6	150													
			—	86.6	72	128.6	150													
20	27.0	—	43.3	36	80.9	100														
		—	86.6	72	87.9	100														
		12.6	43.3	36	120.4	125														
		—	86.6	72	93.5	110														
		—	86.6	72	103.6	110														
		—	86.6	72	136.1	150														
027	575	518	632	10.2	75	10.2	75	10.2	75	—	—	2	2.4 (ea)	10	11.0	—	34.6	36	49.6	60
																—	69.3	72	57.0	60
																12.6	34.6	36	62.6	70
																—	69.3	72	72.8	80
																—	69.3	72	98.8	100
																—	69.3	72	98.8	100
	15	17.0	—	34.6	36	57.1	70													
			—	69.3	72	64.5	70													
			12.6	34.6	36	90.6	100													
			—	69.3	72	69.7	80													
			—	69.3	72	80.3	90													
			—	69.3	72	106.3	110													
20	22.0	—	34.6	36	63.3	80														
		—	69.3	72	70.8	80														
		12.6	34.6	36	96.8	110														
		—	69.3	72	63.3	80														
		—	69.3	72	75.9	90														
		—	69.3	72	86.5	90														

See Legend and Notes on page 67.

# Electrical data (cont)



→ 50AJ,AK,AW,AY UNITS (cont)

UNIT SIZE 50A	VOLTAGE 3 PH, 60 Hz	VOLTAGE RANGE		COMPRESSOR								CONDENSER FAN MOTOR		EVAPORATOR FAN MOTOR		POWER EXHAUST	OPTIONAL ELECTRIC HEAT		POWER SUPPLY	
		Min	Max	Cir A, No. 1		Cir A, No. 2		Cir B, No. 1		Cir B, No. 2		Qty	FLA	Hp	FLA	FLA (total)	FLA	kW	MCA	MOCP*
				FLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA									
030	208	187	229	23	184	23	184	21.8	184	21.8	184	2	5.3 (ea)	10	30.8	—	75.1	27	141.1	150
																—	150.1	54	141.1	150
																23.6	75.1	27	164.7	175
																—	150.1	54	164.7	175
																—	75.1	27	160.4	200
																—	150.1	54	160.4	200
	230	207	253	23	184	23	184	21.8	184	21.8	184	2	5.3 (ea)	15	46.2	—	75.1	27	160.4	200
																—	150.1	54	160.4	200
																23.6	75.1	27	184.0	225
																—	150.1	54	184.0	225
																—	75.1	27	176.9	225
																—	150.1	54	176.9	225
460	414	508	10.2	90	10.2	90	11	90	11	90	2	2.7 (ea)	10	14	—	43.3	36	66.5	80	
															—	86.6	72	71.6	80	
															12.6	43.3	36	79.1	90	
															—	86.6	72	87.4	90	
															—	43.3	36	75.3	90	
															—	86.6	72	80.4	90	
575	518	632	9	73	9	73	9	73	9	73	2	2.4 (ea)	15	17	—	34.6	36	62.5	70	
															—	69.3	72	64.5	70	
															12.6	34.6	36	68.7	90	
															—	69.3	72	70.8	90	
															—	34.6	36	68.7	90	
															—	69.3	72	70.8	90	

See Legend and Notes on page 67.



→ 50AJ,AK,AW,AY UNITS (cont)

UNIT SIZE 50A	VOLTAGE 3 PH, 60 Hz	VOLTAGE RANGE		COMPRESSOR								CONDENSER FAN MOTOR		EVAPORATOR FAN MOTOR		POWER EXHAUST	OPTIONAL ELECTRIC HEAT		POWER SUPPLY	
		Min	Max	Cir A, No. 1		Cir A, No. 2		Cir B, No. 1		Cir B, No. 2		Qty	FLA	Hp	FLA	FLA (total)	FLA	kW	MCA	MOCP*
				FLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA									
035	208	187	229	21.8	184	25.6	190	25.6	190	25.6	190	2	5.3 (ea)	15	46.2	—	—	—	169.4	200
																75.1	27	169.4	200	
																150.1	54	207.9	250	
																—	—	—	193.0	225
																23.6	75.1	27	193.0	225
																150.1	54	237.4	250	
														20	59.4	—	—	—	185.9	225
																75.1	27	185.9	225	
																150.1	54	224.4	250	
																23.6	75.1	27	209.5	250
																150.1	54	209.5	250	
																—	—	—	253.9	300
	25	74.8	—	—	—	205.1	250													
			75.1	27	205.1	250														
			150.1	54	243.6	300														
			23.6	75.1	27	228.7	300													
			150.1	54	228.7	300														
			—	—	—	273.1	300													
	230	207	253	21.8	184	25.6	190	25.6	190	25.6	190	2	5.3 (ea)	15	42.0	—	—	—	164.3	200
																86.6	36	164.3	200	
																173.2	72	225.7	250	
																23.6	86.6	36	187.9	225
																173.2	72	190.3	225	
																—	—	—	255.2	300
20														54.0	—	—	—	179.3	225	
															86.6	36	179.3	225		
															173.2	72	240.7	250		
															23.6	86.6	36	202.9	250	
															173.2	72	205.3	250		
															—	—	—	270.2	300	
25	68.0	—	—	—	196.8	250														
		86.6	36	196.8	250															
		173.2	72	258.2	300															
		23.6	86.6	36	220.4	250														
		173.2	72	222.8	250															
		—	—	—	287.7	300														
460	414	508	11	90	13.5	95	13.5	95	13.5	95	2	2.7 (ea)	15	21.0	—	—	—	84.4	100	
															43.3	36	84.4	100		
															86.6	72	112.9	125		
															12.6	—	—	97.0	110	
															43.3	36	97.0	110		
															86.6	72	128.6	150		
													20	27.0	—	—	—	91.9	110	
															43.3	36	91.9	110		
															86.6	72	120.4	125		
															12.6	—	—	104.5	125	
															43.3	36	104.5	125		
															86.6	72	136.1	150		
25	34.0	—	—	—	100.6	125														
		43.3	36	100.6	125															
		86.6	72	129.1	150															
		12.6	—	—	113.2	125														
		43.3	36	113.2	125															
		86.6	72	144.9	175															
575	518	632	9	73	10.2	75	10.2	75	10.2	75	2	2.4 (ea)	15	17.0	—	—	—	66.1	80	
															34.6	36	66.1	80		
															69.3	72	90.6	100		
															12.6	—	—	78.7	90	
															34.6	36	80.3	90		
															69.3	72	106.3	110		
													20	22.0	—	—	—	72.3	90	
															34.6	36	72.3	90		
															69.3	72	96.8	110		
															12.6	—	—	84.9	100	
															34.6	36	86.5	100		
															69.3	72	112.6	125		
25	27.0	—	—	—	78.6	100														
		34.6	36	78.6	100															
		69.3	72	103.1	125															
		12.6	—	—	91.2	110														
		34.6	36	92.8	110															
		69.3	72	118.8	125															

See Legend and Notes on page 67.

# Electrical data (cont)



→ 50AJ,AK,AW,AY UNITS (cont)

UNIT SIZE 50A	VOLTAGE 3 PH, 60 Hz	VOLTAGE RANGE		COMPRESSOR								CONDENSER FAN MOTOR		EVAPORATOR FAN MOTOR		POWER EXHAUST	OPTIONAL ELECTRIC HEAT		POWER SUPPLY	
				Cir A, No. 1		Cir A, No. 2		Cir B, No. 1		Cir B, No. 2		Qty	FLA	Hp	FLA	FLA (total)	FLA	kW	MCA	MOCP*
		Min	Max	FLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA									
040	208	187	229	25.6	190	25.6	190	34.3	265	34.3	265	4	6.5 (ea)	15	46.2	—	75.1	27	203.6	225
																—	150.1	54	203.6	225
																23.6	75.1	27	227.2	250
																—	150.1	54	227.2	250
																—	75.1	27	220.1	250
																—	150.1	54	220.1	250
		20	59.4	—	75.1	27	224.4	250												
				—	150.1	54	224.4	250												
				23.6	75.1	27	243.7	300												
				—	150.1	54	243.7	300												
				—	75.1	27	253.9	300												
				—	150.1	54	253.9	300												
	25	74.8	—	75.1	27	239.3	300													
			—	150.1	54	239.3	300													
			23.6	75.1	27	262.9	300													
			—	150.1	54	262.9	300													
			—	75.1	27	273.1	300													
			—	150.1	54	273.1	300													
	230	207	253	25.6	190	25.6	190	34.3	265	34.3	265	4	6.6 (ea)	15	42.0	—	86.6	36	198.7	225
																—	173.2	72	198.7	225
																23.6	86.6	36	222.3	250
																—	173.2	72	222.3	250
																—	86.6	36	213.7	250
																—	173.2	72	213.7	250
20		54.0	—	86.6	36	240.7	250													
			—	173.2	72	240.7	250													
			23.6	86.6	36	237.3	250													
			—	173.2	72	237.3	250													
			—	86.6	36	270.2	300													
			—	173.2	72	270.2	300													
25	68.0	—	86.6	36	231.2	250														
		—	173.2	72	231.2	250														
		23.6	86.6	36	258.2	300														
		—	173.2	72	258.2	300														
		—	86.6	36	254.8	300														
		—	173.2	72	254.8	300														
460	414	508	13.5	95	13.5	95	16	120	16	120	4	3.3 (ea)	15	21.0	—	43.3	36	98.5	110	
															—	86.6	72	98.5	110	
															12.6	43.3	36	111.1	125	
															—	86.6	72	111.1	125	
															—	43.3	36	106.0	125	
															—	86.6	72	106.0	125	
	20	27.0	—	43.3	36	120.4	125													
			—	86.6	72	120.4	125													
			12.6	43.3	36	118.6	125													
			—	86.6	72	118.6	125													
			—	43.3	36	136.1	150													
			—	86.6	72	136.1	150													
25	34.0	—	43.3	36	114.7	125														
		—	86.6	72	114.7	125														
		12.6	43.3	36	129.1	150														
		—	86.6	72	129.1	150														
		—	43.3	36	127.3	150														
		—	86.6	72	127.3	150														
575	518	632	10.2	75	10.2	75	12.9	80	12.9	80	4	2.6 (ea)	15	17.0	—	34.6	36	77.9	90	
															—	69.3	72	77.9	90	
															12.6	34.6	36	90.5	100	
															—	69.3	72	90.5	100	
															—	34.6	36	84.1	100	
															—	69.3	72	84.1	100	
	20	22.0	—	34.6	36	96.7	110													
			—	69.3	72	96.7	110													
			12.6	34.6	36	112.6	125													
			—	69.3	72	112.6	125													
			—	34.6	36	90.4	110													
			—	69.3	72	90.4	110													
25	27.0	—	34.6	36	103.1	125														
		—	69.3	72	103.1	125														
		12.6	34.6	36	103.0	125														
		—	69.3	72	103.0	125														
		—	34.6	36	118.8	125														
		—	69.3	72	118.8	125														

See Legend and Notes on page 67.



→ 50AJ,AK,AW,AY UNITS (cont)

UNIT SIZE 50A	VOLTAGE 3 PH, 60 Hz	VOLTAGE RANGE		COMPRESSOR								CONDENSER FAN MOTOR		EVAPORATOR FAN MOTOR		POWER EXHAUST	OPTIONAL ELECTRIC HEAT		POWER SUPPLY	
		Min	Max	Cir A, No. 1		Cir A, No. 2		Cir B, No. 1		Cir B, No. 2		Qty	FLA	Hp	FLA	FLA (total)	FLA	kW	MCA	MOCP*
				FLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA									
050	208	187	229	34.3	265	34.3	265	34.3	265	47	380	4	6.5 (ea)	20	59	—	75.1	27	250.2	300
																—	150.1	54	250.2	300
																23.6	75.1	27	273.8	300
																—	150.1	54	273.8	300
																—	75.1	27	269.4	300
																—	150.1	54	269.4	300
		25	75	—	75.1	27	269.4	300												
				—	150.1	54	269.4	300												
				23.6	75.1	27	293.0	350												
				—	150.1	54	293.0	350												
				—	75.1	27	285.9	350												
				—	150.1	54	285.9	350												
	30	88	—	75.1	27	285.9	350													
			—	150.1	54	285.9	350													
			23.6	75.1	27	309.5	350													
			—	150.1	54	309.5	350													
			—	75.1	27	309.5	350													
			—	150.1	54	309.5	350													
	230	207	253	34.3	265	34.3	265	34.3	265	47	380	4	6.6 (ea)	20	54	—	86.6	36	243.8	250
																—	173.2	72	243.8	250
																23.6	86.6	36	267.4	300
																—	173.2	72	270.2	300
																—	86.6	36	261.3	300
																—	173.2	72	261.3	300
25														68	—	86.6	36	261.3	300	
															—	173.2	72	261.3	300	
															23.6	86.6	36	284.9	350	
															—	173.2	72	284.9	350	
															—	86.6	36	287.7	350	
															—	173.2	72	287.7	350	
30	80	—	86.6	36	276.3	350														
		—	173.2	72	276.3	350														
		23.6	86.6	36	299.9	350														
		—	173.2	72	299.9	350														
		—	86.6	36	302.7	350														
		—	173.2	72	302.7	350														
460	414	508	16	120	16	120	16	120	22.4	175	4	3.3 (ea)	20	27	—	43.3	36	117.4	125	
															—	86.6	72	117.4	125	
															12.6	43.3	36	130.0	150	
															—	86.6	72	130.0	150	
															—	43.3	36	126.1	150	
															—	86.6	72	126.1	150	
													25	34	—	43.3	36	126.1	150	
															—	86.6	72	129.1	150	
															12.6	43.3	36	138.7	150	
															—	86.6	72	138.7	150	
															—	43.3	36	133.6	150	
															—	86.6	72	133.6	150	
30	40	—	43.3	36	133.6	150														
		—	86.6	72	136.6	175														
		12.6	43.3	36	146.2	175														
		—	86.6	72	146.2	175														
		—	43.3	36	152.4	175														
		—	86.6	72	152.4	175														
575	518	632	12.9	80	12.9	80	12.9	80	18.6	140	4	2.6 (ea)	20	22	—	34.6	36	95.2	110	
															—	69.3	72	95.2	110	
															12.6	34.6	36	107.8	125	
															—	69.3	72	107.8	125	
															—	34.6	36	101.5	125	
															—	69.3	72	101.5	125	
													25	27	—	34.6	36	101.5	125	
															—	69.3	72	103.1	125	
															12.6	34.6	36	114.1	125	
															—	69.3	72	114.1	125	
															—	34.6	36	107.7	125	
															—	69.3	72	107.7	125	
30	32	—	34.6	36	107.7	125														
		—	69.3	72	109.3	125														
		12.6	34.6	36	120.3	150														
		—	69.3	72	120.3	150														
		—	34.6	36	125.1	150														
		—	69.3	72	125.1	150														

See Legend and Notes on page 67.

