

**50TCQ  
Packaged Rooftop Heat Pump Units  
15 and 20 Nominal Tons  
Sizes:17 and 24**



## Product Data



C10580

(Unit shown with optional economizer and power exhaust.)



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50TCQD



Turn to the Experts™

Your new 15 or 20 ton WeatherMaker Carrier rooftop unit (RTU) was designed by customers for customers. With a newly designed cabinet that integrates “no-strip screw” collars, handled access panels, and more, we’ve made your unit easy to install, easy to maintain and easy to use and reliable.

**Easy to install:**

These new WeatherMaker™ units are designed for dedicated factory supplied vertical or horizontal air flow duct configurations. No special field kits are required. Designed to fit on pre-installed curbs by other another manufacturer, these units also fit on past designed Carrier installed curbs with a new certified and authorized adapter curb. This new cabinet design also integrates a large control box that gives you room to work and room to mount Carrier accessory controls.

**Easy to maintain:**

Easy access handles by Carrier provide quick and easy access to all major, normally serviced components. Our “no-strip” screw system has superior holding power and guides screws into position while preventing the screw from stripping the unit’s metal. Take accurate pressure readings by reading condenser pressure with panels in place as compressors are strategically located to eliminate any air bypass.

**Easy to use:**

The newly designed, central terminal board by Carrier puts all your connections and troubleshooting points in one convenient place, standard. Most low voltage connections are made to the same board and make it easy to find what you’re looking for and easy to access it.

**Reliable:**

Each unit comes with precision sized and tested scroll compressor that is internally protected from over temperature and pressures. Each refrigerant circuit is further protected with a high pressure, loss of charge and freeze protection switch. In addition, a liquid line filter drier and suction line accumulator protects each circuit. Each unit is factory tested prior to shipment to help ensure units operation once properly installed.



## FEATURES AND BENEFITS

- Two stage cooling capacity with independent circuits and control.
- EER's up to 10.8.
- IEER's up to 11.5 with single speed indoor fan motor and up to 12.0 with 2-speed/VFD indoor fan motor.
- COP's up to 3.3.
- Dedicated vertical and horizontal air flow duct configuration models. No field kits required.
- Utility connections through the side or bottom. Bottom connections are also in an enclosed environment to help prevent water entry. Field supplied couplings are required.
- Standardized components and control box layout. Standardized components and controls make stocking parts and service easier.
- Scroll compressors on all units with crankcase heaters. This makes service, stocking parts, replacement, and trouble-shooting easier.
- Precision sized TXV metering device on each refrigerant circuit.
- 4-way reversing valve rapidly changes the flow of refrigerant to quickly changeover from cooling to heating, heating to cooling and defrost.
- Easy-adjust, belt-drive motor available. Carrier provides a factory solution for most points in the fan performance table. Motor assembly also contains a fan belt break protection system on all models and reliable pillow block bearing system that allows lubrication thru front of the unit.
- Capable of thru-the-base or thru-the-curb electrical routing.
- Full range of electric heaters and single point electric kits – pre engineered and approved for field installation.
- Single-point electrical connection.
- Sloped, composite drain pan sheds water; and won't rust.
- Standardized controls and control box layout. Standardized components and controls make stocking parts and service easier.
- Dependable time/temperature defrost logic provides a defrost cycle, if needed, every 30, 60, 90, or 120 minutes and is adjustable.
- Clean, large, easy to use control box.
- Color-coded wiring.
- Large, laminated wiring and power wiring drawings which are affixed to unit make troubleshooting easy.
- Single, central terminal board for test and wiring connections.
- Fast-access, handled, panels for easy access on normally accessed service panels.
- “No-strip” screw system guides screws into the panel and captures them tightly without stripping the screw, the panel, or the unit.
- Standard mechanical cooling operation from 115°F (46°C) to 30°F (-1°C) ambient temperatures. Low ambient controls are available for cooling operation below 30°F (-1°C).
- 2-in (51mm) disposable filters on all units, with 4-in (102mm) filter track - field installed.
- Refrigerant filter-drier and suction line accumulator on each circuit.
- High pressure switch, loss of charge switch and freeze protection adds greater unit reliability.
- Many factory-installed options ranging from air management economizers, 2 position dampers, manual outdoor air dampers, plus convenience outlets, disconnect switch and smoke detectors.
- Standard Parts Warranty: 5 year compressor parts, 5 year electric heater parts 1 year others.
- Optional Staged Air Volume (SAV) system utilizes a Variable Frequency Drive (VFD) to automatically adjust the indoor fan motor speed between cooling stages. Available on 2-stage cooling models with electromechanical controls or RTU Open.

# MODEL NUMBER NOMENCLATURE

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
5	0	T	C	Q	D	2	4	A	1	A	6	-	0	A	0	A	0

## Unit Heat Type

50 = Elect. Heat Pkg. Rooftop

## Tier / Model

TC = Standard Efficiency

## Heat Options

Q = Heat Pump

## Refrig. System Options

D = 2-stage cooling compressor models

## Cooling Tons

17 = 15 Ton

24 = 20 Ton

## Sensor Options

A = None

B = RA Smoke Detector

C = SA Smoke Detector

D = RA + SA Smoke Detector

E = CO<sub>2</sub>

F = RA Smoke Detector & CO<sub>2</sub>

G = SA Smoke Detector & CO<sub>2</sub>

H = RA + SA Smoke Detector & CO<sub>2</sub>

## Indoor Fan Options

1 = Standard Static Option, Vertical

2 = Medium Static Option, Vertical

3 = High Static Option, Vertical

B = Medium Static, High Eff Motor, Vertical

C = High Static, High Eff Motor, Vertical

5 = Standard Static Option, Horizontal\*

6 = Medium Static Option, Horizontal

7 = High Static Option, Horizontal

F = Medium Static, High Eff Motor, Horizontal

G = High Static, High Eff Motor, Horizontal

## Coil Options (Outdoor-Indoor-Hail Guard)

A = Al/Cu - Al/Cu

B = Precoat Al/Cu - Al/Cu

C = E coat Al/Cu - Al/Cu

D = E coat Al/Cu - E coat Al/Cu

E = Cu/Cu - Al/Cu

F = Cu/Cu - Cu/Cu

M = Al/Cu - Al/Cu - Louvered Hail Guards

N = Precoat Al/Cu - Al/Cu - Louvered Hail Guards

P = E coat Al/Cu - Al/Cu - Louvered Hail Guards

Q = E coat Al/Cu - E coat Al/Cu - Louvered Hail Guards

R = Cu/Cu - Al/Cu - Louvered Hail Guards

S = Cu/Cu - Cu/Cu - Louvered Hail Guards

\* Not available on horizontal 50TCQ24 units.

## Brand / Packaging

0 = Standard

3 = Cal. Seismic compliant

## Electrical Options

A = None

C = Non-Fused Disconnect

G = 2-speed indoor fan (VFD) cntl.

J = 2-speed fan cntl. & non-fused disconnect

## Service Options

0 = None

1 = Unpowered C.O.

2 = Powered C.O.

3 = Hinged panels

4 = Hinged panels, unpwd. C.O.

5 = Hinged panels, pwd. C.O.