# Electrical data (cont)



→ 50AJ,AK,AW,AY UNITS (cont)

UNIT SIZE 50A	VOLTAGE 3 PH, 60 Hz	VOLTAGE RANGE		COMPRESSOR								CONDENSER FAN MOTOR		EVAPORATOR FAN MOTOR		POWER EXHAUST	OPTIONAL ELECTRIC HEAT		POWER SUPPLY	
				Cir A, No. 1		Cir A, No. 2		Cir B, No. 1		Cir B, No. 2		Qty	FLA	Hp	FLA	FLA (total)	FLA	kW	MCA	MOCP*
		Min	Max	FLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA									
060	208	187	229	40.8	265	47	380	40.8	265	47	380	6	6.5 (ea)	25	74.8	—	112.6	41	308.1	350
																—	225.2	81	308.1	350
																35.4	112.6	41	343.5	400
																—	225.2	81	343.5	400
																—	112.6	41	324.6	400
																—	225.2	81	324.6	400
		30	88	—	112.6	41	335.2	400												
				—	225.2	81	335.2	400												
				35.4	112.6	41	360.0	400												
				—	225.2	81	360.0	400												
				—	112.6	41	357.1	450												
				—	225.2	81	357.1	450												
	40	114	35.4	112.6	41	392.5	500													
			—	225.2	81	392.5	500													
			—	112.6	41	367.7	450													
			—	225.2	81	367.7	450													
			35.4	112.6	41	392.5	500													
			—	225.2	81	412.0	500													
	230	207	253	40.8	265	47	380	40.8	265	47	380	6	6.6 (ea)	25	68	—	129.9	54	300.2	350
																—	259.8	108	300.2	350
																35.4	129.9	54	335.6	400
																—	259.8	108	335.6	400
																—	129.9	54	315.2	350
																—	259.8	108	315.2	350
30		80	35.4	129.9	54	359.8	400													
			—	259.8	108	359.8	400													
			—	129.9	54	350.6	400													
			—	259.8	108	350.6	400													
			35.4	129.9	54	404.1	450													
			—	259.8	108	404.1	450													
40	104	—	129.9	54	380.6	450														
		—	259.8	108	380.6	450														
		35.4	129.9	54	434.1	500														
		—	259.8	108	434.1	500														
		—	129.9	54	345.2	400														
		—	259.8	108	345.2	400														
460	414	508	20.2	135	22.4	175	20.2	135	22.4	175	6	3.3 (ea)	25	34	—	65.0	54	147.5	175	
															—	129.9	108	147.5	175	
															18.9	65.0	54	166.4	200	
															—	129.9	108	166.4	200	
															—	65.0	54	155.0	175	
															—	129.9	108	155.0	175	
	30	40	18.9	65.0	54	179.9	200													
			—	129.9	108	179.9	200													
			—	65.0	54	173.9	200													
			—	129.9	108	173.9	200													
			18.9	65.0	54	203.5	225													
			—	129.9	108	203.5	225													
40	52	—	65.0	54	170.0	200														
		—	129.9	108	170.0	200														
		18.9	65.0	54	194.9	225														
		—	129.9	108	194.9	225														
		18.9	65.0	54	188.9	225														
		—	129.9	108	188.9	225														
575	518	632	16.6	120	18.6	140	16.6	120	18.6	140	6	2.6 (ea)	25	27	—	65.0	54	119.8	125	
															—	129.9	108	119.8	125	
															18.9	65.0	54	138.7	150	
															—	129.9	108	138.7	150	
															—	65.0	54	126.0	150	
															—	129.9	108	126.0	150	
	30	32	18.9	65.0	54	169.9	200													
			—	129.9	108	169.9	200													
			—	65.0	54	144.9	175													
			—	129.9	108	144.9	175													
			18.9	65.0	54	193.5	200													
			—	129.9	108	193.5	200													
40	41	—	65.0	54	137.3	175														
		—	129.9	108	137.3	175														
		18.9	65.0	54	181.2	200														
		—	129.9	108	181.2	200														
		—	65.0	54	156.2	175														
		—	129.9	108	156.2	175														

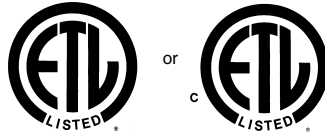
See Legend and Notes on page 67.

## LEGEND AND NOTES FOR ELECTRICAL DATA TABLES

### LEGEND

<b>FLA</b>	— Full Load Amps
<b>HACR</b>	— Heating, Air Conditioning and Refrigeration
<b>LRA</b>	— Locked Rotor Amps
<b>MCA</b>	— Minimum Circuit Amps
<b>MOCP</b>	— Maximum Overcurrent Protection
<b>NEC</b>	— National Electrical Code
<b>RLA</b>	— Rated Load Amps

\*Fuse or HACR circuit breaker.



### NOTES:

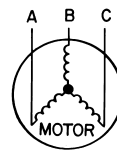
1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker.

### 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.

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

EXAMPLE: Supply voltage is 460-3-60.



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

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

Determine maximum deviation from average voltage.

(AB) 457 - 452 = 5 v

(BC) 464 - 457 = 7 v

(AC) 457 - 455 = 2 v

Maximum deviation is 7 v.

Determine percent 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.

# Controls

## Control components

The 48/50A series rooftops use the *ComfortLink™* Control system that has been developed for use in all types of Carrier Commercial equipment. The control system monitors all operating conditions in the rooftop unit as well as controlling the compressors, economizers, fans, heat and other devices. It also has the capability of communicating with the Carrier Comfort Network using the CCN protocol.

The system uses a microprocessor and a series of boards, each with inputs and outputs. A local network communications bus (LEN) ties all the boards together into a system and enables the boards to communicate.

For the 48/50A series, the control consists of the following key components:

**Main base board (MBB)** — The MBB is the center of the *ComfortLink* control system. It contains the major portion of the operating software and controls the operation of the unit. The MBB continuously monitors inputs and outputs as well as data about from the LEN and CCN communications channels. The MBB also controls 11 output relays. A complete list of the MBB and system I/O are contained in the following table. The board is located in the main control box.

**Economizer control board (ECB1)** — The ECB controls the economizer actuator. The ECB controls the economizer motor using a digital communications signal that also provides operation and diagnostic data on the economizer motor. The ECB also controls the operation of the power exhaust motors and provides up to 6 stages of digitally sequenced power exhaust. Exhaust sequencing can be based on either the economizer motor position or the building pressure. On the A series unit, the ECB board is located in an auxiliary box located at the end of the unit near the economizer motor. The board also contains a second LEN port than can be used with the handheld Navigator™ display.

**Supply and Building Pressure control board (ECB2)** — The board, which is the same hardware as the ECB1, is used to control the supply fan inverter on the

VAV units. It sends a 4 to 20 mA signal to the inverter based on a supply duct pressure sensor connected to the board. The board also accepts a signal from another pressure sensor that monitors building pressure and controls the operation of the optional modulating power exhaust system. This board is located in the auxiliary control box.

**CV staged gas heat board (SCB)** — When the optional staged gas heat is used on 48AJ,AW units the SCB board will be installed and control the operation of the gas valves. It also provides additional sensors for monitoring of the supply air temperature. This board is located in the gas heat section of the unit.

**Integrated gas controller (IGC)** — One IGC is provided with each bank of gas heat exchangers. It controls the direct spark ignition system and monitors the rollout switch, limit switches, and induced-draft motor Hall Effect sensor. It is equipped with an LED for diagnostics.

**Controls options board (COB)** — The optional control board is used to provide inputs for demand limiting, remote set point and other optional inputs. It is located in the main control box.

**Compressor protection Cycle-LOC™ board (CS)** — This board monitors the status of the compressor by sensing the current flow to the compressors and then provides digital status signal to the MBB.

**Scrolling Marquee Display** — This device is the keypad interface used to access the control information, read sensor values, test the unit, and monitor alarm status. The marquee display is a 4-key, 4-character, 16-segment LED (light-emitting diode) display. The display is very easy to operate using 4 buttons and a group of 11 LED's that indicate the following menu structures:

- Run Status
- Outputs
- Service Test
- Configuration
- Temperatures
- Timeclock
- Pressures
- Operating Modes
- Set Points
- Alarms
- Inputs

# Controls (cont)



Through the display inputs and outputs can be checked for their value or status. Because the unit is equipped with suction pressure transducers and discharge saturation temperature sensors it can also display pressures typically obtained from gauges. The control includes a full alarm

history which can be accessed from the display. Through the display, a built-in test routine can be used at start-up commission and during maintenance inspections to diagnose operational problems with the unit.

## MAIL CONTROL BOARD (MBB) BOARD INPUTS AND OUTPUTS

POINT NAME	POINT DESCRIPTION	TYPE OF I/O	I/O POINT NAME	CONNECTOR PIN NO.
<b>INPUTS</b>				
<b>GASFAN</b>	YAC Indoor Fan Relay (fan request from YAC)	Switch Input	DI1	J6, 3-4
<b>FSD</b>	Fire Shutdown Switch Input	Switch Input	DI2	J6, 5-6
<b>G</b>	Thermostat 'G' Input /Remote Occupied	Switch Input	DI3	J7, 1-2
<b>W2</b>	Thermostat 'W2' Input	Switch Input	DI4	J7, 3-4
<b>W1</b>	Thermostat 'W1' Input	Switch Input	DI5	J7, 5-6
<b>Y2</b>	Thermostat 'Y2' Input	Switch Input	DI6	J7, 7-8
<b>Y1</b>	Thermostat 'Y1' Input	Switch Input	DI7	J7, 9-10
<b>CSB_A1</b>	Compressor A1 Current Sensor	Digital Input	DIG1	J9, 10-12
<b>CSB_A2</b>	Compressor A2 Current Sensor	Digital Input	DIG2	J9, 7-9
<b>CSB_B1</b>	Compressor B1 Current Sensor	Digital Input	DIG3	J9, 4-6
<b>CSB_B2</b>	Compressor B2 Current Sensor	Digital Input	DIG4	J9, 1-3
<b>DP_A / SCTA</b>	Circuit A Saturated Condensing Temperature	5 K Thermistor	AN1	J8, 21-23
<b>DP_B / SCTB</b>	Circuit B Saturated Condensing Temperature	5 K Thermistor	AN2	J8, 24-26
<b>SP_A / SSTA</b>	Circuit A Saturated Suction Pressure	Press Transduce	AN3	J8, 15-17
<b>SP_B / SSTB</b>	Circuit B Saturated Suction Pressure	Press Transduce	AN4	J8, 18-20
<b>RAT</b>	Return Air Temperature	10 K Thermistor	AN5	J8, 9-10
<b>EDT</b>	Evaporator Discharge Air Temperature	10 K Thermistor	AN6	J8, 11-12
<b>OAT</b>	Outdoor Air Temperature	10 K Thermistor	AN7	J8, 13-14
<b>SPT</b>	Space Temperature (T55/56)	10 K Thermistor	AN8	J8, 1-2
<b>SPTO</b>	Space Temperature Offset (T56)	10 K Thermistor	AN9	J8, 3-4
<b>IAQ, IAQMINOV</b>	IAQ Analog Input	4-20 mA	AN10	J8, 5-6
<b>FLTS</b>	Filter Status	Switch Input	AN11	J8, 7-8
<b>OUTPUTS</b>				
<b>CMPB2</b>	Compressor B2	Relay	RLY1	J10, 20-21
<b>CMPB1</b>	Compressor B1	Relay	RLY2	J10, 22-23
<b>CMPA2</b>	Compressor A2	Relay	RLY3	J10, 24-25
<b>CMPA1</b>	Compressor A1	Relay	RLY4	J10, 26-27
<b>CONDfanB</b>	Condenser Fan B	Relay	RLY5	J10, 10-11
<b>CONDfanA</b>	Condenser Fan A	Relay	RLY6	J10, 12-13
<b>HS2</b>	Heat Stage 2	Relay	RLY7	J10, 14-16
<b>HS1</b>	Heat Stage 1	Relay	RLY8	J10, 17-19
<b>HIR</b>	Heat Interlock Relay	Relay	RLY9	J10, 4-6
<b>SF</b>	Supply Fan	Relay	RLY10	J10, 7-9
<b>ALRM</b>	Alarm Output Relay	Relay	RLY11	J10, 1-3

IAQ — Indoor-Air Quality

## ECONOMIZER CONTROL BOARD (ECB1) INPUTS AND OUTPUTS

POINT NAME	POINT DESCRIPTION	I/O TYPE	I/O POINT NAME	CONNECTOR PIN NO.
<b>INPUTS</b>				
<b>RMTIN</b>	Remote Occupancy	Switch	DI1	J4, 1-2
<b>ENTH</b>	Economizer Enable	Switch	DI2	J4, 3-4
<b>RARH</b>	Return Air Relative Humidity	4-20 mA	AN1	J5, 1-3
<b>OARH</b>	Outdoor Air Relative Humidity	4-20 mA	AN2	J5, 4-6
<b>OUTPUTS</b>				
<b>ECONOCMD</b>	Economizer Actuator (Analog Control)	4-20 mA	AO1	J9, 1-2
<b>ECONOCMD</b>	Economizer Actuator (Digital Control)	Digital	PP/MP	J7, 1-3
<b>PE_A</b>	Power Exhaust Stage A	Relay	RLY1	J8, 1-3
<b>PE_B</b>	Power Exhaust Stage B	Relay	RLY2	J8, 4-6
<b>PE_C</b>	Power Exhaust Stage C	Relay	RLY3	J8, 7-9
<b>ECON_PWR</b>	Economizer Power	Relay	RLY6	J8, 16-18