## Intake / Exhaust Options

A = None

B = Temp econo w/ baro relief

F = Enthalpy econo w/ baro relief

K = 2 position damper

U = Temp ultra low leak econo w/baro relief

V = Temp ultra low leak econo w/PE (cent)  
- vertical air only

W = Enthalpy ultra low leak econo w/baro relief

X = Enthalpy ultra low leak econo  
w/PE (cent) - vertical air only

## Base Unit Controls

0 = Electromechanical

1 = PremierLink Controller

2 = RTU Open Multi-Protocol Controller

6 = Electromechanical w/2-speed fan and  
W7220 econo controller

## Design Rev

- = Factory Assigned

## Voltage

1 = 575/3/60

5 = 208-230/3/60

6 = 460/3/60

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**Table 1 – FACTORY-INSTALLED OPTIONS AND FIELD-INSTALLED ACCESSORIES**

CATEGORY	ITEM	FACTORY INSTALLED OPTION	FIELD INSTALLED ACCESSORY
<b>Cabinet</b>	Dedicated Vertical Air Flow Duct Configuration	X	
	Dedicated Horizontal Air Flow Duct Configuration	X	
	Hinged Access Panels	X	
<b>Coil Options</b>	Cu/Cu (indoor and outdoor) coils	X	
	E – coated (indoor & outdoor) coils	X	
	Pre – coated (indoor & outdoor) coils	X	
<b>Condenser Protection</b>	Condenser coil hail guard (louvered design)	X	X
<b>Controls</b>	Thermostats, temperature sensors, and subbases		X
	PremierLink DDC communicating controller	X	X
	RTU Open Multi protocol controller	X	
	Smoke detector (supply and/or return air)	X	
	Time Guard II compressor delay control circuit		X
	Phase Monitor		X
<b>Economizers &amp; Outdoor Air Dampers</b>	EconoMi\$er IV (for electro – mechanical controlled RTUs)	X	X
	EconoMi\$er2 (for DDC controlled RTUs)	X	X
	Motorized 2 position outdoor – air damper	X	X
	Manual outdoor – air damper (25%)	X	X
	Barometric relief <sup>1</sup>	X	X
	Power exhaust	X	X
	Barometric relief hood (Horizontal economizer only)		X
	Ultra Low Leak EconoMi\$er X (for 2 – speed SAV system only, with 2 – stage cooling), vertical and horizontal supply and return air flow.	X	X
<b>Economizer Sensors &amp; IAQ Devices</b>	Single dry bulb temperature sensors <sup>2</sup>	X	X
	Differential dry bulb temperature sensors <sup>2</sup>		X
	Single enthalpy sensors <sup>2</sup>	X	X
	Differential enthalpy sensors <sup>2</sup>		X
	CO <sub>2</sub> sensor (wall, duct, or unit mounted) <sup>3</sup>	X	X
<b>Electric Heat</b>	Electric Resistance Heaters		X
	Single Point Kit		X
<b>Indoor Motor &amp; Drive</b>	Multiple motor and drive packages	X	
	Staged Air Vol (SAV) system w/VFD controller (2 – stage cool only with electrical mechanical and RTU Open controls)	X	
	Display Kit for SAV system with VFD		X
<b>Low Ambient Control</b>	Motormaster head pressure controller <sup>3</sup>		X
<b>Power Options</b>	Convenience outlet (powered)	X	
	Convenience outlet (unpowered)	X	
	Non – fused disconnect	X	
<b>Roof Curbs</b>	Roof curb 14 – in (356mm)		X
	Roof curb 24 – in (610mm)		X
	Adapter Curb (Adapts to Models – DP/DR/HJ/TM)		X

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**NOTES:**

1. Included with economizer.
2. Sensors for optimizing economizer.
3. See application data for assistance.

# FACTORY OPTIONS AND/OR ACCESSORIES

## Economizer (dry-bulb or enthalpy)

Economizers save money. They bring in fresh, outside air for ventilation; and provide cool, outside air to cool your building. This is the preferred method of low-ambient cooling. When coupled to CO<sub>2</sub> sensors, Economizers can provide even more savings by coupling the ventilation air to only that amount required.

Economizers are available, installed and tested by the factory, with either enthalpy or dry-bulb temperature inputs. There are also models for electromechanical as well as direct digital controllers. Additional sensors are available as accessories to optimize the economizers.

Economizers include gravity controlled, barometric relief equalizes building pressure and ambient air pressures. This can be a cost effective solution to prevent building pressurization. If further control of exhaust air is required, a dual centrifugal fan power exhaust system is also available.

## CO<sub>2</sub> Sensor

Improves productivity and saves money by working with the economizer to intake only the correct amount of outside air for ventilation. As occupants fill your building, the CO<sub>2</sub> sensor detects their presence through increasing CO<sub>2</sub> levels, and opens the economizer appropriately.

When the occupants leave, the CO<sub>2</sub> levels decrease, and the sensor appropriately closes the economizer. This intelligent control of the ventilation air, called Demand Control Ventilation (DCV) reduces the overall load on the rooftop, saving money.

## Smoke Detectors

Trust the experts. Smoke detectors make your application safer and your job easier. Carrier smoke detectors immediately shut down the rooftop unit when smoke is detected. They are available, installed by the factory, for supply air, return air, or both.

## Louvered Hail Guards

Sleek, louvered panels protect the condenser coil from hail damage, foreign objects, and incidental contact.

## Convenience Outlet (powered or un-powered)

Reduce service and/or installation costs by including a convenience outlet in your specification. Carrier will install this service feature at our factory. Provides a convenient, 15 amp, 115v GFCI receptacle with “Wet in Use” cover. The “powered” option allows the installer to power the outlet from the line side of the disconnect as required by code. The “unpowered” option is to be powered from a separate 115/120v power source.

## Non-Fused Disconnect

This OSHA-compliant, factory-installed, safety switch allows a service technician to locally secure power to the rooftop.

## Power Exhaust with Barometric Relief

Superior internal building pressure control. This field-installed accessory or factory-installed option may eliminate the need for costly, external pressure control fans.

## PremierLink™, DDC Controller

This CCN controller regulates your rooftop's performance to tighter tolerances and expanded limits, as well as facilitates zoning systems and digital accessories. It also unites your Carrier HVAC equipment together on one, coherent CCN network. The PremierLink can be factory-installed, or easily field-installed.

## RTU Open, Multi-Protocol Controller

Connect the rooftop to an existing BAS without needing complicated translators or adapter modules using the RTU Open controller. This new controller speaks the 4 most common building automation system languages (Bacnet, Modbus, N2, and Lonworks). Use this controller when you have an existing BAS.

## Time Guard II Control Circuit

This accessory protects your compressor by preventing short-cycling in the event of some other failure, prevents the compressor from restarting for 30 seconds after stopping. Not required with PremierLink®, RTU Open, or authorized commercial thermostats.

## Filter or Fan Status Switches

Use these differential pressure switches to detect a filter clog or indoor fan motor failure. When used in conjunction with a compatible unit controller/thermostat, the switches will activate an alarm to warn the appropriate personnel.

## Motorized 2-Position Damper

The new Carrier 2-position, motorized outdoor air damper admits up to 100% outside air. Using reliable, gear-driven technology, the 2-position damper opens to allow ventilation air and closes when the rooftop stops, stopping unwanted infiltration.

## Manual OA Damper

Manual outdoor air dampers are an economical way to bring in ventilation air. The dampers are available in 25% versions.

## FACTORY OPTIONS AND/OR ACCESSORIES (cont.)

### Staged Air Volume (SAV) Indoor Fan Speed System

Carrier's Staged Air Volume (SAV) system saves energy and installation time by utilizing a Variable Frequency Drive (VFD) to automatically adjust the indoor fan motor speed in sequence with the units cooling operation. Per ASHRAE 90.1 2010 standard section 6.4.3.10.b, during the first stage of cooling operation the VFD will adjust the fan motor to provide 2/3rd of the total cfm established for the unit. When a call for the second stage of cooling is required, the VFD will allow the total cfm for the unit established (100%). During the heating mode the VFD will allow total design cfm (100%) operation and during the ventilation mode the VFD will allow operation to 2/3rd of total cfm.

Compared to single speed indoor fan motor systems, Carrier's SAV system can save substantial energy, 25%+\*, versus single speed indoor fan motor systems.

The VFD used in Carrier's SAV system has soft start capabilities to slowly ramp up the speeds, thus eliminating any high inrush air volume during initial start-up. It also has internal over current protection for the fan motor and a field installed display kit that allows adjustment and in depth diagnostics of the VFD.

This SAV system is available on models with 2-stage cooling operation with electrical mechanical or RTU Open, Multi Protocol controls. Both space sensor and conventional thermostats controls can be used to provide accurate control in any application.

The SAV system is very flexible for initial fan performance set up and adjustment. The standard factory shipped VFD is pre-programmed to automatically stage the fan speed between the first and second stage of cooling. The unit fan performance static pressure and cfm can be easily adjusted using the traditional means of pulley adjustments. The other means to adjust the unit static and cfm performance is to utilize the field installed Display Kit and adjust the frequency and voltage in the VFD to required performance requirements. In either case, once set up, the VFD will automatically adjust the speed between the cooling stage operations.

\*Data based on .10 (\$/kWh) in an office application utilizing Carrier's HAP 4.6 simulation software program

### Motormaster Head Pressure Controller

The Motormaster motor controller is a low ambient, head pressure controller kit that is designed to maintain the unit's condenser head pressure during periods of low ambient cooling operation. This device should be used as an alternative to economizer free cooling not when economizer usage is either not appropriate or desired. The Motormaster will either cycle the outdoor-fan motors or operate them at reduced speed to maintain the unit operation, depending on the model.

### Alternate Motors and Drives

Some applications need larger horsepower motors, some need more airflow, and some need both. Regardless of the case, your Carrier expert has a factory installed combination to meet your application. A wide selection of motors and pulleys (drives) are available, factory installed, to handle nearly any application.

### Thru-the-Base Connections

Thru-the-base provisions/connection points are available as standard with every unit. When bottom connections are required, field furnished couplings are required.

### Electric Heaters / Single Point Kit

Carrier offers a full-line of field-installed accessory heaters and single point kits when required. The heaters are very easy to use, install and are all pre-engineered and certified.

### Barometric Hood

For Horizontal Economizer applications where relief damper is installed in duct work. This kit provides the needed protection.

### Hinged Access Panels

Allows access to unit's major components with specifically designed hinged access panels. Panels are: filter, control box, fan motor and compressor.

**Table 2 – AHRI COOLING RATING TABLE 2-STAGE COOLING**

COOLING MODE							
50TCQ	COOLING STAGES	NOMINAL CAPACITY (TONS)	NET COOLING CAPACITY (BTUH)	TOTAL POWER (kW)	EER	IEER WITH SINGLE SPEED INDOOR MOTOR	IEER WITH 2-SPEED INDOOR MOTOR
D17	2	15	172,000	15.9	10.8	11.5	12.0
D24*	2	25	232,000	21.9	10.6	11.1	12.0

HEATING MODE				
50TCQ	HEATING, LOW (BTUH)		HEATING, HIGH (BTUH)	
	CAPACITY (BTUH)	COP	CAPACITY (BTUH)	COP
D17	103,000	2.4	166,000	3.3
D24*	136,000	2.3	220,000	3.3

\* AHRI rated cfm is 6500 for vertical units and 6000 for horizontal units

**LEGEND**

- AHRI – Air Conditioning, Heating and Refrigeration Institute
- ASHRAE – American Society of Heating, Refrigerating and Air Conditioning, Inc.
- COP – Coefficient of performance
- EER – Energy Efficiency Ratio
- IEER – Integrated Energy Efficiency

**NOTES**

1. Rated and certified under AHRI Standard 340/360, as appropriate.
2. Ratings are based on:  
**Cooling Standard:** 80°F (27°C) db, 67°F (19°C) wb indoor air temp and 95°F db outdoor air temp.  
**IEER Standard:** A measure that expresses cooling part-load EER efficiency for commercial unitary air conditioning and heat pump equipment on the basis of weighted operation at various load capacities.
3. All 50TCQ units comply with ASHRAE 90.1 Energy Standard for minimum EER and IEER requirements.
4. Where appropriate, 50TCQ units comply with US Energy Policy Act (2005). Refer to state and local codes or visit the following website: <http://bcap-energy.org> to determine if compliance with this standard pertains to your state, territory, or municipality.

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**Table 3 – SOUND PERFORMANCE TABLE**

MODEL SIZE	COOLING STAGES	OUTDOOR SOUND (dB)									
		A-Wtg.	AHRI 370 Rating	63	125	250	500	1000	2000	4000	8000
17	2	84.1	84	92.2	83.9	80.4	81.8	78.7	76.5	72.2	65.4
24	2	86.5	87	95.6	87.5	84.2	84.2	81.7	77.9	73.2	66.3

**LEGEND**

dB – Decibel

**NOTES:**

1. Outdoor sound data is measure in accordance with AHRI standard 270–2008.
2. Measurements are expressed in terms of sound power. Do not compare these values to sound pressure values because sound pressure accounts for specific environmental factors which do not match individual applications. Sound power values are independent of the environment and therefore more accurate.
3. A-weighted sound ratings filter out very high and very low frequencies, to better approximate the response of an “average” human ear. A-weighted measurements for Carrier units are taken in accordance with 270–2008.





**Table 4 – PHYSICAL DATA**

**(COOLING)**

**15 AND 20 TONS**

		<b>50TCQD17</b>	<b>50TCQD24</b>
<b>Refrigeration System</b>			
# Circuits / # Comp. / Type		2 / 2 / Scroll	2 / 2 / Scroll
R-410a charge A/B (lbs)		16.0/16.5	23.4/23.4
Metering Device		TXV	TXV
High – press. Trip / Reset (psig)		630 / 505	630 / 505
Low – press. Trip / Reset (psig)		24 / 45	24 / 45
<b>Evap. Coil</b>			
Material		Cu / Al	Cu / Al
Tube Diameter		3/8 – in	3/8 – in
Rows / FPI		3 / 15	4 / 15
Total face area (ft2)		19.56	22.00
Condensate drain conn. size		3/4 – in	3/4 – in
<b>Evap. fan and motor</b>			
<b>VERTICAL</b>			
Standard Static	Motor Qty / Drive type	1 / Belt	1 / Belt
	Max BHP	2.2	4.9
	RPM range	514 – 680	690 – 863
	Motor frame size	56	56
	Fan Qty / Type	2 / Centrifugal	2 / Centrifugal
	Fan Diameter (in)	15 x 15	15 x 15
Medium Static	Motor Qty / Drive type	1 / Belt	n/a
	Max BHP	3.3	n/a
	RPM range	679 – 863	n/a
	Motor frame size	56	n/a
	Fan Qty / Type	2 / Centrifugal	n/a
	Fan Diameter (in)	15 x 15	n/a
High Static	Motor Qty / Drive type	1 / Belt	n/a
	Max BHP	4.9	n/a
	RPM range	826 – 1029	n/a
	Motor frame size	56	n/a
	Fan Qty / Type	2 / Centrifugal	n/a
	Fan Diameter (in)	15 x 15	n/a
Medium Static – High Efficiency	Motor Qty / Drive type	n/a	1 / Belt
	Max BHP (208/230/460/575v)	n/a	6.5/6.9/7.0/8.3
	RPM range	n/a	835 – 1021
	Motor frame size	n/a	184T
	Fan Qty / Type	n/a	2 / Centrifugal
	Fan Diameter (in)	n/a	15 x 15
High Static – High Efficiency	Motor Qty / Drive type	n/a	1 / Belt
	Max BHP (208/230/460/575v)	n/a	10.5/11.9/11.9/11.0
	RPM range	n/a	941 – 1176
	Motor frame size	n/a	213T
	Fan Qty / Type	n/a	2 / Centrifugal
	Fan Diameter (in)	n/a	15 x 15