### VAV CONTROL BOARD (ECB2) INPUTS/OUTPUTS

POINT NAME	POINT DESCRIPTION	I/O TYPE	I/O POINT NAME	CONNECTOR PIN NO.
<b>INPUTS</b>				
	Not Used		DI1	J4, 1-2
	Not Used		DI2	J4, 3-4
<b>BP</b>	Building Static Pressure	4-20 mA	AN1	J5, 1-3
<b>SP</b>	Supply Duct Static Pressure	4-20 mA	AN2	J5, 4-6
<b>OUTPUTS</b>				
<b>SFAN_VFD</b>	Supply Fan Inverter Speed	4-20 mA	AO1	J9, 1-2
	Not Used		PP/MP	J7, 1-3
	Not Used		RLY1	J8, 1-3
	Not Used		RLY2	J8, 4-6
	Not Used		RLY3	J8, 7-9
	Hot Gas Bypass Valve	Relay	RLY6	J8, 16-18

### STAGED GAS HEAT BOARD (SCB) INPUTS/OUTPUTS

POINT NAME	POINT DESCRIPTION	I/O TYPE	I/O POINT NAME	CONNECTOR PIN NO.
<b>INPUTS</b>				
	Not Used		AN1	J5, 1-3
	Not Used		AN2	J5, 4-6
<b>SAT1</b>	Supply Air Temperature 1	10 K Thermistor	AN3	J5, 7-9
<b>SAT2</b>	Supply Air Temperature 2	10 K Thermistor	AN4	J5, 10-12
<b>SAT3</b>	Supply Air Temperature 3	10 K Thermistor	AN5	J5, 13-15
	Not Used		AN6	J6, 1-3
	Not Used		AN7	J6, 4-6
	Not Used		AN8	J6, 7-9
	Not Used		AN9	J7, 1-2
	Not Used		AN10	J7, 3-4
<b>OUTPUTS</b>				
	Not Used		AO1	J8, 1-2
	Not Used		AO2	J8, 3-4
<b>HS3</b>	Heat Stage 3	Relay	RLY1	J9, 1-3
<b>HS4</b>	Heat Stage 4	Relay	RLY2	J9, 4-6
<b>HS5</b>	Heat Stage 5	Relay	RLY3	J9, 7-9
<b>HS6</b>	Heat Stage 6	Relay	RLY4	J9, 10-12
			RLY5	J9, 13-15

### CONTROLS OPTIONS BOARD INPUTS/OUTPUTS

POINT NAME	POINT DESCRIPTION	TYPE OF I/O	I/O POINT NAME	CONNECTOR PIN NO.
<b>INPUTS</b>				
<b>SFS</b>	Supply Fan Status Switch	Switch	DI1	J7, 1-2
<b>DMD_SW1</b>	Demand Limit — Redline	Switch	DI2	J7, 3-4
<b>DMD_SW2</b>	Demand Limit — Load Shed	Switch	DI3	J7, 5-6
<b>PRES</b>	Fire Pressurization	Switch	DI4	J7, 7-8
<b>EVAC</b>	Fire Evacuation	Switch	DI5	J7, 9-10
<b>PURG</b>	Smoke Purge	Switch	DI6	J7, 11-12
<b>IAQIN</b>	Indoor Air Quality Override Switch	Switch	DI7	J7, 13-14
<b>OACFM</b>	Outside Air CFM	4-20 mA	AN7	J6, 1-3
<b>DMDLMTMA</b>	4-20 mA Demand Limit	4-20 mA	AN8	J6, 4-6
<b>SATRESMA</b>	4-20 mA Supply Air Set Point	4-20 mA	AN9	J6, 7-9
<b>OAQ</b>	Outside Air CO <sub>2</sub> Sensor	4-20 mA	AN10	J6, 10-12
	Not Used		AN1	J5, 1-2
	Not Used		AN2	J5, 3-4
	Not Used		AN3	J5, 5-6
	Not Used		AN4	J5, 7-8
	Not Used		AN5	J5, 9-10
	Not Used		AN6	J5, 11-12

# Controls (cont)



## Controls options

The control is capable of a wide range of operating modes which are dependent on the type of unit and configurations made at the time of installation. The following is a summary of the various Cooling modes of operation that can be selected.

APPLICATION	UNIT	DEMAND SOURCE	COOLING CONTROL METHOD
VAV	48/50AK,AY	RAT	Multiple Stage SAT
		SPT	Multiple Stage SAT
VVT Linkage	48/50AJ,AK,AW,AY	SPT	2 Stage Demand
		SPT	Multiple Stage SPT
VVT 2-Stage Demand	48/50AJ,AK,AW,AY	Y1, Y2	2 Stage Demand
		Y1, Y2	Multiple Adaptive Demand
CV T56, T58 Sensor	48/50AJ,AW	SPT	2 Stage Demand
		SPT	Multiple Stage SPT
CV, Mechanical Thermostat	48/50AJ,AW	Y1, Y2	2 Stage Demand
		Y1, Y2	Multiple Adaptive Demand

Each of the cooling modes is entered based on the status of the return-air temperature (RAT), space temperature sensor (SPT) and status of the thermostat cooling inputs Y1 and Y2.

**Multiple stage evaporator discharge temperature (EDT)** — The capacity of the economizer and compressors are controlled based on the evaporator air discharge temperature and supply air temperature set point. Two stages of economizer and up to 6 stages of additional compressor capacity control are provided.

**2-stage demand** — The unit will operate with 2 stages of economizer control and 2 stages of compressor capacity control based on configurable set points relative to the space temperature.

**Multiple stage SPT control** — Two stages of economizer control will be provided and up to 6 stages of compressor capacity control, based on the deviation to set point and the trend of the supply air temperature set point.

**Multiple adaptive demand** — The unit will use the signal from a conventional thermostat to turn the Y1, Y2 signals into a high and low demand signal.

This demand will then be used to sequence the compressors and provide up to 6 stages of capacity based on the unit size.

For each of the above modes of operation all mechanical cooling will first be delayed while the unit attempts to use the economizer for free cooling. Once the economizer is at full capacity, the control will then supplement the free cooling with as much mechanical cooling as required. To prevent any rapid changes in cooling, the control will also use the economizer to trim the cooling supplied.

In heating mode the following modes of operation can be selected:

APPLICATION	UNIT	DEMAND SOURCE	HEATING CONTROL METHOD
VAV	48/50AK,AY	RAT	2 Stage Gas or Electric Heat
		SPT	2 Stage Gas or Electric Heat
VVT Linkage	48/50AJ,AK,AW,AY	SPT	2 Stage Gas or Electric Heat
		SPT	Multiple Stage Gas Heat
VVT 2-Stage Demand	48/50AJ,AK,AW,AY	Y1, Y2	2 Stage Gas or Electric Heat
		Y1, Y2	Multiple Stage Gas Heat
CV T56, T58 Sensor	48/50AJ,AW	SPT	2 Stage Gas or Electric Heat
		SPT	Multiple Stage Gas Heat
CV, Mechanical Thermostat	48/50AJ,AW	Y1, Y2	2 Stage Gas or Electric Heat
		Y1, Y2	Multiple Stage Gas Heat

Standard units can be provided with either 2 stages of electric heat or 2 stages of gas heat. Constant volume units can also be equipped with the staged gas heat option, which can provide up to 11 stages of gas heat.

Heating with VAV units will be enabled based on the return air temperature or the space temperature. Once enabled, control will be based on the return air temperature. Variable Air Volume terminals will be commanded open to the heating cfm through linkage or the HIR relay.

Constant Volume heating will be controlled by demand signals from linkage, space sensors or electro-mechanical thermostats.

The controls also include inputs for occupied and unoccupied and the capability of configure operation for the following modes of operation:

- Unoccupied free cooling
- Unoccupied heat and cooling with different set points from occupied

The controls are capable of full time of day scheduling that can be configured through the STDU or through the Carrier Comfort Network.

## Economizer and IAQ options

The controls have been designed to support the requirements of indoor air quality control through the use of outside air. Units can either be equipped with an outside air adjustable, self-closing economizer or a fully modulating, gear driven economizer with no linkages. The economizer can be configured for a full modulation mode or 3-position mode of operation. The control includes logic for a minimum ventilation position and different set points for occupied and unoccupied minimum position set points. This control also has logic built in to calibrate the economizer position to the actual percentage of outside air introduced. During periods when the compressors are not being used the control will use the RAT, SAT and OAT to calibrate the economizer. This will allow for setting the outside air actual percentage and not just the percent damper position.

The use of the economizer will depend on the mode of change selected. This control integrates the changeover directly into the control. Five types of changeover are available:

- Outdoor air dry bulb
- Differential dry bulb
- Outdoor air enthalpy
- Differential enthalpy
- Outdoor air dew point

The units are provided with an outdoor air and return air temperature sensor so the first two changeover methods are available as standard. To use the enthalpy changeover options the control supports the addition of highly reliable, electronic humidity sensors. The humidity sensor input is then used with the dry bulb sensors to calculate the enthalpy. For outdoor enthalpy changeover the control also has the ASHRAE 90.1 A, B, C, D economizer changeover curves built into the software.

When operating with outside air economizers, large amounts of air can be introduced into the building and a means must be provided for building pressure relief. The 48/50A series control supports the following three types of building pressure control:

- Relief Dampers — Can be used on low return duct static applications
- Damper Controlled Power Exhaust — The unit can be equipped with multiple power exhaust fans, 4 on the 020-050 and 6 on the 060 units. The software allows for the configuration of the power exhaust damper position or outside air percentage set points. The fans are in 3 groups which allow for 4 stages on the 020-050 unit and 6 stages on the 060 size unit.
- Modulating Power Exhaust — Both the VAV and CV units can be equipped with power exhaust fans that are controlled by a building pressure sensor that is connected to the *ComfortLink*™ controls.

The units are capable of using either 2-in. or optional 4-in. pleated filters and can have an optional filter pressure drop switch to warn of dirty filter conditions.

The Indoor Air Quality (IAQ) function provides a demand-based control for ventilation air quantity, by providing a modulating outside air damper position that is proportional to the space CO<sub>2</sub> level. The ventilation damper position is varied between a minimum ventilation level (based on internal sources of contaminants and CO<sub>2</sub> levels other than the effect of people) and the maximum design ventilation level (determined at maximum populated status in the building). During a less-than-fully populated space period, the CO<sub>2</sub> level will be lower than that at full-load design condition and will require less ventilation air. Reduced quantities of ventilation air will result in reduced operating costs. Space CO<sub>2</sub> levels are monitored and compared to user-configured set points. Accessory CO<sub>2</sub> sensor for space (or return duct mounting) is required. The IAQ routine can be enhanced by also installing a sensor for Outdoor Air Quality.

During the occupied period, in the absence of a demand for cooling using outside air, if CO<sub>2</sub> levels are below the set point for the minimum ventilation level, the outside-air damper will open to the minimum ventilation level damper position set point. The minimum damper position will be maintained as long as the CO<sub>2</sub> level remains below the set point.

When the space CO<sub>2</sub> level exceeds set point for the minimum ventilation level condition, the *ComfortLink* control will begin to open the outside air damper position to admit more ventilation air and remove the additional contaminants. As the space CO<sub>2</sub> level approaches the set point for maximum design ventilation level condition, the outside air damper position will reach the maximum ventilation level damper position set point limit. Damper position will be modulated in a directly proportional relationship between these two CO<sub>2</sub> set point limits and their corresponding damper position limits.

In most applications a fixed reference value can be set for the outdoor air quality level, but the control also supports the addition of an outdoor air quality sensor that will be compared to the indoor or return IAQ sensor. If an OAQ sensor is connected, the demand set point levels will be adjusted automatically as the outdoor CO<sub>2</sub> levels vary. Also, if the outdoor CO<sub>2</sub> level exceeds a user-configured maximum limit value, then outside air damper position will be limited to the minimum ventilation damper set point value. The control can also receive these signals through the CCN.

IAQ and OAQ measurement levels are displayed by the *ComfortLink* control in parts per million (PPM).

**Fire and smoke controls interface** — The unit can be equipped with an optional return air smoke detector. The smoke detector is wired to stop the unit and send a message to a remote alarm system if a fault condition is detected. If the controls options board is added, the control will support smoke control modes including evacuation, smoke purge, and pressurization.

# Controls (cont)



**Demand limiting** — The control supports demand limiting using Redline and Load Limiting logic. On CCN systems this can be done through the network or for non-CCN network jobs this can be done by adding the Controls Expansion Board.

## Diagnostics

The *ComfortLink™* control has fully integrated all controls and sensors into a common control system. The control monitors these inputs as well as many of the routines to provide advanced diagnostic and prognostics. These include adaptive logic to allow the unit to continue to operate in a reduced output mode and automatic resets where applicable. The last 10 alarms and alerts are stored in memory and can be accessed through the display. The alarms can also be monitored through the Carrier Comfort Network connection. The unit also supports the use of the hand held Navigator™ display which can be plugged in at the main control box and auxiliary control box at the opposite end of the unit.

Some of the diagnostics that are included are;

- Monitoring of all sensors
- Suction pressure transducers to provide compressor protection and coil freeze protection
- Monitoring of the economizer motor using a digitally controlled motor
- Monitoring of compressor status using compressor protection boards
- Adaptive logic for low supply-air temperatures
- Compressor lockout at low ambient conditions
- Storage of compressor run hours and starts
- Low refrigerant charge protection
- Compressor reverse rotation protection

## Control interface

The *ComfortLink* control can interface with the Carrier Comfort Network through the 485 communications port. This will allow for the use of all system control programs. These programs include:

- Network Service Tool
- DataPort™ Software
- DataLINK™ Software
- ComfortID™ System

Contact Carrier Controls Marketing for more information.

The control can also provide interface with non-Carrier Energy Management systems.

Several contact connection points have been provided in the main control box for interface to external controls and systems. These are summarized in the Interface Connection table.