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		50TCQD17	50TCQD24
<b>HORIZONTAL</b>			
Standard Static	Motor Qty / Drive type	1 / Belt	n/a
	Max BHP	2.2	n/a
	RPM range	514–680	n/a
	Motor frame size	56	n/a
	Fan Qty / Type	2 / Centrifugal	n/a
	Fan Diameter (in)	18 x 15/15 X 11	n/a
Medium Static	Motor Qty / Drive type	1 / Belt	n/a
	Max BHP	3.3	n/a
	RPM range	614–780	n/a
	Motor frame size	56	n/a
	Fan Qty / Type	2 / Centrifugal	n/a
	Fan Diameter (in)	18 x 15/15 X 11	n/a
High Static	Motor Qty / Drive type	1 / Belt	n/a
	Max BHP	4.9	n/a
	RPM range	746–912	n/a
	Motor frame size	56	n/a
	Fan Qty / Type	2 / Centrifugal	n/a
	Fan Diameter (in)	18 x 15/15 X 11	n/a
Medium Static-- High Efficiency	Motor Qty / Drive type	n/a	1 / Belt
	Max BHP (208/230/460/575v)	n/a	6.5/6.9/7.0/8.3
	RPM range	n/a	835–1021
	Motor frame size	n/a	184T
	Fan Qty / Type	n/a	2 / Centrifugal
	Fan Diameter (in)	n/a	18 x 15 / 15 x 11
High Static-- High Efficiency	Motor Qty / Drive type	n/a	1 / Belt
	Max BHP (208/230/460/575v)	n/a	10.5/11.9/11.9/11.0
	RPM range	n/a	941–1176
	Motor frame size	n/a	213T
	Fan Qty / Type	n/a	2 / Centrifugal
	Fan Diameter (in)	n/a	18 x 15 / 15 x 11
<b>Cond. Coil (Circuit A)</b>			
	Coil type	RTPF	RTPF
	Coil Length (in)	70	82
	Coil Height (in)	44	44
	Rows / FPI	2 Rows / 17 FPI	2 Rows / 17 FPI
	Total face area (ft2)	21.4	25.1
<b>Cond. Coil (Circuit B)</b>			
	Coil type	RTPF	RTPF
	Coil Length (in)	70	82
	Coil Height (in)	44	44
	Rows / FPI	2 Rows / 17 FPI	2 Rows / 17 FPI
	Total face area (ft2)	21.4	25.1
<b>Cond. fan / motor</b>			
	Qty / Motor drive type	3 / direct	4 / direct
	Motor HP / RPM	1/4 / 1100	1/4 / 1100
	Fan diameter (in)	22	22
<b>Filters</b>			
	RA Filter # / size (in)	6 / 20 x 25 x 2	6 / 20 x 25 x 2
	OA inlet screen # / size (in)	4 / 16 x 25 x 1	4 / 16 x 25 x 1

RTPF – Round tube / plate fin design

Table 5 – 15 AND 20 TONS

ELECTRIC HEAT - ELECTRICAL DATA  
2-STAGE COOLING SINGLE SPEED INDOOR FAN MOTOR

UNIT	NOM. V-Ph-Hz	IFM TYPE	ELECTRIC HEATER PART NUMBER CRHEATER***A00 VERT/HORZ	NOMINAL (kW)	APPLICATION (kW)	SINGLE POINT KIT PART NUMBER CRSINGLE***A00			
						NO C.O. or UNPWRD C.O.		w/PWRD C.O.	
						NO P.E.	w/ PE (pwrd fr/unit)	NO P.E.	w/ PE (pwrd fr/unit)
50TCQ*17	208/230-3-60	STD	279/270A00	25.0	18.8/23.0	056A00	056A00	056A00	056A00
			280/271A00	50.0	37.6/45.9	056A00	056A00	056A00	056A00
			281/272A00	75.0	56.3/68.9	056A00	056A00	056A00	056A00
		MED	279/270A00	25.0	18.8/23.0	056A00	056A00	056A00	056A00
			280/271A00	50.0	37.6/45.9	056	056A00	056A00	056A00
			281/272A00	75.0	56.3/68.9	056A00	056A00	056A00	056A00
		HIGH	279/270A00	25.0	18.8/23.0	056A00	056A00	056A00	056A00
			280/271A00	50.0	37.6/45.9	056A00	056A00	056A00	056A00
			281/272A00	75.0	56.3/68.9	056A00	056A00	056A00	056A00
	460-3-60	STD	282A/27300	25.0	23.0	057A00	057A00	057A00	057A00
			283/274A00	50.0	45.9	057A00	057A00	057A00	057A00
			284/275A00	75.0	68.9	057A00	057A00	057A00	057A00
		MED	282/273A00	25.0	23.0	057A00	057A00	057A00	057A00
			283/274A00	50.0	45.9	057A00	057A00	057A00	057A00
			284/275A00	75.0	68.9	057A00	057A00	057A00	057A00
		HIGH	282/273A00	25.0	23.0	057A00	057A00	057A00	057A00
			283/274A00	50.0	45.9	057A00	057A00	057A00	057A00
			284/275A00	75.0	68.9	057A00	057A00	057A00	057A00
	575-3-60	STD	285/276A00	24.8	22.8	-	-	-	-
			286/277A00	49.6	45.6	057A00	057A00	057A00	057A00
			287/278A00	74.4	68.3	057A00	057A00	057A00	057A00
		MED	285/276A00	24.8	22.8	-	-	-	-
			286/277A00	49.6	45.6	057A00	057A00	057A00	057A00
			287/278A00	74.4	68.3	057A00	057A00	057A00	057A00
HIGH		285/276A00	24.8	22.8	-	-	-	-	
		286/277A00	49.6	45.6	057A00	057A00	057A00	057A00	
		287/278A00	74.4	68.3	057A00	057A00	057A00	057A00	
50TCQ*24	208/203-3-60	STD**	279/---A00	25.0	18.8/23.0	056A00	056A00	056A00	056A00
			280/---A00	50.0	37.6/45.9	056A00	056A00	056A00	056A00
			281/---A00	75.0	56.3/68.9	056A00	056A00	056A00	056A00
		MED- High Efficiency	279/270A00	25.0	18.8/23.0	056A00	056A00	056A00	056A00
			280/271A00	50.0	37.6/45.9	056A00	056A00	056A00	056A00
			281/272A00	75.0	56.3/68.9	056A00	056A00	056A00	056A00
		HIGH- High Efficiency	279/270A00	25.0	18.8/23.0	056A00	056A00	056A00	056A00
			280/271A00	50.0	37.6/45.9	056A00	056A00	056A00	056A00
			281/272A00	75.0	56.3/68.9	056A00	056A00	056A00	056A00
	460-3-60	STD**	282/---A00	25.0	23.0	057A00	057A00	057A00	057A00
			283/---A00	50.0	45.9	057A00	057A00	057A00	057A00
			284/---A00	75.0	68.9	057A00	057A00	057A00	057A00
		MED- High Efficiency	282/271A00	25.0	23.0	057A00	057A00	057A00	057A00
			283/272A00	50.0	45.9	057A00	057A00	057A00	057A00
			284/273A00	75.0	68.9	057A00	057A00	057A00	057A00
		HIGH- High Efficiency	282/271A00	25.0	23.0	057A00	057A00	057A00	057A00
			283/272A00	50.0	45.9	057A00	057A00	057A00	057A00
			284/273A00	75.0	68.9	057A00	057A00	057A00	057A00
	575-3-60	STD**	285/---A00	24.8	22.8	-	057A00	-	057A00
			286/---A00	49.6	45.6	057A00	057A00	057A00	057A00
			287/---A00	74.4	68.3	057A00	057A00	057A00	057A00
		MED- High Efficiency	285/276A00	24.8	22.8	-	057A00	-	057A00
			286/277A00	49.6	45.6	057A00	057A00	057A00	057A00
			287/278A00	74.4	68.3	057A00	057A00	057A00	057A00
HIGH- High Efficiency		285/276A00	24.8	22.8	-	057A00	057A00	057A00	
		286/277A00	49.6	45.6	057A00	057A00	057A00	057A00	
		287/278A00	74.4	68.3	057A00	057A00	057A00	057A00	

50TCQD

LEGEND

- \*\* STD IFM not available on horizontal 50TCQ\*24. STD IFM is available on vertical 50TCQ\*24
- APP PWR - 208 / 230V / 460V / 575V
- C.O. - Convenient outlet
- IFM - Indoor fan motor
- NOM PWR - 240V / 480V / 600V
- P.E. - Power exhaust
- PWRD - Powered convenient outlet
- UNPWRD - Unpowered convenient outlet