## INTERFACE CONNECTIONS

TB-3 — CCN COMMUNICATIONS (HY84HA096)	
TB3	1 LEN +
	2 LEN C
	3 LEN –
	4 24 VAC
	5 CCN +
	6 CCN c
	7 CCN –
	8 Grd
TB-4 — THERMOSTAT CONNECTIONS (HY84HA090)	
TB4	1 Thermostat R
	2 Thermostat Y1
	3 Thermostat Y2
	4 Thermostat W1
	5 Thermostat W2
	6 Thermostat G
	7 Thermostat C
	8 Thermostat X
TB-5 — FIELD CONNECTIONS (HY84HA101)	
TB5	1 VAV Heater Interlock Relay, Ground
	2 VAV Heater Interlock Relay, 24 VAC
	3 T56 Sensor
	4 T56/T58 Ground
	5 T58 Set Point
	6 Indoor Air IAQ Remote Sensor/Remote Pot/Remote 4-20 mA
	7 Indoor Air IAQ Remote Sensor/Remote Pot/Remote 4-20 mA
	8 Smoke Detector Remote Alarm
	9 Smoke Detector Remote Alarm
	10 Fire Shutdown
	11 Fire Shutdown
	12 Fire Control Common
	13 Fire Pressurization
	14 Fire Evacuation
	15 Fire Smoke Purge
	16
TB-6 — FIELD CONNECTIONS (HY84HA101)	
TB6	1 Remote Occupied/Economizer Enable 24 VAV
	2 Remote Occupied Contact
	3 Remote Economizer Contact
	4 Demand Limit Contacts Common
	5 Demand Limit Redline
	6 Demand Limit Loadshed
	7 Demand Limit 4-20 mA
	8 Demand Limit 4-20 mA
	9 Remote Supply Air Set Point 4-20 mA
	10 Remote Supply Air Set Point 4-20 mA
	11 Outdoor Air IAQ 4-20 mA
	12 Outdoor Air IAQ 4-20 mA
	13 IAQ Remote Switch
	14 IAQ Remote Switch
	15 Not Used
	16 Note Used



- Start/Stop (On/Off) — Start/Stop is accomplished with a contact closure between terminals 1 and 3 on TB6.
- Remote Economizer Enable — Enabling and disabling of the economizer can be done by connecting a contact closure to terminals 1 and 2 on TB6. The economizer can be configured for a switch closure changeover for 3-position operation.
- VAV Heating Interlock — Interface with non linkage terminals can be done through TB5 terminal 1 and 2.
- Remote IAQ Inputs — External IAQ demand inputs can be connected through terminals 6 and 7 on TB5.
- Smoke Detectors Alarm Output — Remote detector alarm outputs can be connected through terminals 8 and 9 on TB5.
- Fire Shutdown — A remote fire shutdown signal can be connected to 10 and 11 on TB5. The software can be configured to shut the unit down on an open or closed signal.
- Fire Pressurization — For a remote control of pressurization a contact closer can be connected to terminals 12 and 13 on TB5. In this mode the economizer damper will be fully opened and the supply fan turned on to pressurize the space.
- Fire Evacuation — For this mode a remote contact closure can be connected to terminal 12 and 14 on TB5. For remote evacuation of a space the outside-air dampers will be opened and the power exhaust fans turned on to evacuate the space of smoke.
- Fire Purge — for this mode external contacts can be connected to terminals 12 and 15 on TB5. In this mode the supply fan and return fans will be turned on with the economizer at a full open position.
- Demand Limiting — For demand limiting the Controls Option board must be used. Connections are provided on TB6 for switch input demand limiting and for 4 to 20 mA demand limit signals.
- Remote Supply Air Set Point — A remote supply air temperature set point can be supported when the Controls Options board is used. It can be connected to terminals 11 and 12 on TB6.
- Outdoor Air IAQ Signal — If an external outdoor air signal is being used then it can be connected to terminals 9 and 10 on TB6.
- IAQ Switch Input — If an external control will be controlling IAQ then it can be connected as a contact closure through terminals 13 and 14 on TB6.

Carrier can also support electronic interface to other systems using the following;

- DataPort™ software (read only, provides ACSII stream output)
- DataLINK™ software (read/write, provides ASCII stream input and output)
- BacLink (read/write)

Contact Carrier Controls Marketing for pricing and availability information regarding these devices.

## Constant volume applications

The units are shipped as operable, stand-alone units using either a standard (mechanical or electronic) 2-stage heat, 2-stage cool thermostat, or with an electronic room temperature sensor and a time clock 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 monitors 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 or it can be programmed to use the time of day scheduling that is built into the control.

### Features with thermostat control of unit

- Two-stage heating (if installed)
- Multiple stage gas heating if constant volume unit is equipped with the staged gas heat option
- Two-stage demand with fully proportional economizers and integrated compressor capacity
- Two-stage cooling or adaptive multiple stage cooling which can provide up to 6 stages of capacity
- Control of unit using Y1, Y2, W1, W2, and G thermostat or T55, T56, or T58 space sensors
- Control of the indoor fan
- Outdoor-air temperature/supply-air temperature monitoring with logic to lock the compressors out at low ambient temperatures down to 0° F
- Control of a condenser fan based on outdoor-air and condensing pressures
- Control of modulating economizer to provide free cooling when outdoor conditions are suitable
- Control allows for use of the economizer and the compressors to maximize the use of outside air cooling to reduce part load operating costs
- Control of the power exhaust fans based on configurable damper positions or outside air intake valves or directly from the optional building pressure sensor
- Compressor Time Guard override (power up and minimum on and off timers) to assure air return in low load conditions
- Support of IAQ sensor

### Features with sensor control of unit

There are 3 sensor options available:

- T55 sensor will monitor room temperature and provide unoccupied override capability (1-4 hours)
- T56 sensor will monitor room temperature, provide unoccupied override capability (1-4 hours), and provide a temperature offset of 5 F maximum.
- T58 is a CCN communicating sensor that will provide the set point and space temperature values.

# Controls (cont)



Standard features are:

- Support of remote occupied/unoccupied input to start and stop the unit
- Two stage economizer demand with fully proportional economizers and integrated compressor capacity
- Cooling capacity control of 2 levels cooling with either 2 stage control or adaptive control with up to 6 stages of mechanical refrigeration capacity
- 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
- Support of IAQ sensor
- 365-day timeclock with backup (supports minute, hour, and day of week, date, month, and year access). The timeclock includes the following features:
  - 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)
  - Temperature compensated start to calculate early start times before occupancy
  - For units connected into a CCN network the timeclock can be integrated into the overall building Energy management system and be updated remotely
- For units connected to the CCN Network you can also display all the unit information including I/O values Maintenance, Configuration, Service, and Set Point data tables
- Indoor air quality (IAQ)

## Variable air volume (VAV) applications

The 48/50AK,AY units are designed to operate in VAV applications. As standard they include a supply fan inverter (VFD) to control the supply fan speed and duct pressure. They are designed to control the leaving-air temperature in cooling to a configurable set point. The changes in mode of operation from Heating, to Vent mode to Cooling mode can be controlled either from the return air temperature sensor or from an accessory space temperature sensor. Some of the features for VAV units in a stand-alone application are:

- The units are shipped as operable, stand-alone units with the addition of a field-supplied timeclock to establish unit start and stop times or they can use *ComfortLink*<sup>™</sup> time of day scheduling routine

- Provide cooling and heating control (if equipped with heat) in both occupied and unoccupied modes
- Supports an optional space temperature sensor for mode control and supply air temperature reset
- If space sensor is equipped with an override feature, the sensor will allow operation during the unoccupied period for a fixed length of time
- Base unit control supports a Heat Interlock Relay (field supplied) to signal the VAV terminal devices to fully open during heating operation
- Control board diagnostics
- Control of an outdoor-condenser fan based upon outdoor-air temperature and saturated condensing temperature
- Control of modulating economizer to provide free cooling when outdoor conditions are suitable.
- Control also allows for use of the economizer and the compressors to maximize the use of outside air cooling to reduce part load operating costs.
- Support of remote occupied/unoccupied input to start
- Controls the operation of the supply fan inverter to maintain a configurable supply duct static pressure set point. Inverter is configured and controlled directly by *ComfortLink* control.
- Support of IAQ sensor
- Support a field test for field check out
- Support linkage to *ComfortID*<sup>™</sup> systems
- Cooling capacity control of up to 6 stages plus economizer
- Control of two stages of heat to maintain return-air temperature
- Control of heat interlock relay
- Compressor time delays to prevent rapid cycling of compressors
- Automatic lead-lag control of compressors to reduce the number of compressor cycles override (power up, minimum)
- 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
- With the addition of the Controls Expansion Board, the *ComfortLink* controls will also support demand limiting and remote set point control

When the unit is connected to CCN (Carrier Comfort Network) additional features can be used:

- Interface of the unit clock with the CCN network clock and allow for remote configuration of the schedules
- CCN demand limit participation
- Interface with *ComfortID* control systems through linkage

## Sequence of operation

**Cooling, constant volume (CV) units** — On power up, the control module will activate the initialization software. The initialization software will determine the unit configuration and also initialize any controls loops and input/output devices. All alarms and configurations are saved in memory and maintained during power outages. All alarms will be maintained in memory and must be cleared through the display.

**Constant volume conventional thermostat control** — If the unit is equipped with a conventional thermostat with Y1, Y2, W1, W2 and G connections then the control will perform the following sequence.

When G is closed the indoor fan will turn on. G must be closed for heating or cooling to occur. If Y1 is closed then the control will first check the ability to use the economizer. If the economizer can be used the control will modulate the damper open to maintain the low load economizer leaving air temperature set point. If Y2 closes then the control will lower the leaving air temperature set point to the configured set point. If the economizer can not satisfy the load then compressors will be sequenced on to maintain either the low or high load temperature set points. If the economizer can not be used or the enable control disables the economizer, then the control will sequence the compressors based on the Y1 and Y2 signals. If two-stage control has been selected then the control will map the compressors to the Y1 and Y2 inputs as defined in the loading sequence. If Adaptive mode has been selected then the control will add and remove compressor stages to maintain the low and high demand set points. If Y1 is closed at least one compressor stage will be turned on.

If W1 closes then it will indicate that the units should be in the Heating mode. The economizer will be closed to the minimum position and if the unit is equipped with gas or electric heat then the first stage of heat will be energized. If W2 closes then the control will turn on the second stage of heat. If the unit is equipped with a staged gas heat control option then the W1 and W2 signal will be used to control the gas heat to the configurable low and high heat load leaving air temperature set points. If the unit is equipped with gas heat then the IGC board will control the operation of the gas heat. See the 48 Series Gas Heat units section on the IGC board sequence of operation.

**Constant volume space temperature sensor control** — If the space temperature operation has been selected using a T55, T56, or T58 sensor then the following logic will be used to control the operation of the unit. If a space temperature is used then a wire jumper must be added between R, W1, and W2. If a remote occupancy control method has been selected then the input must first be closed for the unit to go into Heat, Vent or Cooling mode. If the internal time clock is used, the

control module determines the occupancy state based on the system time schedules. If Temperature Compensated Start is active, the unit will be controlled as in the occupied mode and will start a time as determined by prior operation to have the space at set point by the occupied time. If the unit has been configured for a preoccupancy purge then the control will start the unit in Vent mode prior to the occupancy time to vent the space. If an IAQ sensor is being used and the low IAQ set point is satisfied then the occupancy purge mode will be terminated. The set points for heat and cooling are configurable through the display. If a T56 sensor is being used then the set point can be shifted by as much as 5 degrees. If the space temperature goes above the cooling set point then the unit will go into Cooling mode. If the economizer can be used, the control will first try to control to the leaving air temperature set point. The set point will depend on the space temperature. If the temperature is above the low demand set point then the low economizer load discharge air temperature set point will be used. If the temperature is above the high load space temperature set point then the high load leaving air temperature set point will be used. If the economizer can not satisfy the load then compressors will be sequenced on to maintain either the low or high load temperature set points. If the economizer can not be used or the enable control disables the economizer then the control will sequence the compressors based on the low and high load space temperature variables. If two-stage control has been selected then the control will map the compressors to the low and high loads as defined in the loading sequence. If Adaptive mode has been selected then the control will add and remove compressor stages to maintain the high and low demand leaving air set points.

If the space temperature goes below the heating space temperature set points then it will indicate that the units should be in the Heating mode. The economizer will be closed to the minimum position and if the unit is equipped with gas or electric heat then the first stage of heat will be energized. If the space temperature goes below the high load space temperature set point then the control will turn on the second stage of heat. If the unit is equipped with a staged gas heat control option then the low load and high load demand signal will control the leaving air temperature set point and will turn on heating stages to maintain the leaving air temperature set points.

If the units is configured for unoccupied free cooling, mechanical cooling or heating and the temperature goes beyond the unoccupied configuration set points then the control will turn on free cooling, mechanical cooling or heat as needed to get within the unoccupied set points. When in this mode, the economizer dampers will be maintained fully closed or to the minimum unoccupied ventilation set point.

# Controls (cont)



**Variable air volume control** — On power up, the control module will activate the initialization software. The initialization software will determine the unit configuration and also initialize any controls loops and input/output devices. All alarms and configurations are saved in memory and maintained during power outages. All alarms will be maintained in memory and must be cleared through the display.

The unit will first determine the mode of operation. If the unit has been configured for space temperature demand then the control will determine, based on the configurable set points, if the unit should be in the heat mode, vent mode or cooling mode. If the unit is configured for return air temperature control then it will start the fan and monitor the return air temperature vs. the configurable set point to determine if the unit should be in cooling, vent or heating mode.

If the control is connected to a ComfortID™ system, the room terminals are equipped with microprocessor controls that give commands to the base module. If linkage is active, the control module will replace local ComfortLink™ set points and occupancy data with linkage supplied data.

If temperature compensated start is active then advance pre-cool or heat of the space is enabled. If the unit is configured to use a pre-purge cycle then the ComfortLink control will start the unit in Vent mode based on a pre-start time interval. If an IAQ sensor is being used and the low IAQ control point is satisfied then the mode will be terminated.

If Cooling mode is required then the controlling set point will be the leaving air temperature set point. If an economizer is present and the changeover control allows the economizer to be used, then it will first attempt to control the leaving-air temperature using free cooling. If this can not satisfy the load then additional compressor stages will be turned on to maintain the leaving-air temperature. When both compressors and economizers are being used the control will use the economizer dampers to maintain better control of the leaving-air and to prevent high compressor cycling. If the economizer can not be used then it will be set to the minimum vent position. When using compressors, the leaving-air temperature will sequence to compressors on and off using a PID control loop. If the unit is equipped with an optional hot gas bypass valve the control will use the hot gas as an additional stage of capacity. When the first stage of cooling is required the control will turn on a circuit “A” compressor and the hot gas bypass valve. When additional cooling is called for it will turn off the hot gas bypass valve. The valve will also be used for additional freeze protection of the coils when low evaporator refrigerant temperatures are detected using the suction pressure transducers.

When operating in cooling the control will also monitor the supply duct pressure and send a 4 to 20 mA signal to the factory supplied inverter to control the speed of the fan and the delivered CFM. If on a Linkage system the control also support static pressure reset based on the needs of the zones.

If the unit has been enabled for occupied heat and the space temperature sensor (SPT), return air temperature sensor (RAT) or Linkage demand calls for heat, the control

will energize the electric heat or gas heat (if present) to warm the space. In this mode the control will energize the heat interlock relay which will signal the terminals to open to the heating position. Note that for the linkage systems the interlock relay connection is not required. Once the heat mode is enabled, up to 2 stages of heat will be controlled by the return air temperature set point. Heating will continue until the return temperature set point is satisfied. If the unit is configured for morning warm-up and the heating demand is below the set point during the first 10 minutes of operation, the control will energize full heating capacity until the return air temperature set point is satisfied.

If the space temperature sensor (SPT), return air temperature sensor (RAT) or Linkage demand requires that the unit be in heating then the control will energize the electric heat or gas heat (if present) to warm the space. In this mode the control will energize the heat interlock relay which should be connected to the terminals to indicate that they should open to the heating position. The interlock relay connection is not required for the Linkage systems. Heating will continue until the mode selection sensor is satisfied.

## 48 series gas heat units

The gas heat units incorporate 2 (3 on size 060) separate systems to provide gas heat. Each system incorporates its own induced-draft motor, Integrated Gas Control (IGC) board, 2 stage gas valve, manifold, and safeties. 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 MBB module board serves only to initiate and terminate heating operation and monitor the status of the requirements for indoor fan operation. The fan will be controlled directly by the MBB board. The base module board is powered by 24 vac. When the thermostat or room sensor calls for heating the MBB board will close heating relays and send power 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. After the induced-draft motors are energized and 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 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 the over temperature 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 minimum unoccupied set point. When additional heat is required, the second stage MBB output relay closes and initiates power to the second stage of all main gas valves in all sections. When the demand is satisfied, MBB heat output relays will open and the gas valves close interrupting the flow of gas to the main burners. If the call for stage 1 heat lasts less

than 1 minute, the heating cycle will not terminate until 1 minute after W1 became active. If the unit is configured for intermittent fan then the indoor-fan motor will continue to operate for an additional 45 seconds then stop and the outdoor-air dampers will close. If the over temperature 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.

## 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. Units equipped with electric heat require a 90-degree elbow below the unit supply duct connection.

**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 values shown in Cooling Cfm Operating Range table and Cooling Capacities tables.

**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 Gas Heating Capacities and Efficiencies table on page 13 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 32 F. With accessory Motormaster® V control units can operate at outdoor temperatures down to -20 F. Outdoor-fan motor no. 1 change out is required for Motormaster V 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 (gas heat units only)** — A change to the gas orifice may be required at high altitudes. Refer to Altitude Compensation table on page 15.

**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. Below 50 F entering-air temperature (EAT) both stages of heat are engaged.

**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-degree elbow must be installed in the supply ductwork below the unit discharge.

## POWER SCHEMATIC 48/50AJ,AK,AW,AY040

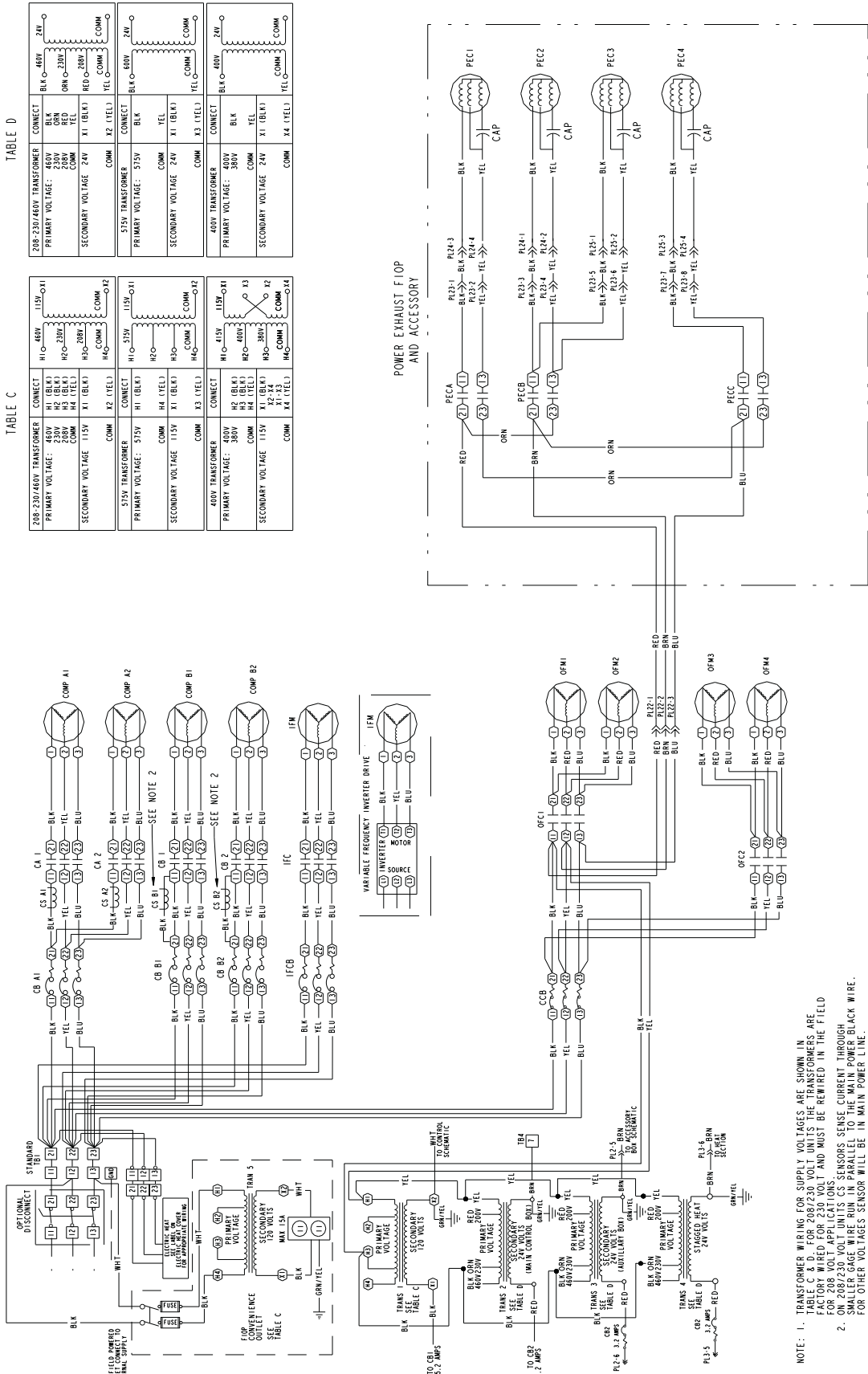
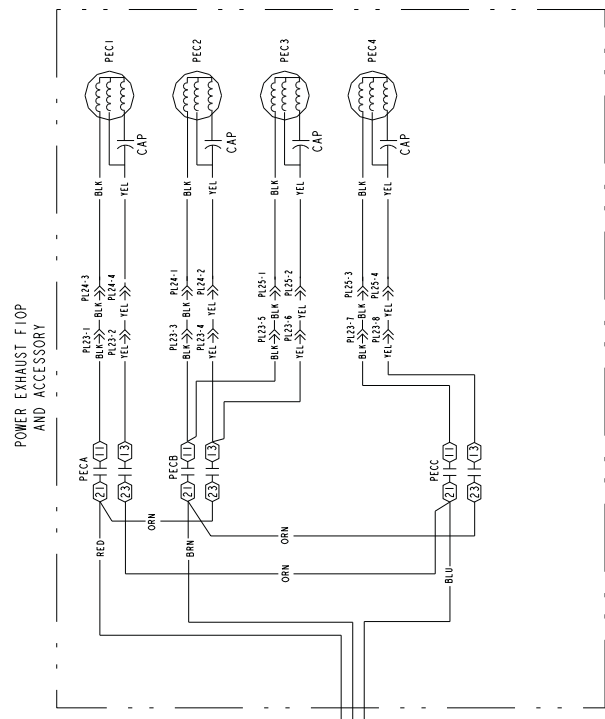


TABLE D

208-230/480V TRANSFORMER PRIMARY VOLTAGE: 480V SECONDARY VOLTAGE: 230V COM1 COM2 COM3	CONNECT BLK ORN YEL RED COM1 COM2 COM3	24V 230V 230V 24V COM1 COM2 COM3
575V TRANSFORMER PRIMARY VOLTAGE: 575V SECONDARY VOLTAGE: 24V COM1 COM2 COM3	CONNECT BLK YEL COM1 COM2 COM3	24V 24V 24V COM1 COM2 COM3
400V TRANSFORMER PRIMARY VOLTAGE: 400V SECONDARY VOLTAGE: 24V COM1 COM2 COM3	CONNECT BLK YEL COM1 COM2 COM3	24V 24V 24V COM1 COM2 COM3

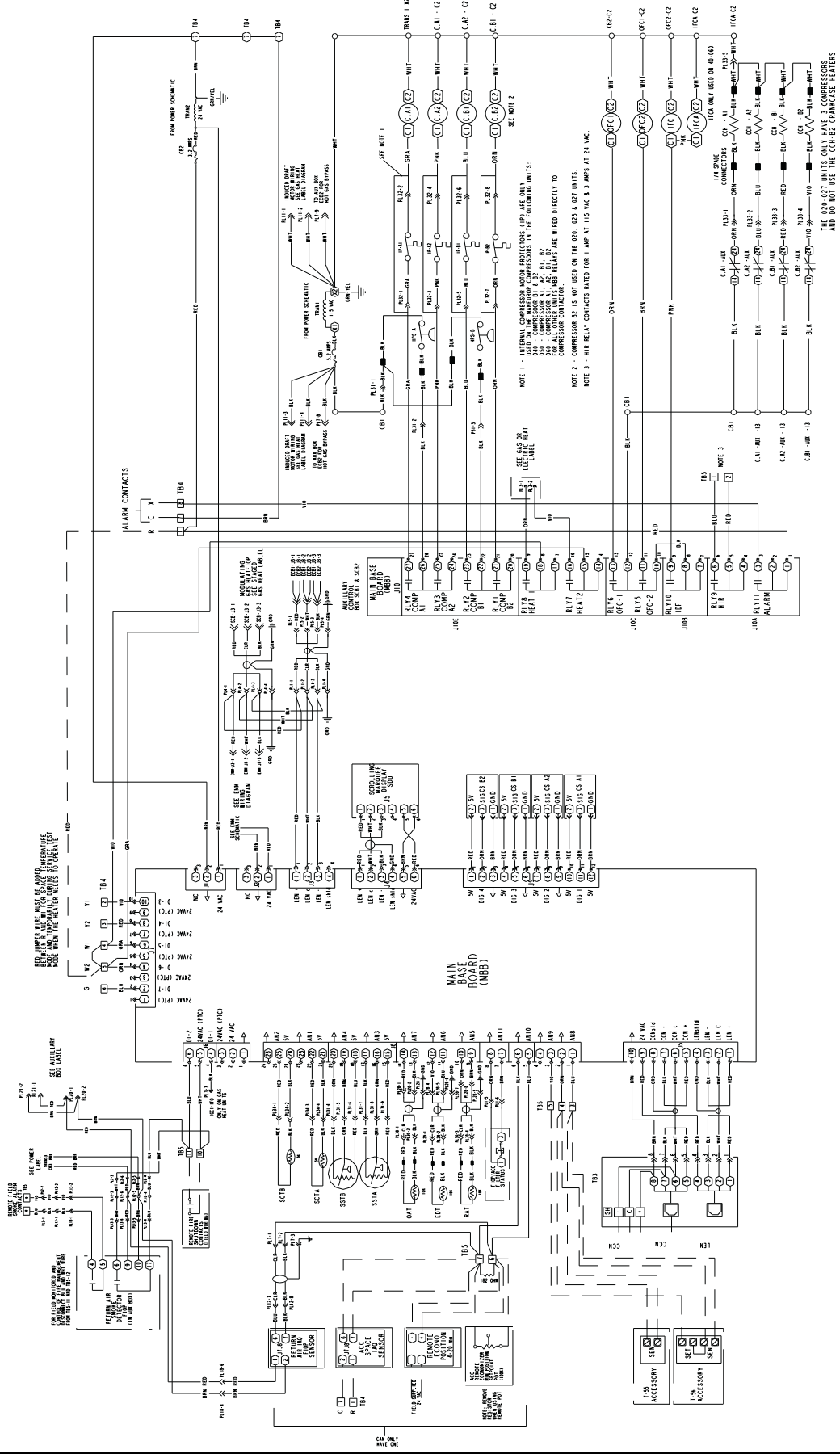
TABLE C

208-230/480V TRANSFORMER PRIMARY VOLTAGE: 480V SECONDARY VOLTAGE: 115V COM1 COM2 COM3	CONNECT H1 (BLK) H2 (BLK) H3 (BLK) H4 (YEL) H5 (YEL) COM1 COM2 COM3	115V 230V 230V 230V 230V COM1 COM2 COM3
575V TRANSFORMER PRIMARY VOLTAGE: 575V SECONDARY VOLTAGE: 115V COM1 COM2 COM3	CONNECT H1 (BLK) H2 (BLK) H3 (BLK) H4 (YEL) H5 (YEL) COM1 COM2 COM3	115V 115V 115V 115V 115V COM1 COM2 COM3
400V TRANSFORMER PRIMARY VOLTAGE: 400V SECONDARY VOLTAGE: 115V COM1 COM2 COM3	CONNECT H1 (BLK) H2 (BLK) H3 (BLK) H4 (YEL) H5 (YEL) COM1 COM2 COM3	115V 380V 400V 380V 380V COM1 COM2 COM3



NOTE: 1. TRANSFORMER WIRING FOR SUPPLY VOLTAGES ARE SHOWN IN RED. CS FOR 208/230 VOLT UNITS. THE TRANSFORMERS ARE FIELD WIRING. BLK, BRN, RED, YEL AND ORN TO BE RETURNED IN THE FIELD FOR 208 VOLT APPLICATIONS.  
2. ON 208/230 VOLT UNITS CS SENSORS SENSE CURRENT THROUGH SMALLER GAGE WIRE RUN IN PARALLEL TO THE MAIN POWER BLACK WIRE. FOR OTHER VOLTAGES SENSOR WILL BE IN MAIN POWER LINE.