Table 6 – 15 AND 20 TONS

ELECTRIC HEAT - ELECTRICAL DATA  
2-STAGE COOLING 2-SPEED INDOOR FAN MOTOR

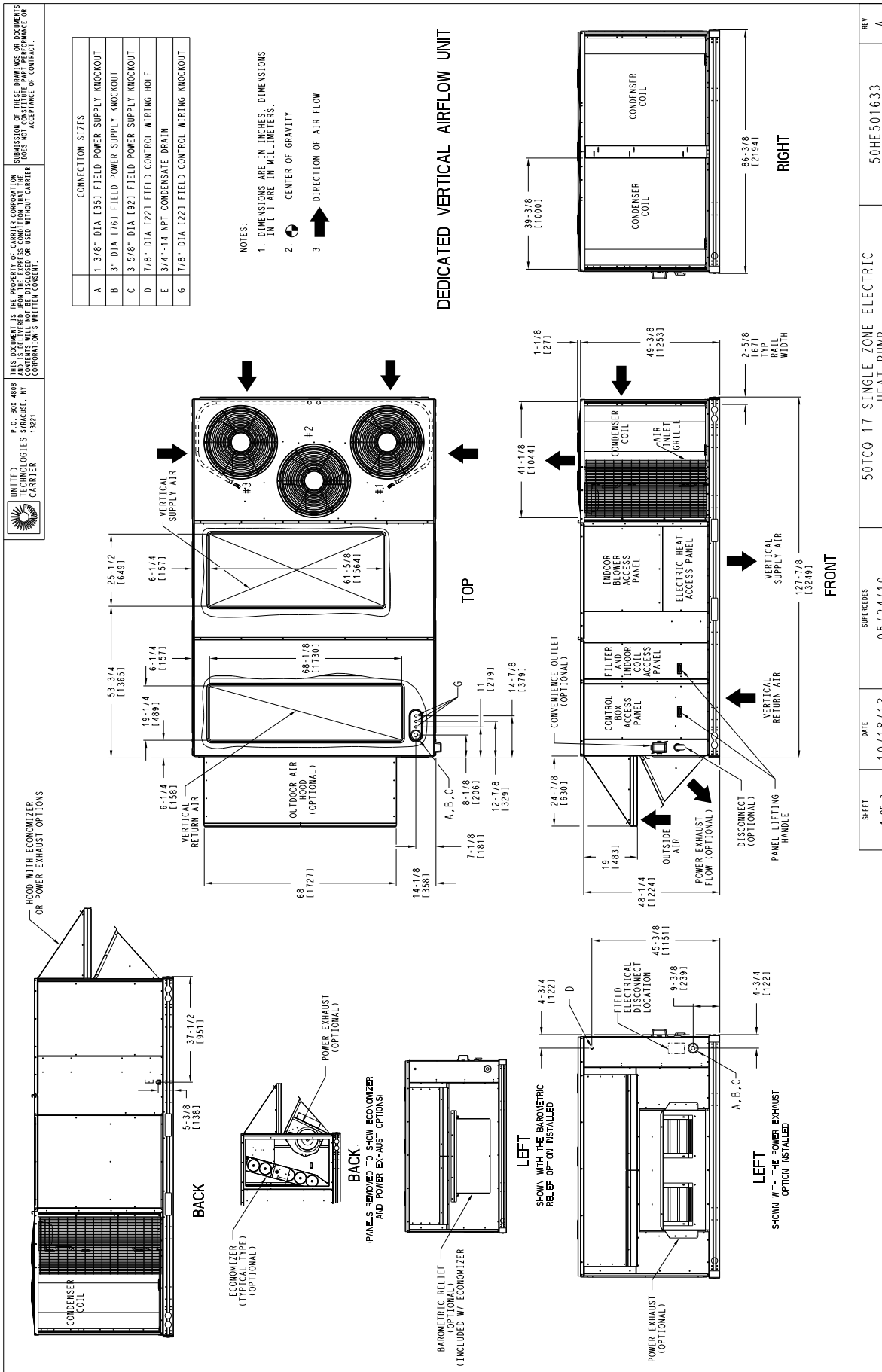
50TCQD

UNIT	NOM. V-Ph-Hz	IFM TYPE	ELECTRIC HEATER PART NUMBER CRHEATER***A00 VERT/HORZ	NOMINAL (kW)	APPLICATION (kW)	SINGLE POINT KIT PART NUMBER CRSINGLE***A00			
						NO C.O. or UNPWRD C.O.		w/PWRD C.O.	
						NO P.E.	w/ PE (pwrd fr/unit)	NO P.E.	w/ PE (pwrd fr/unit)
50TCQ*17	208/230-3-60	STD	279/270A00	25.0	18.8/23.0	056A00	056A00	056A00	056A00
			280/271A00	50.0	37.6/45.9	056A00	056A00	056A00	056A00
			281/272A00	75.0	56.3/68.9	056A00	056A00	056A00	056A00
		MED	279/270A00	25.0	18.8/23.0	056A00	056A00	056A00	056A00
			280/271A00	50.0	37.6/45.9	056A00	056A00	056A00	056A00
			281/272A00	75.0	56.3/68.9	056A00	056A00	056A00	056A00
		HIGH	279/270A00	25.0	18.8/23.0	056A00	056A00	056A00	056A00
			280/271A00	50.0	37.6/45.9	056A00	056A00	056A00	056A00
			281/272A00	75.0	56.3/68.9	056A00	056A00	056A00	056A00
	460-3-60	STD	282/273A00	25.0	23.0	057A00	057A00	057A00	057A00
			283/274A00	50.0	45.9	057A00	057A00	057A00	057A00
			284/275A00	75.0	68.9	057A00	057A00	057A00	057A00
		MED	282/273A00	25.0	23.0	057A00	057A00	057A00	057A00
			283/274A00	50.0	45.9	057A00	057A00	057A00	057A00
			284/275A00	75.0	68.9	057A00	057A00	057A00	057A00
		HIGH	282/273A00	25.0	23.0	057A00	057A00	057A00	057A00
			283/274A00	50.0	45.9	057A00	057A00	057A00	057A00
			284/275A00	75.0	68.9	057A00	057A00	057A00	057A00
575-3-60	STD	285/276A00	24.8	22.8	-	-	-	-	
		286/277A00	49.6	45.6	057A00	057A00	057A00	057A00	
		287/278A00	74.4	68.3	057A00	057A00	057A00	057A00	
	MED	285/276A00	24.8	22.8	-	-	-	-	
		286/277A00	49.6	45.6	057A00	057A00	057A00	057A00	
		287/278A00	74.4	68.3	057A00	057A00	057A00	057A00	
	HIGH	285/276A00	24.8	22.8	-	-	-	-	
		286/277A00	49.6	45.6	057A00	057A00	057A00	057A00	
		287/278A00	74.4	68.3	057A00	057A00	057A00	057A00	
50TCQ*24	208/203-3-60	STD**	279/---A00	25.0	18.8/23.0	056A00	056A00	056A00	056A00
			280/---A00	50.0	37.6/45.9	056A00	056A00	056A00	056A00
			281/---A00	75.0	56.3/68.9	056A00	056A00	056A00	056A00
		MED	279/270A00	25.0	18.8/23.0	056A00	056A00	056A00	056A00
			280/271A00	50.0	37.6/45.9	056A00	056A00	056A00	056A00
			281/272A00	75.0	56.3/68.9	056A00	056A00	056A00	056A00
		HIGH	279/270A00	25.0	18.8/23.0	056A00	056A00	056A00	056A00
			280/271A00	50.0	37.6/45.9	056A00	056A00	056A00	056A00
			281/272A00	75.0	56.3/68.9	056A00	056A00	056A00	056A00
	460-3-60	STD**	282/---A00	25.0	23.0	057A00	057A00	057A00	057A00
			283/---A00	50.0	45.9	057A00	057A00	057A00	057A00
			284/---A00	75.0	68.9	057A00	057A00	057A00	057A00
		MED	282/273A00	25.0	23.0	057A00	057A00	057A00	057A00
			283/274A00	50.0	45.9	057A00	057A00	057A00	057A00
			284/275A00	75.0	68.9	057A00	057A00	057A00	057A00
		HIGH	282/273A00	25.0	23.0	057A00	057A00	057A00	057A00
			283/274A00	50.0	45.9	057A00	057A00	057A00	057A00
			284/275A00	75.0	68.9	057A00	057A00	057A00	057A00
575-3-60	STD**	285/---A00	24.8	22.8	-	057A00	-	057A00	
		286/---A00	49.6	45.6	057A00	057A00	057A00	057A00	
		287/---A00	74.4	68.3	057A00	057A00	057A00	057A00	
	MED	285/276A00	24.8	22.8	-	057A00	-	057A00	
		286/277A00	49.6	45.6	057A00	057A00	057A00	057A00	
		287/278A00	74.4	68.3	057A00	057A00	057A00	057A00	
	HIGH	285/276A00	24.8	22.8	-	057A00	057A00	057A00	
		286/277A00	49.6	45.6	057A00	057A00	057A00	057A00	
		287/278A00	74.4	68.3	057A00	057A00	057A00	057A00	