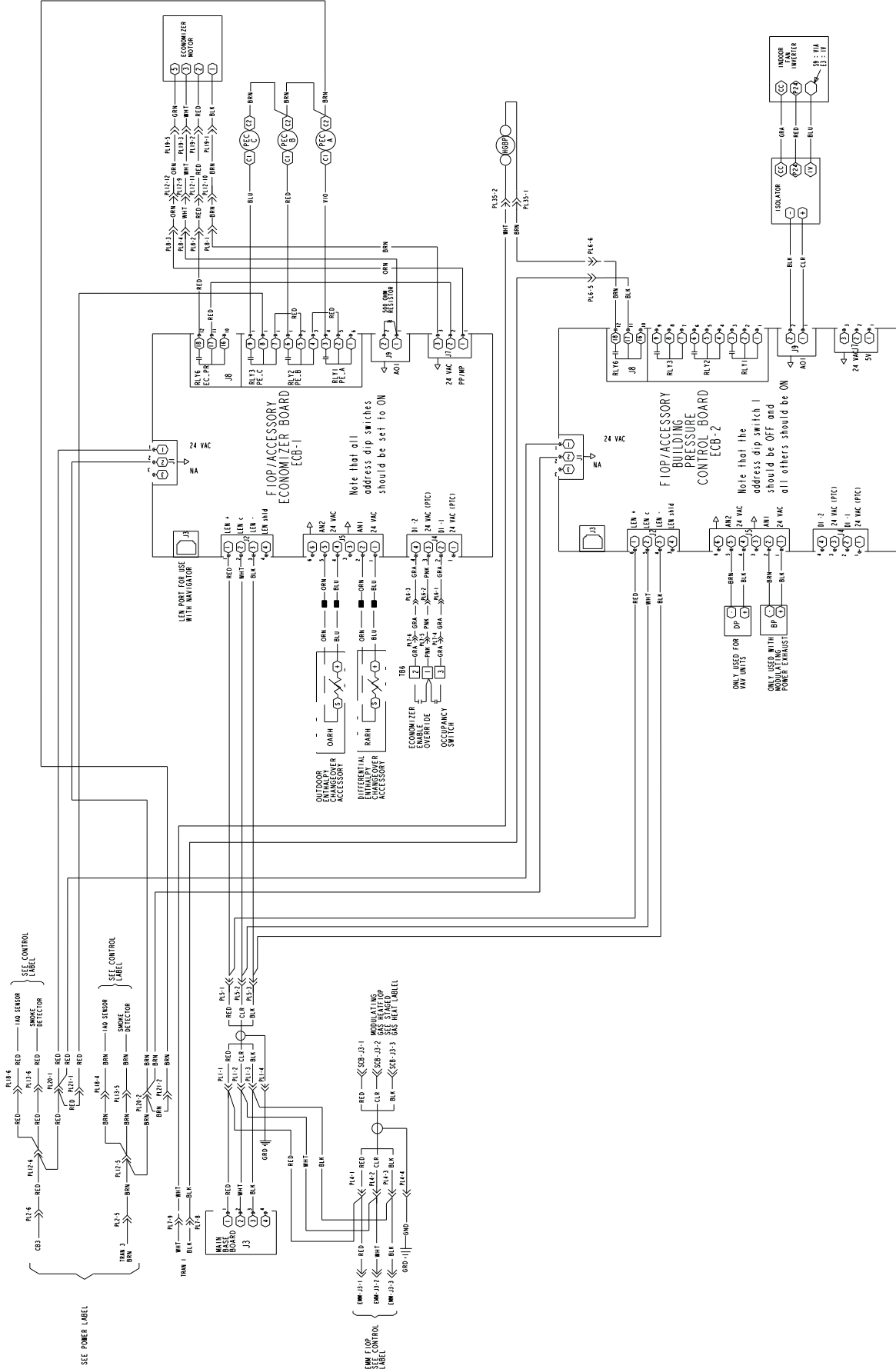
MAIN BOX CONTROL SCHEMATIC 48/50AJ,AK,AW,AY020-060



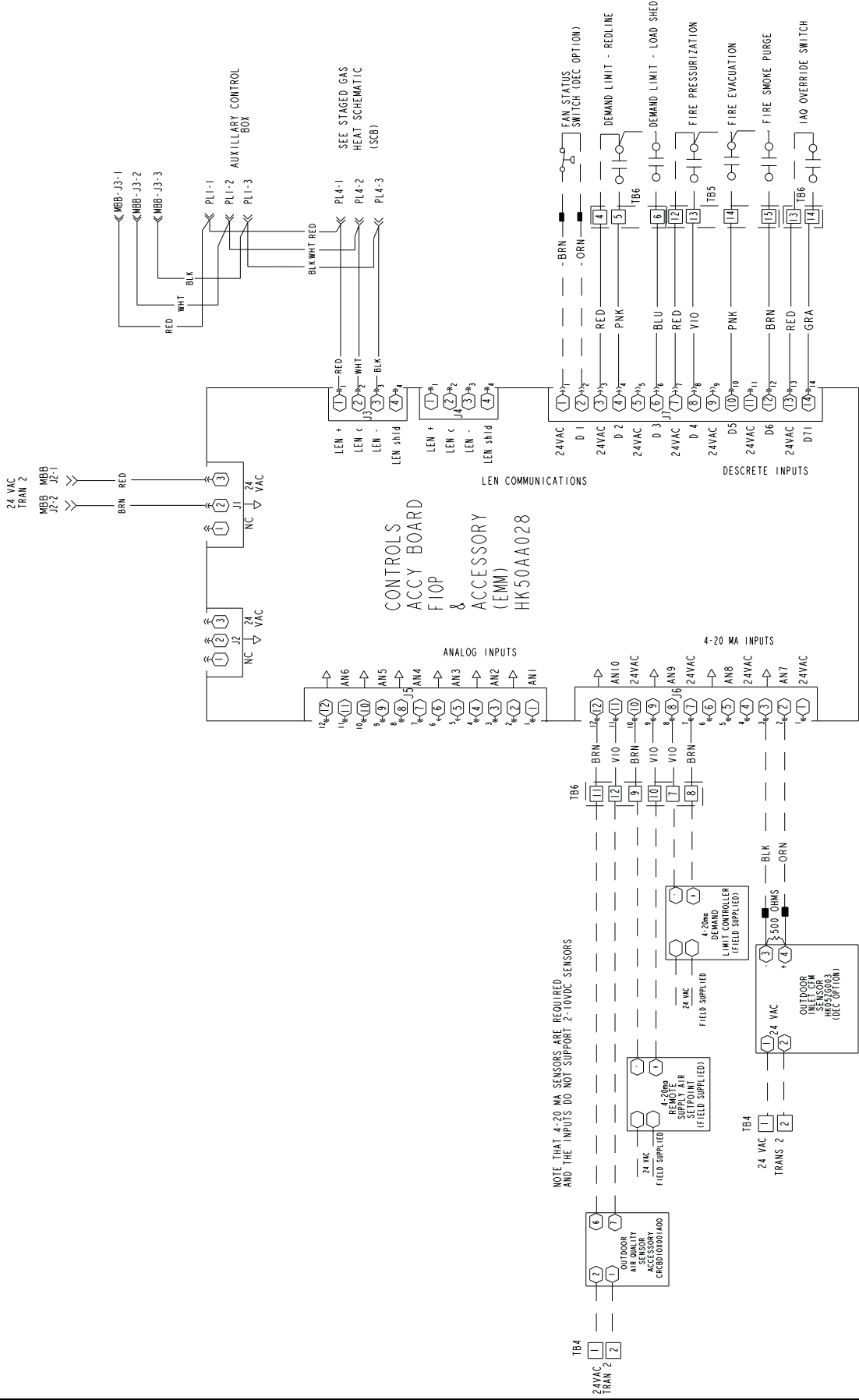
# Typical wiring schematic (cont)



## AUXILIARY CONTROL BOX SCHEMATIC 48/50AJ,AK,AW,AY020-060



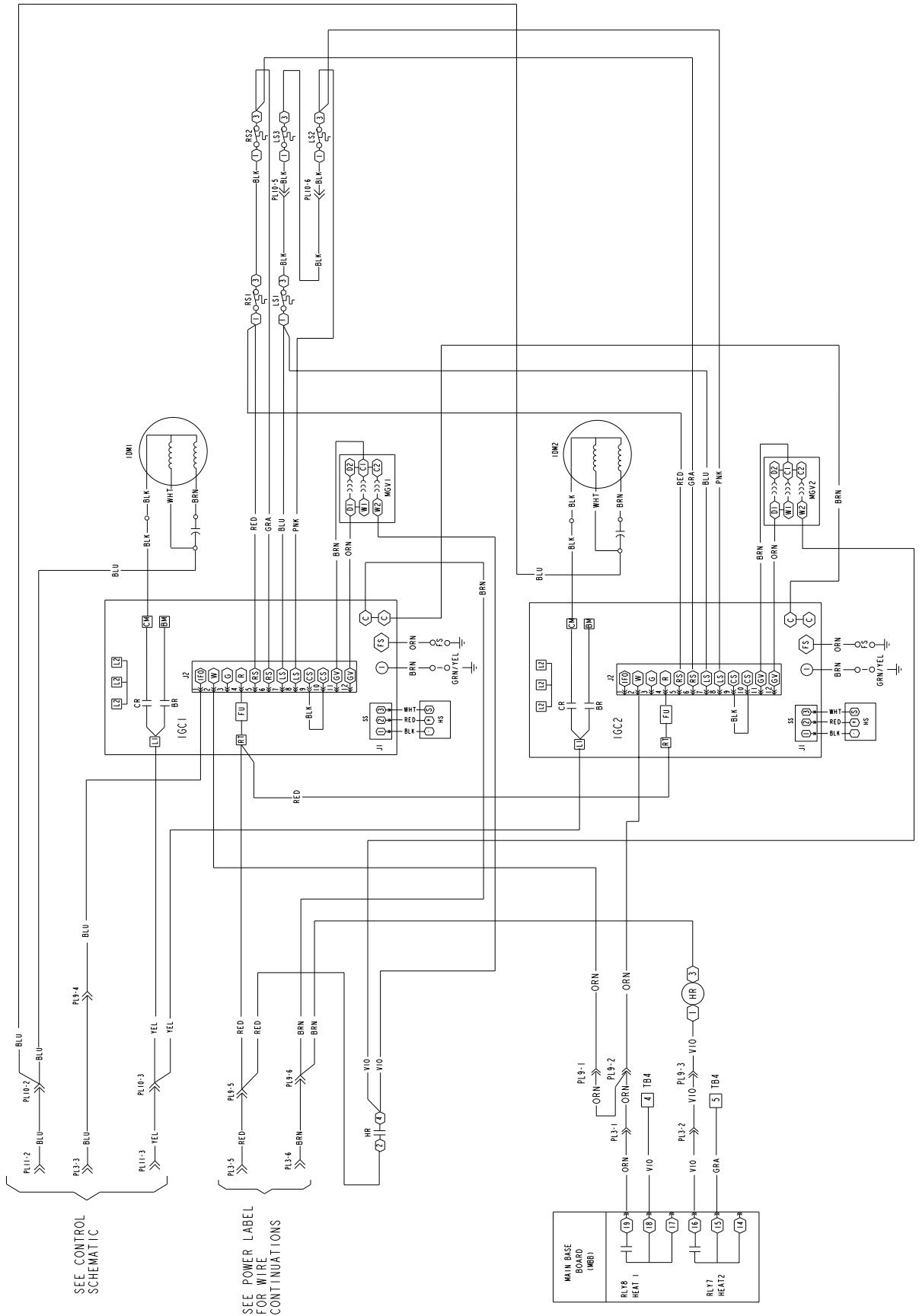
# ACCESSORY BOARD WIRING SCHEMATIC 48/50AJ,AK,AW,AY020-060



# Typical wiring schematics (cont)

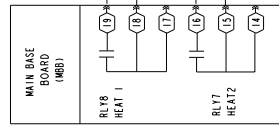


## GAS HEAT CONTROL SCHEMATIC 48/50AJ,AK020-050



SEE CONTROL SCHEMATIC

SEE POWER LABEL FOR WIRE CONTINUATIONS



## LEGEND AND NOTES FOR TYPICAL WIRING SCHEMATIC


### LEGEND


<b>A</b>	—	Circuit A
<b>AUX</b>	—	Auxiliary Contact
<b>BP</b>	—	Building Pressure Transducer
<b>C</b>	—	Compressor Contactor
<b>CAP</b>	—	Capacitor
<b>CB</b>	—	Circuit Breaker
<b>CCB</b>	—	Control Circuit Breaker
<b>CCH</b>	—	Crankcase Heater
<b>CCN</b>	—	Carrier Comfort Network
<b>CS</b>	—	Compressor Current Sensor Board
<b>DP</b>	—	Discharge Pressure Transducer
<b>ECB1</b>	—	Economizer Control Board
<b>ECB2</b>	—	VAV Control Board
<b>EDT</b>	—	Evaporator Discharge Temperature
<b>EMM</b>	—	Energy Management Module
<b>FIOP</b>	—	Factory-Installed Option
<b>FS</b>	—	Flame Sensor
<b>FU</b>	—	Fuse
<b>GND</b>	—	Ground
<b>HGBP</b>	—	Hot Gas Bypass
<b>HPS</b>	—	High-Pressure Switch
<b>HR</b>	—	Heat Relay
<b>HS</b>	—	Hall Effect Induced Draft Motor Switch
<b>IAQ</b>	—	Indoor Air Quality
<b>IARH</b>	—	Return Air Relative Humidity
<b>IDM</b>	—	Induced-Draft Motor

<b>IFC</b>	—	Indoor-Fan Contactor
<b>IFCB</b>	—	Indoor-Fan Circuit Breaker
<b>IFM</b>	—	Indoor-Fan Motor
<b>IGC</b>	—	Integrated Gas Control Board
<b>IP</b>	—	Internal Compressor Protector
<b>LS</b>	—	Limit Switch
<b>MBB</b>	—	Main Base Board
<b>MGV</b>	—	Main Gas Valve
<b>OARH</b>	—	Outdoor Air Relative Humidity
<b>OAT</b>	—	Outdoor Air Temperature Sensor
<b>OFC</b>	—	Outdoor-Fan Contactor
<b>OFM</b>	—	Outdoor-Fan Motor
<b>PEC</b>	—	Power Exhaust Contactor
<b>PL</b>	—	Plug
<b>RARH</b>	—	Return Air Relative Humidity
<b>RAT</b>	—	Return Air Temperature Sensor
<b>RS</b>	—	Rollout Switch
<b>SCB</b>	—	Staged Gas Heat Control Board
<b>SCT</b>	—	Saturated Condensing Temperature Sensor
<b>SDU</b>	—	Scrolling Marquee Display
<b>SST</b>	—	Saturated Suction Temperature Sensor
<b>T-55</b>	—	Room Temperature Sensor
<b>T-56</b>	—	Room Temperature Sensor with Set Point
<b>TB</b>	—	Terminal Block
<b>TRANS</b>	—	Transformer

### THERMOSTAT MARKINGS

<b>BM</b>	—	Blower Motor
<b>C</b>	—	Common
<b>CM</b>	—	Inducer Motor
<b>CS</b>	—	Centrifugal Switch
<b>G</b>	—	Fan
<b>IFO</b>	—	Indoor Fan On
<b>L1</b>	—	Line 1
<b>R</b>	—	Thermostat Power
<b>RT</b>	—	Power Supply
<b>SS</b>	—	Speed Sensor
<b>W1</b>	—	Thermostat Heat Stage 1
<b>W2</b>	—	Thermostat Heat Stage 2
<b>X</b>	—	Alarm Output
<b>Y1</b>	—	Thermostat Cooling Stage 1
<b>Y2</b>	—	Thermostat Cooling Stage 2

 Terminal (Marked)


 Terminal (Unmarked)

 Terminal Block

 Splice

 Factory Wiring

 Field Wiring

 To indicate common potential only, not to represent wiring.

# Guide specifications (constant volume application)



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

### HVAC Guide Specifications — Section 48/50AJ,AW

Size Range: **20 to 60 Tons, Nominal cooling**

Carrier Model Number: **48AJ, 48AW, 50AJ, 50AW**

#### Part 1 — General

##### 1.01 SYSTEM DESCRIPTION

Outdoor roof curb or slab mounted, electronically controlled heating and cooling unit utilizing hermetic scroll compressors with crankcase heaters for cooling duty and with optional gas heat or electric heat. Units shall discharge supply and return air vertically or horizontally as shown on contract drawings. EER shall meet requirements of ASHRAE Standard 90.1-1999.

##### 1.02 QUALITY ASSURANCE

- A. Unit shall be rated in accordance with ARI Standard 340/360.
- B. Unit shall be designed to conform to ANSI/ASHRAE 15 (latest edition), ASHRAE 62, UL Standard 1995 and National Electrical Code.
- C. Unit shall be listed by ETL and ETL, Canada as a total package.
- D. 48AJ,AW units shall be designed to conform with ANSI Standard Z21.47 (U.S.A.) / CSA Standard 2.3 (Canada), Gas-Fired Central Furnaces.
- E. Roof curb shall be designed to NRCA criteria per Bulletin B-1986.
- F. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
- G. Unit shall be manufactured in a facility registered to the ISO 9001:2000 manufacturing quality standard.

##### 1.03 DELIVERY, STORAGE AND HANDLING

Unit shall be stored and handled per manufacturer's recommendations. All exposed coils shall have protective shipping covers.

#### Part 2 — Products

##### 2.01 EQUIPMENT

###### A. General:

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 with 0.75-in. thick, 1.5-lb density, fiberglass insulation.
  - b. Access panels and doors shall be 20-gage sheet metal with 0.5-in. thick, 1.5-lb density, fiberglass insulation.
  - c. Corner and center posts shall be 16-gage galvanized steel.
  - d. Basepans in the heating and return air sections shall be 16-gage galvanized steel.
  - e. Basepans in the 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 with 0.5-in. thick, 1.5-lb density, fiberglass insulation
  - 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 500-hour salt spray exposure per ASTM B117 (scribed specimen).
  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.
  5. Unit shall have a factory-installed sloped condensate drain connection made from an aluminized steel or optional stainless steel.
  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 for the 020-050 units and two-piece solid fan shaft construction on the 060 size unit.

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. Fully hermetic, scroll type compressors with overload protection and short cycle protection with minimum on and off timers.

2. Factory rubber-in-shear mounted and internally spring mounted for vibration isolation.

3. Reverse rotation protection capability.

4. Crankcase heaters shall only be activated during compressor off mode.

E. Coils:

1. Standard evaporator and condenser coils shall have copper or aluminum plate fins mechanically bonded to seamless internally grooved copper tubes with all joints brazed.

2. Coils shall be leak tested at 150 psig (1034 kPa) and pressure tested at 450 psig (3103 kPa).

3. Optional pre-coated aluminum-fin coils shall have a durable epoxy-phenolic coating to provide protection in mildly corrosive coastal environments. Coating shall be applied to the aluminum fin stock prior to the fin stamping process to create an inert barrier between the aluminum fin and copper tube. Epoxy-phenolic barrier shall minimize galvanic action between dissimilar metals.

4. Copper-fin coils shall be constructed of copper fins mechanically bonded to copper tubes and copper tube sheets. Galvanized steel tube sheets shall not be acceptable. A polymer strip shall prevent coil assembly from contacting the sheet metal coil pan to minimize potential for galvanic corrosion between coil and pan. All copper construction shall provide protection in moderate coastal environments.

5. E-Coated aluminum-fin coils shall have a flexible epoxy polymer coating uniformly applied to all coil surface areas without material bridging between fins. Coating process shall ensure complete coil encapsulation. Color shall be high gloss black with gloss — 60 deg of 65 to 90% per ASTM D523-89. Uniform dry film thickness from 0.8 to 1.2 mil on all surface areas including fin edges. Superior hardness characteristics of 2H per ASTM D3363-92A and cross-hatch adhesion of 4B-5B per ASTM D3359-93. Impact resistance shall be up to

160 in./lb (ASTM D2794-93). Humidity and water immersion resistance shall be up to minimum 1000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92). Corrosion durability shall be confirmed through testing to be no less than 1000 hours salt spray per ASTM B117-90. Coil construction shall be aluminum fins mechanically bonded to copper tubes.

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. Optional stainless steel heat exchangers shall be available.

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.

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. Solid core filter drier.

2. Thermostatic expansion valve.

3. Fusible plug.

H. Filter Section:

Standard filter section shall consist of either factory installed 2-in. (51 mm) thick throwaway fiberglass filters or 30% pleated filters of commercially available sizes.

Optional 4-in. filter track shall be supplied with 30% pleated fiberglass filters.

# Guide specifications (constant volume application) (cont)



## I. Controls and Safeties:

1. Unit *ComfortLink*™ Controls:
  - a. Scrolling marquee display.
  - b. CCN (Carrier Comfort Network) capable.
  - c. Unit control with standard suction pressure transducers and condensing temperature thermistors.
  - d. Shall provide a minimum 5 F temperature difference between cooling and heating set points to meet ASHRAE 90.1, energy standard.
  - e. Shall provide and display a current alarm list and an alarm history list.
  - f. Automatic compressor lead/lag control.
  - g. Service run test capability.
  - h. Shall accept input from a CO<sub>2</sub> sensor (both indoor and outdoor).
  - i. Configurable alarm light shall be provided which activates when certain types of alarms occur.
  - j. Compressor minimum run time (3 minutes) and minimum off time (3 minutes) are provided.
  - k. Service diagnostic mode.
  - l. Optional integrated economizer control or two-position self-closing adjustable outside air damper.
  - m. Minimum of 3 capacity stages.
  - n. Unit shall be complete with self-contained low voltage control circuit.
  - o. Control of evaporator leaving air temperature through compressor and economizer control.

## 2. Safeties:

- a. Unit shall incorporate a solid-state compressor lockout which provides optional reset capability at the space thermostat should any of the following safety devices trip and shut off compressor:
  - 1) Compressor lockout protection provided for either internal or external overload.
  - 2) Low-pressure protection.
  - 3) Freeze protection (evaporator coil).
  - 4) High-pressure protection (high pressure switch or internal).
  - 5) Compressor reverse rotation protection.
  - 6) Loss-of-charge protection.
- b. Supply-air sensor shall be located in the unit and should be used for economizer control and compressor stage control
- c. Induced draft heating section (48 Series) shall be provided with the following minimum protections:
  - 1) High-temperature limit switch.

- 2) Induced-draft motor speed sensor.
- 3) Flame rollout switch.
- 4) Flame proving controls.
- 5) Redundant gas valve.

## J. Operating Characteristics:

1. Unit shall be capable of starting and running at 115 F (52 C) ambient outdoor temperature per maximum load criteria of ARI Standard 340/360.
2. Unit with standard controls will operate in cooling down to an outdoor ambient temperature of 32 F (0° C).
3. Unit shall be provided with fan time delay to prevent cold air delivery.

## K. Electrical Requirements:

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

## L. Motors:

1. Compressor motors shall be cooled by refrigerant gas passing through motor windings and shall have either internal line break thermal and current overload protection or external current overload modules with compressor temperature sensors.
2. All condenser-fan motors shall be totally enclosed 3-phase type with permanently lubricated ball bearings, class F insulation and internal, automatic-reset thermal overloads thermal overload protection or manual reset calibrated circuit breakers.
3. All indoor-fan motors 5 hp and larger shall meet the minimum efficiency requirements as established by the Energy Policy Act of 1992 (EPACT), effective October 24, 1997.

## M. Special Features:

Certain features are not applicable when the features designated \* are specified. For assistance in amending the specifications, contact your local Carrier Sales Office.

1. Full Perimeter Roof Curbs (Horizontal and Vertical):

Formed of 14-gage galvanized steel with wood nailer strip and shall be capable of supporting entire unit weight.

### \* 2. Integrated Economizer:

- a. Economizer shall be furnished and installed complete with recirculated air dampers, outside-air dampers, and controls.
- b. Low-leakage dampers ride in UL approved gears.
- c. Capable of introducing up to 100% outdoor air for minimum ventilation as well as freecooling.
- d. Damper actuator shall be gear driven, 24-v fully modulating design.



- e. Economizer outdoor hood shall be pre-painted.
- \* 3. Barometric Relief Damper Package:
  - a. Package shall include damper, seals, hardware, and hoods to relieve excess internal pressure.
  - b. Damper shall close due to gravity upon unit shutdown.
- \* 4. Power Exhaust:

Package shall include a multiple exhaust fan (centrifugal style) fan, 1 Hp 208-230, 460 v (factory-wired for 460 v) direct-drive motor, and damper for vertical flow units with economizer to control over-pressurization of building. Control shall be through *ComfortLink™* based on damper position or through an optional building pressure sensor. On the 020-050 units 4 stages of control shall be available and 6 stages on the 060 size unit.
- \* 5. Thermostats and Subbases:

To provide staged heating and cooling in addition to automatic (or manual) changeover and fan control.
- \* 6. Electronic Programmable Thermostat:

Capable of using deluxe full-featured electronic thermostat.
- \* 7. Liquefied Propane Conversion Kit (48 Series):

Kit shall contain all the necessary hardware and instructions to convert a standard natural gas unit for use with liquefied propane gas.
- \* 8. Convenience Outlet:

Shall be factory-installed and internally mounted with an externally accessible 115-v, 15 amp. GFI, female receptacle with hinged cover. A step-down transformer and overload protection shall be included so no additional wiring is necessary unless the field-wired outlet has been requested. When applied with a unit-mounted disconnect the outlet shall be wired to the line side of the disconnect, but shall include a means to shut off the outlet.
- \* 9. Non-Fused Disconnect Switch:

Shall be factory-installed, internally mounted, and UL approved. Non-fused switch shall provide unit power shutoff. Shall be accessible from outside the unit and shall provide power off lockout capability.
- \*10. Electric Heater Package (50 Series Units Only):
  - a. Fully assembled for installation. The packages are designed in accordance with UL safety standards 1995 and listed by ETL. Heater construction approved by UL 5306.
  - b. Heater element open coil resistance wire, nickel-chrome alloy, 0.29 inches inside diameter, strung through ceramic insulators mounted on metal frame. Coil ends are staked and welded to terminal screw slots.
  - c. Heater assemblies are provided with integral fusing for protection of internal heater circuits not exceeding 48 amps each.
  - d. Auto reset thermo limit controls, magnetic heater contactors (24 v coil) and terminal block all mounted in electric heater control box (minimum 18-gage Galvanized steel) attached to end of heater assembly.
- \*11. Hail Guard, Condenser Coil Grille:

Shall protect the condenser coil from hail, flying debris, and damage by large objects without increasing unit clearances.
- \*12. CO<sub>2</sub> Sensor:

The CO<sub>2</sub> sensor shall have the ability to monitor CO<sub>2</sub> levels and relay information to the controller. The controller will use CO<sub>2</sub> level information to modulate the economizer and provide demand control ventilation. The sensor shall be available as field installed or factory-installed return air sensor or a remote space sensor.
- \*13. Return Air Smoke Detector:

The smoke detector shall send input to the controller to shut down the unit in case smoke is detected. The smoke detector shall be factory installed in the return air section or shall be available as a field-installed accessory.
- \*14. Filter Status:

The filter status switch shall be a pressure differential switch and will indicate a dirty filter. The switch shall be available as field or factory installed.
- \*15. Return Air Dry Bulb Sensors:

Return air dry bulb sensors are used to provide differential dry bulb changeover for the economizer.
- \*16. Humidity Sensor:

A humidity sensor will allow for outside air enthalpy changeover control using the standard outside air dry bulb sensor and the option accessory humidity sensor. When both an outside and return air humidity sensor is used then differential enthalpy changeover can be supported.
- \*17. Two-Position Damper:

A two-position damper shall admit up to 25% outdoor air during fan operation and shall close when the fan is off. The damper position shall be mechanically adjustable.
- \*18. 4-Inch Filters:

A factory-installed option shall be available for 4-inch, high-efficiency filters.