LEGEND

- \*\* STD IFM not available on horizontal 50TCQ\*24. STD IFM is available on vertical 50TCQ\*24
- APP PWR - 208 / 230V / 460V / 575V
- C.O. - Convenient outlet
- IFM - Indoor fan motor
- NOM PWR - 240V / 480V / 600V
- P.E. - Power exhaust
- PWRD - Powered convenient outlet
- UNPWRD - Unpowered convenient outlet

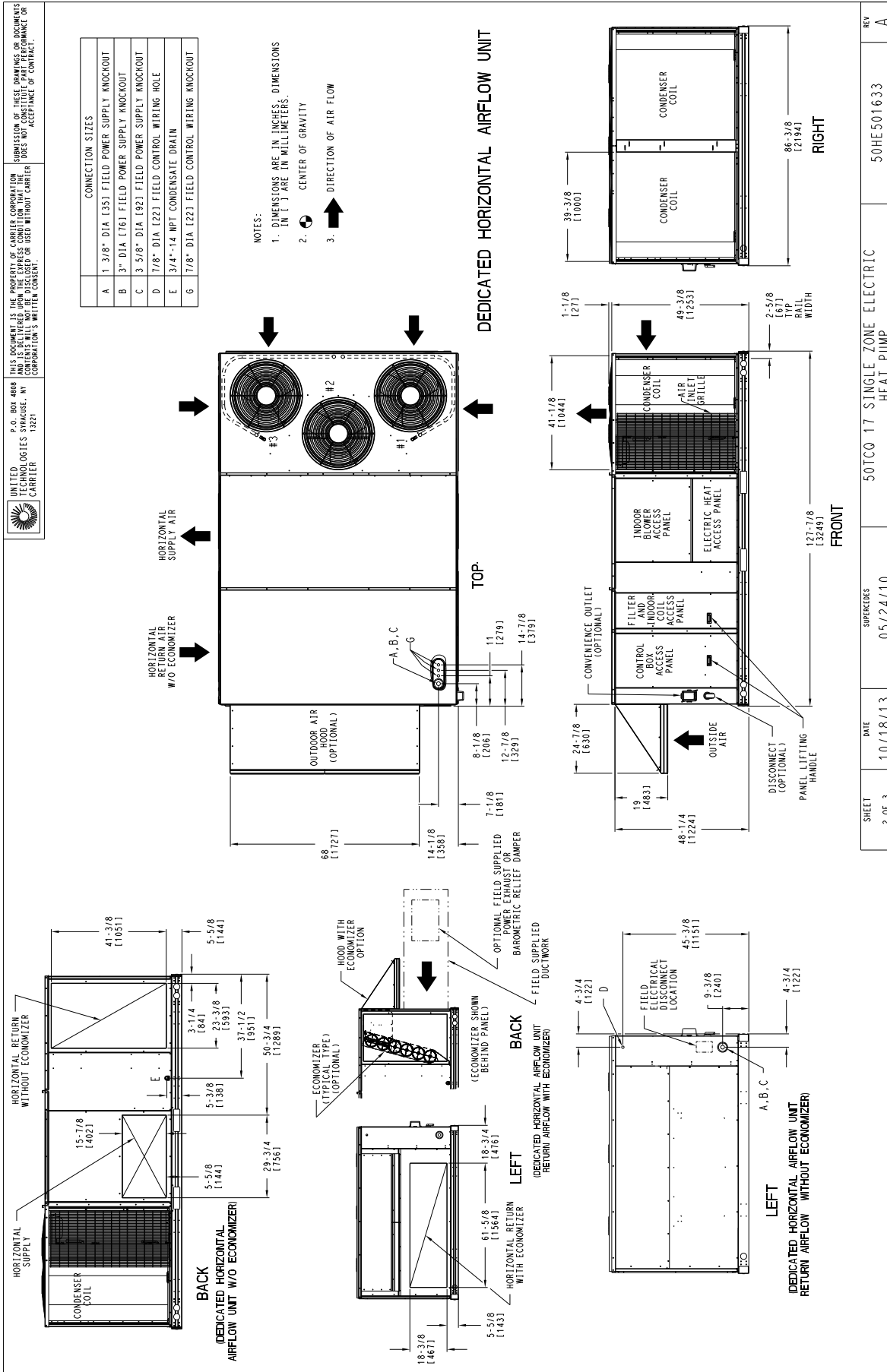
# DIMENSIONS



50TCQD

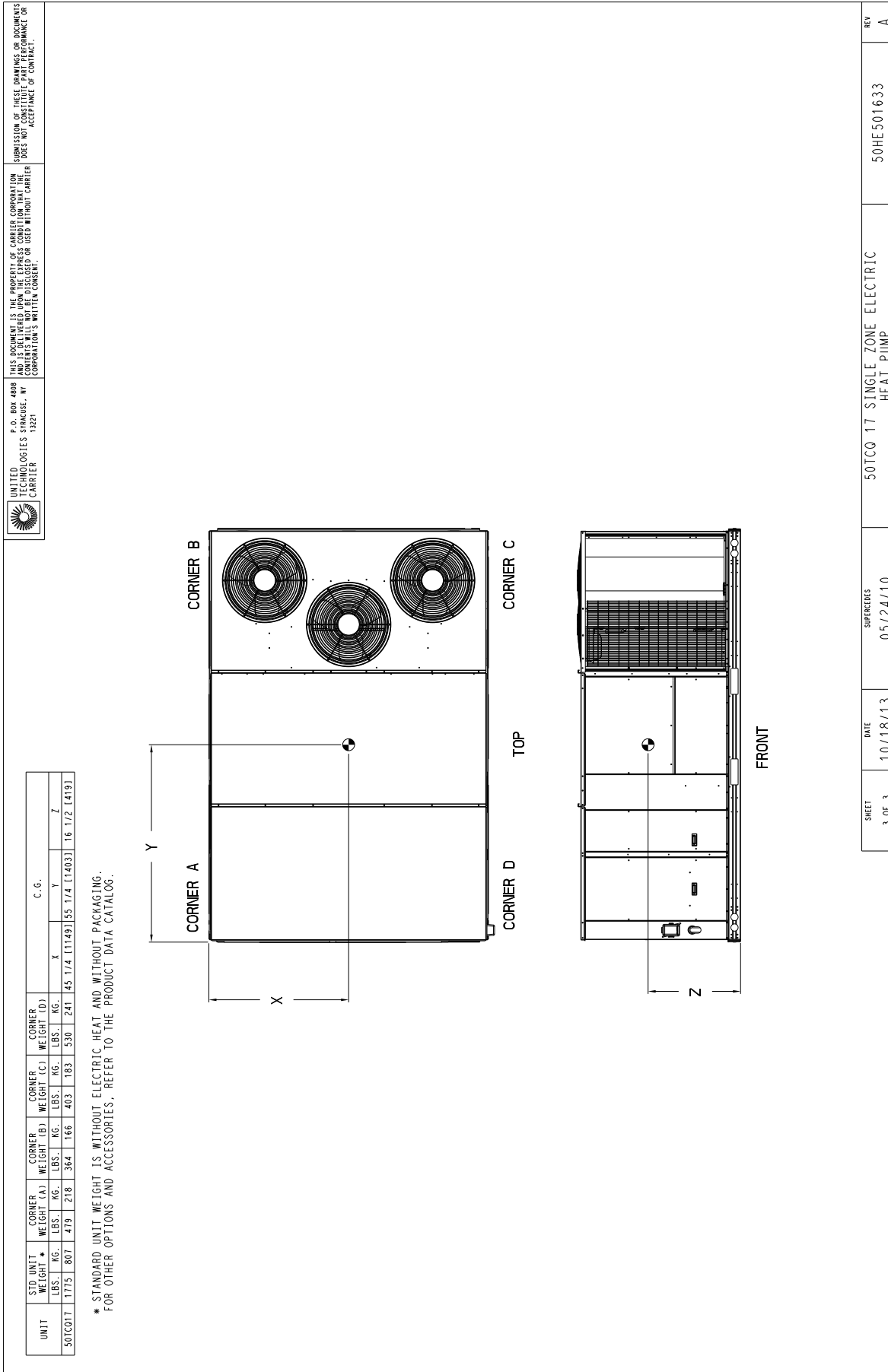
**Fig. 1 - Unit Dimensional Drawing – Size 17 Units, Sheet 1 of 3**

**DIMENSIONS (cont.)**



**Fig. 1 - Unit Dimensional Drawing - Size 17 Units, Sheet 2 of 3**

# DIMENSIONS (cont.)



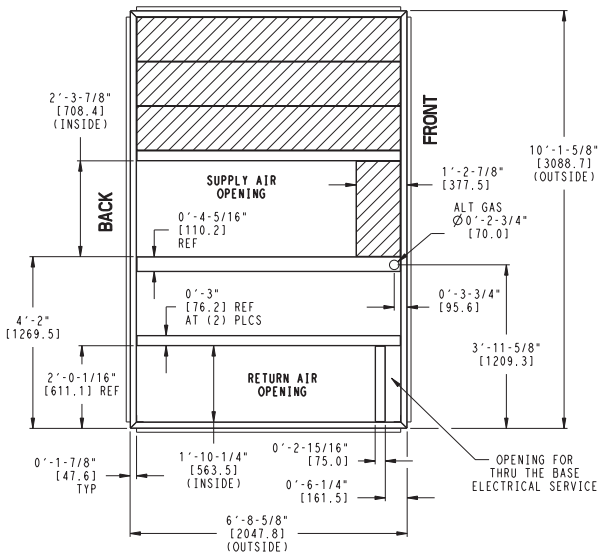
**Fig. 1 - Unit Dimensional Drawing – Size 17 Units, Sheet 3 of 3**

50TCQD

# DIMENSIONS (cont.)

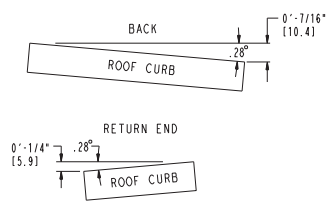
UNIT SIZE	"A"	ROOF CURB ACCESSORY
17	1'-2" [356.0] 2'-0" [610.0]	CRRFCURB045A00 CRRFCURB046A00

**50TCQD**

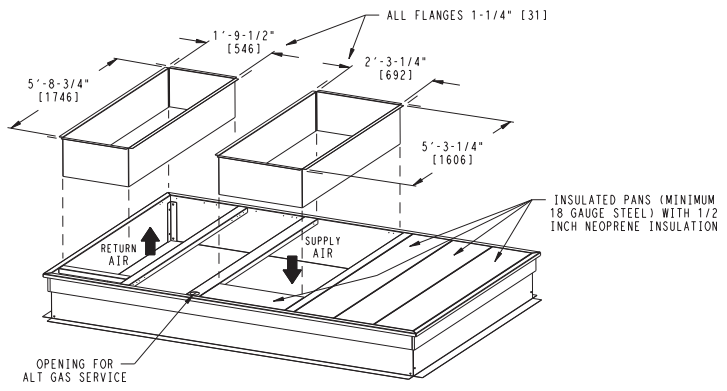
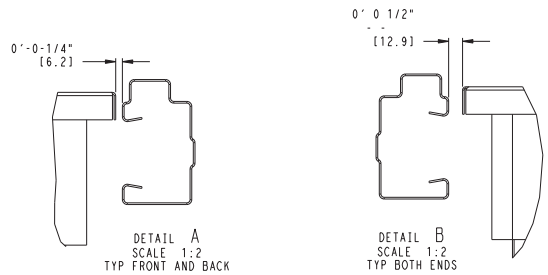
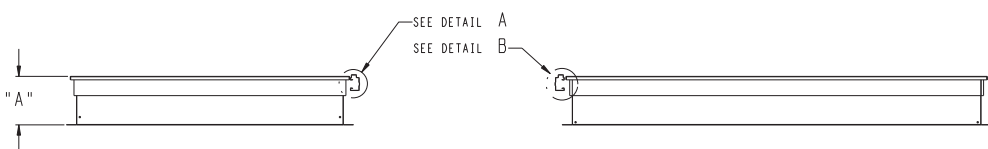
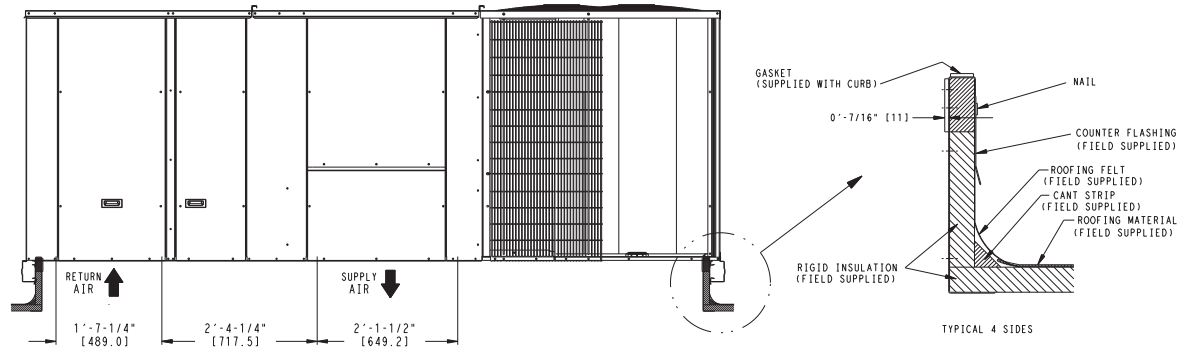


- NOTES:
- 1 ROOF CURB ACCESSORY IS SHIPPED UNASSEMBLED.
  - 2 DIMENSIONS IN [ ] ARE IN MILLIMETERS.
  - 3 ROOF CURB GALVANIZED STEEL.
  - 4 ATTACH DUCTWORK TO CURB (FLANGES ON DUCT REST ON CURB)
  - 5 SERVICE CLEARANCE 4 FT ON EACH SIDE