# Guide specifications (constant volume application) (cont)



**\*19. Control Expansion Board:**

Shall provide the following additional optional features:

- a. Remote set point
- b. Demand limit control
- c. Remote economizer position
- d. Fire and smoke control override control
- e. Remote sensor monitoring
- f. Fan status switch monitoring

**\*20. Staged Gas Heat (48AJ,AW):**

The control shall have the option for control of the gas heat to a discharge air temperature by sequencing on the gas cells to provide up to 11 stages of capacity. The control shall be integrated directly into the main unit controls and shall include leaving air temperature sensors to ensure that high temperatures do not occur during the operation of the staged gas heat.

# Guide specifications (variable air volume application)



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

### HVAC Guide Specifications — Section 48/50AK,AY

Size Range: **20 to 60 Tons, Nominal cooling**

Carrier Model Number: **48AK, 48AY, 50AK, 50AY**

#### Part 1 — General

##### 1.01 SYSTEM DESCRIPTION

Outdoor roof curb or slab mounted, electronically controlled heating and cooling unit utilizing hermetic scroll compressors with crankcase heaters for cooling duty and gas combustion or electric heating duty. Units shall discharge supply and return air vertically or horizontally as shown on contract drawings. EER shall meet requirements of ASHRAE Standard 90.1-1999.

##### 1.02 QUALITY ASSURANCE

- A. Unit shall be rated in accordance with ARI Standard 340/360.
- B. Unit shall be designed to conform to ANSI/ASHRAE 15 (latest edition), ASHRAE 62, UL Standard 1995 and National Electrical Code.
- C. Unit shall be listed by ETL and ETL, Canada as a total package.
- D. 48AK,AY units shall be designed to conform with ANSI Standard Z21.47 (U.S.A.) / CSA Standard 2.3 (Canada), Gas-Fired Central Furnaces.
- E. Roof curb shall be designed to NRCA criteria per Bulletin B-1986.
- F. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
- G. Unit shall be manufactured in a facility registered to the ISO 9001:2000 manufacturing quality standard.

##### 1.03 DELIVERY, STORAGE AND HANDLING

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

#### Part 2 — Products

##### 2.01 EQUIPMENT

###### A. General:

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 with 0.75-in. thick, 1.5-lb density, fiberglass insulation.
  - b. Access panels and doors shall be 20-gage sheet metal with 0.5-in. thick, 1.5-lb density, fiberglass insulation.
  - c. Corner and center posts shall be 16-gage galvanized steel.
  - d. Basepans in the heating and return air sections shall be 16-gage galvanized steel.
  - e. Basepans in the 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 with 0.5-in. thick, 1.5-lb density, fiberglass insulation
  - 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 500-hour salt spray exposure per ASTM B117 (scribed specimen).
  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.
  5. Unit shall have a factory-installed sloped condensate drain connection made from an aluminized steel or optional stainless steel.
  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.

# Guide specifications (variable air volume application) (cont)



e. Solid fan shaft construction for the 020-050 units and two-piece solid fan shaft construction on the 060 size unit.

## 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 with direct control from the unit *ComfortLink™* controls

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. RS232C/RS485 capability (accessory card source required).

i. Electronic thermal overload protection.

j. DC link feature for harmonic reduction and improved power factor (460 v units, 20 Hp and larger only).

## D. Compressors:

1. Fully hermetic, scroll type compressors with overload protection and short cycle protection with minimum on and off timers.

2. Factory rubber-in-shear mounted and internally spring mounted for vibration isolation.

3. Reverse rotation protection capability.

4. Crankcase heaters shall only be activated during compressor off mode.

## E. Coils:

1. Standard evaporator and condenser coils shall have copper or aluminum plate fins mechanically bonded to seamless internally grooved copper tubes with all joints brazed.

2. Coils shall be leak tested at 150 psig (1034 kPa) and pressure tested at 450 psig (3103 kPa).

3. Optional pre-coated aluminum-fin coils shall have a durable epoxy-phenolic coating to provide protection in mildly corrosive coastal environments. Coating shall be applied to the aluminum fin stock prior to the fin stamping process to create an inert barrier between the aluminum fin and copper tube. Epoxy-phenolic barrier shall minimize galvanic action between dissimilar metals.

4. Copper-fin coils shall be constructed of copper fins mechanically bonded to copper tubes and copper tube sheets. Galvanized steel tube sheets shall not be acceptable. A polymer strip shall prevent coil assembly from contacting the sheet metal coil pan to minimize potential for galvanic corrosion between coil and pan. All copper construction shall provide protection in moderate coastal environments.

5. E-Coated aluminum-fin coils shall have a flexible epoxy polymer coating uniformly applied to all coil surface areas without material bridging between fins. Coating process shall ensure complete coil encapsulation. Color shall be high gloss black with gloss — 60 deg of 65 to 90% per ASTM D523-89. Uniform dry film thickness from 0.8 to 1.2 mil on all surface areas including fin edges. Superior hardness characteristics of 2H per ASTM D3363-92A and cross-hatch adhesion of 4B-5B per ASTM D3359-93. Impact resistance shall be up to 160 in./lb (ASTM D2794-93). Humidity and water immersion resistance shall be up to minimum 1000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92). Corrosion durability shall be confirmed through testing to be no less than 1000 hours salt spray per ASTM B117-90. Coil construction shall be aluminum fins mechanically bonded to copper tubes.

## 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. Optional stainless steel heat exchangers shall be available.
  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.
  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. Solid core filter drier.
  2. Thermostatic expansion valve.
  3. Fusible plug.
- H. Filter Section:  
Standard filter section shall consist of either factory installed 2-in. (51 mm) thick throwaway fiberglass filters or 30% pleated filters of commercially available sizes.  
Optional 4-in. filter track shall be supplied with 30% pleated fiberglass filters.
- I. Controls and Safeties:
1. Unit *ComfortLink™* Controls:
    - a. Scrolling marquee display.
    - b. CCN (Carrier Comfort Network) capable.
    - c. Unit control with standard suction pressure transducers and condensing temperature thermistors.
    - d. Shall provide a 5 F temperature difference between cooling and heating set points to meet ASHRAE 90.1, energy standard.
    - e. Shall provide and display a current alarm list and an alarm history list.
    - f. Automatic compressor redundancy.
    - g. Service run test capability.
    - h. Shall accept input from a CO<sub>2</sub> sensor (both indoor and outdoor).
    - i. Configurable alarm light shall be provided which activates when certain types of alarms occur.
    - j. Compressor minimum run time (3 minutes) and minimum off time (3 minutes) are provided.
  - k. Service diagnostic mode.
  - l. Optional integrated economizer control or two-position self-closing adjustable outside-air damper.
  - m. Minimum of 4 capacity stages.
  - n. Unit shall be complete with self-contained low voltage control circuit.
2. Safeties:
- a. Unit shall incorporate a solid-state compressor lockout which provides optional reset capability at the space thermostat should any of the following safety devices trip and shut off compressor:
    - 1) Compressor lockout protection provided for either internal or external overload.
    - 2) Low-pressure protection.
    - 3) Freeze protection (evaporator coil).
    - 4) High-pressure protection (high pressure switch or internal).
    - 5) Compressor reverse rotation protection.
    - 6) Loss of charge protection.
  - b. Supply-air sensor shall be located in the unit and should be used for economizer control and compressor stage control
  - c. Induced draft heating section (48 Series) shall be provided with the following minimum protections:
    - 1) High-temperature limit switch.
    - 2) Induced-draft motor speed sensor.
    - 3) Flame rollout switch.
    - 4) Flame proving controls.
    - 5) Redundant gas valve.
- J. Operating Characteristics:
1. Unit shall be capable of starting and running at 115 F (52 C) ambient outdoor temperature per maximum load criteria of ARI Standard 340/360.
  2. Unit with standard controls will operate in cooling down to an outdoor ambient temperature of 32 F (0° C).
  3. Unit shall be provided with fan time delay to prevent cold air delivery.
- K. Electrical Requirements:  
All unit power wiring shall enter unit cabinet at a single location.
- L. Motors:
1. Compressor motors shall be cooled by refrigerant gas passing through motor windings and shall have either internal line break thermal and current overload protection or external current overload modules with compressor temperature sensors.
  2. All condenser-fan motors shall be totally enclosed 3-phase type with permanently lubricated ball bearings, class F insulation and internal, automatic-reset thermal overloads thermal overload protection or manual reset calibrated circuit breakers.

# Guide specifications (variable air volume application) (cont)



3. All indoor-fan motors 5 hp and larger shall meet the minimum efficiency requirements as established by the Energy Policy Act of 1992 (EPACT), effective October 24, 1997.

## M. Special Features:

Certain features are not applicable when the features designated \* are specified. For assistance in amending the specifications, contact your local Carrier Sales Office.

1. Full Perimeter Roof Curbs (Horizontal and Vertical):  
Formed of 14-gage galvanized steel with wood nailer strip and shall be capable of supporting entire unit weight.
- \* 2. Integrated Economizer:
  - a. Economizer shall be furnished and installed complete with recirculated air dampers, outside air dampers, and controls.
  - b. Low-leakage dampers ride in UL-approved gears.
  - c. Capable of introducing up to 100% outdoor air for minimum ventilation as well as free cooling.
  - d. Damper actuator shall be gear driven, 24-v fully modulating design.
  - e. Economizer outdoor hood shall be pre-painted.
- \* 3. Barometric Relief Damper Package:
  - a. Package shall include damper, seals, hardware, and hoods to relieve excess internal pressure.
  - b. Damper shall close due to gravity upon unit shutdown.
- \* 4. Power Exhaust:

Package shall include a multiple exhaust fan (centrifugal style) fan, 1 Hp 208-230, 460 v (factory-wired for 460 v) direct-drive motor, and damper for vertical flow units with economizer to control over-pressurization of building. Control shall be through *ComfortLink*<sup>™</sup> based on optional building pressure sensor. On the 020-050 units 4 stages of control shall be available and 6 stages on the 060 size unit.
- \* 5. Liquefied Propane Conversion Kit (48 Series):

Kit shall contain all the necessary hardware and instructions to convert a standard natural gas unit for use with liquefied propane gas.
- \* 6. Convenience Outlet:

Shall be factory-installed and internally mounted with an externally accessible 115-v, 15 amp. GFI, female receptacle with hinged cover. A step-down transformer and overload protection shall be included so no additional wiring is necessary unless the field wired outlet has been requested. When applied with a

unit-mounted disconnect the outlet shall be wired to the line side of the disconnect, but shall include a means to shut off the outlet.

- \* 7. Non-Fused Disconnect Switch:

Shall be factory-installed, internally mounted, and UL approved. Non-fused switch shall provide unit power shutoff. Shall be accessible from outside the unit and shall provide power off lockout capability.
- \* 8. Electric Heater Package (50 Series Units Only):
  - a. Fully assembled for installation. The packages are designed in accordance with UL safety standards 1995 and listed by ETL. Heater construction approved by UL 5306.
  - b. Heater element open coil resistance wire, nickel-chrome alloy, 0.29 inches inside diameter, strung through ceramic insulators mounted on metal frame. Coil ends are staked and welded to terminal screw slots.
  - c. Heater assemblies are provided with integral fusing for protection of internal heater circuits not exceeding 48 amps each.
  - d. Auto reset thermo limit controls, magnetic heater contactors (24 v coil) and terminal block all mounted in electric heater control box (minimum 18-gage Galvanized steel) attached to end of heater assembly.
- \* 9. Hail Guard, Condenser Coil Grille:

Shall protect the condenser coil from hail, flying debris, and damage by large objects without increasing unit clearances.
- \*10. CO<sub>2</sub> Sensor:

The CO<sub>2</sub> sensor shall have the ability to monitor CO<sub>2</sub> levels and relay information to the controller. The controller will use CO<sub>2</sub> level information to modulate the economizer and provide demand control ventilation. The sensor shall be available as field installed or factory-installed return air sensor or a remote space sensor.
- \*11. Return Air Smoke Detector:

The smoke detector shall send input to the controller to shut down the unit in case smoke is detected. The smoke detector shall be factory installed in the return air section or shall be available as a field-installed accessory.
- \*12. Filter Status:

The filter status switch shall be a pressure differential switch and will indicate a dirty filter. The switch shall be available as field or factory installed.
- \*13. Return Air Dry Bulb Sensors:

An option return air dry bulb sensor can be used to provide differential dry bulb changeover for the economizer.



\*14. Humidity Sensor:

A humidity sensor will allow for outside air enthalpy changeover control using the standard outside air dry bulb sensor and the option accessory humidity sensor. When both an outside and return air humidity sensor are used then differential enthalpy changeover can be supported.

\*15. Two-Position Damper:

A two-position damper shall admit up to 25% outdoor air during fan operation and shall close when the fan is off. The damper position shall be mechanically adjustable.

\*16. 4-Inch Filters:

A factory-installed option shall be available for 4-inch, high-efficiency filters.

\*17. Control Expansion Board:

Shall provide the following additional optional features:

- a. Remote set point
- b. Demand limit control
- c. Remote economizer position
- d. Fire and smoke control override control
- e. Remote sensor monitoring
- f. Fan status switch monitoring







**Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.**