➔ DIRECTION OF AIR FLOW



MAX CURB LEVELING TOLERANCES

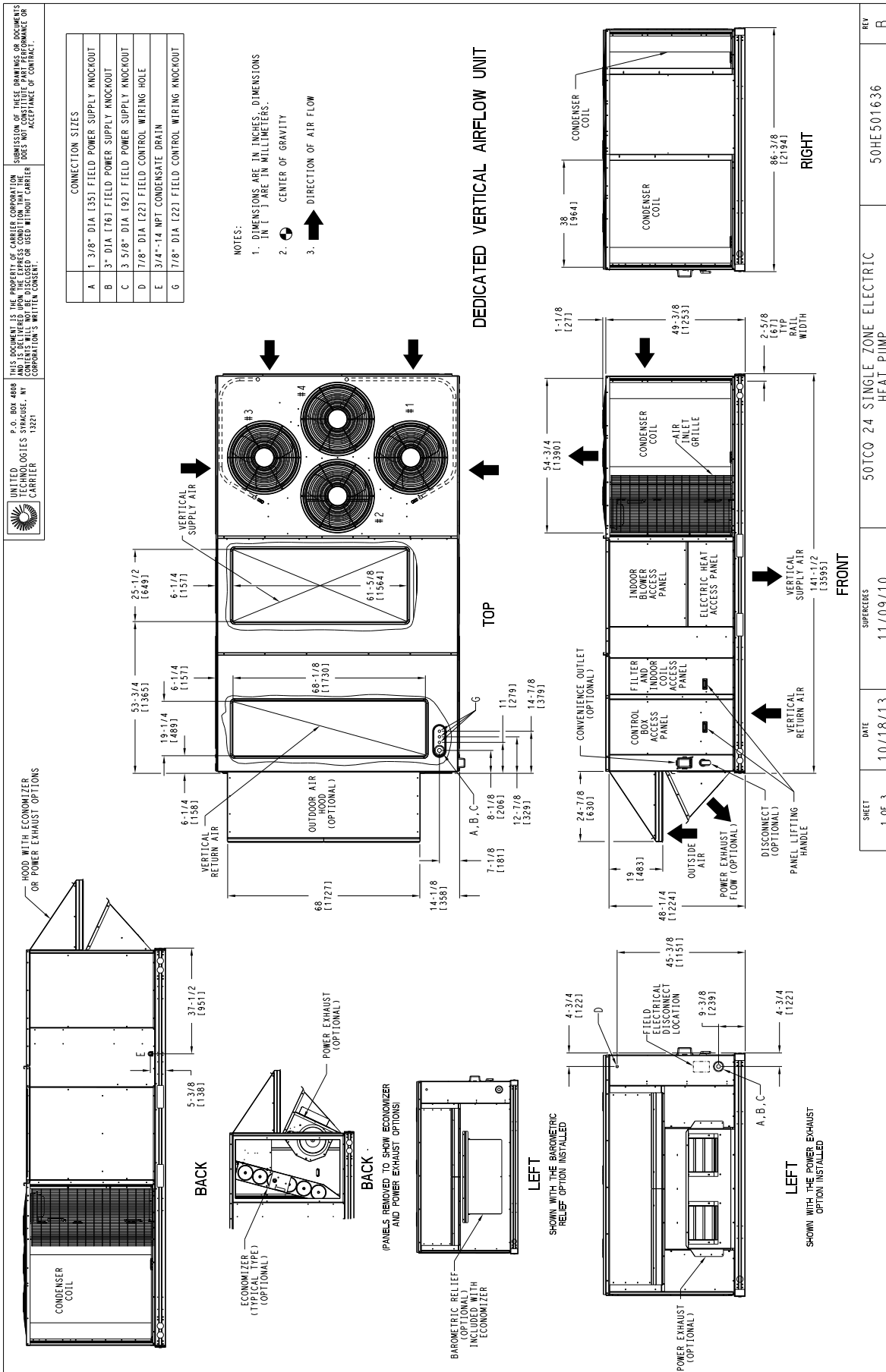


**Fig. 2 - Roof Curb Dimensions - 50 TCQ-17**

C10139



# DIMENSIONS (cont.)

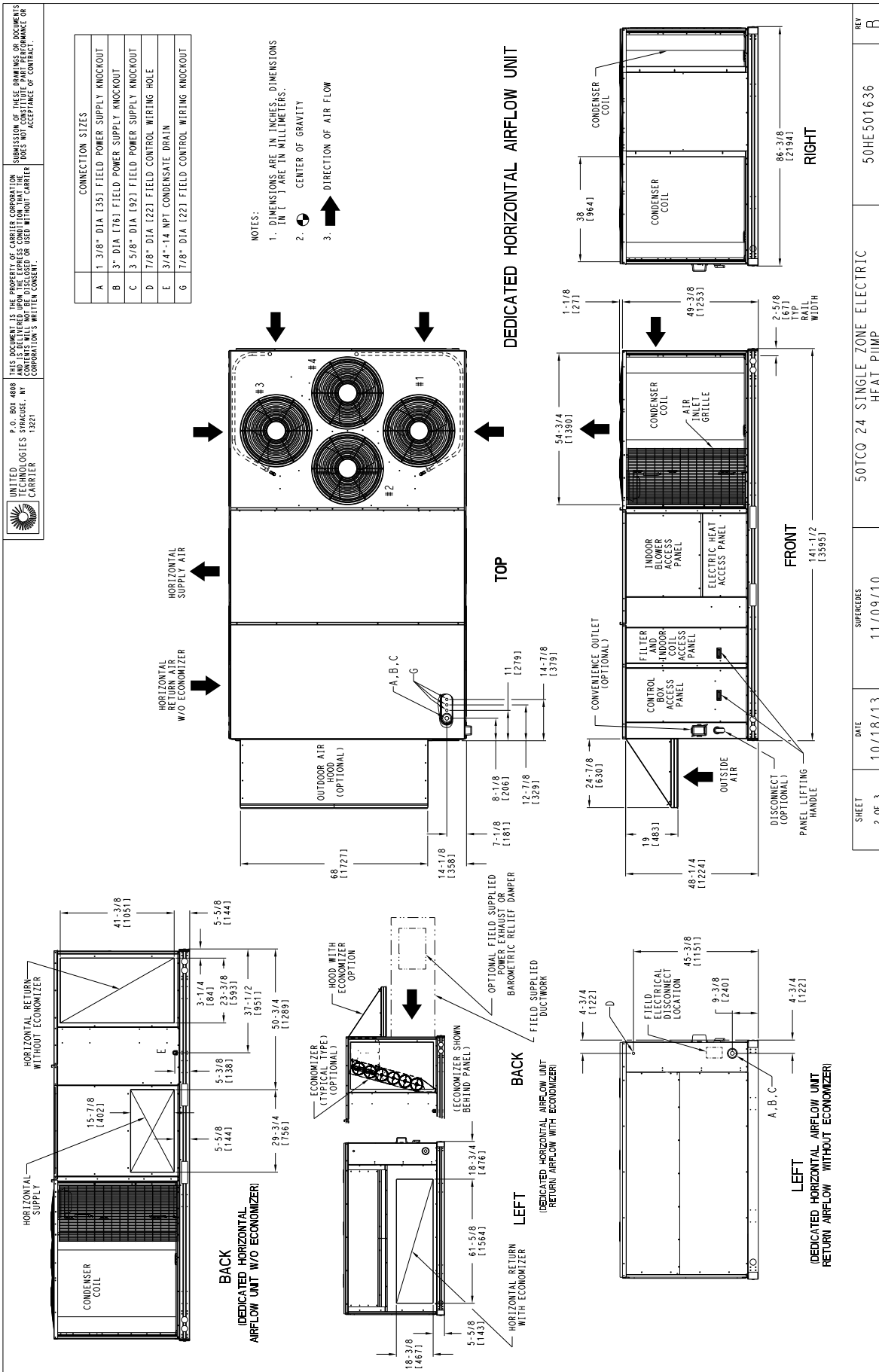


50TCQD

**Fig. 3 - Unit Dimensional Drawing – Size 24 Units, Sheet 1 of 3**

# DIMENSIONS (cont.)

50TCQD



SHEET 2 OF 3	DATE 10/18/13	SUPERSEDES 11/09/10	50TCQ 24 SINGLE ZONE ELECTRIC HEAT PUMP
50TCQD			REV B

**Fig. 3 - Unit Dimensional Drawing – Size 24 Units, Sheet 2 of 3**

# DIMENSIONS (cont.)

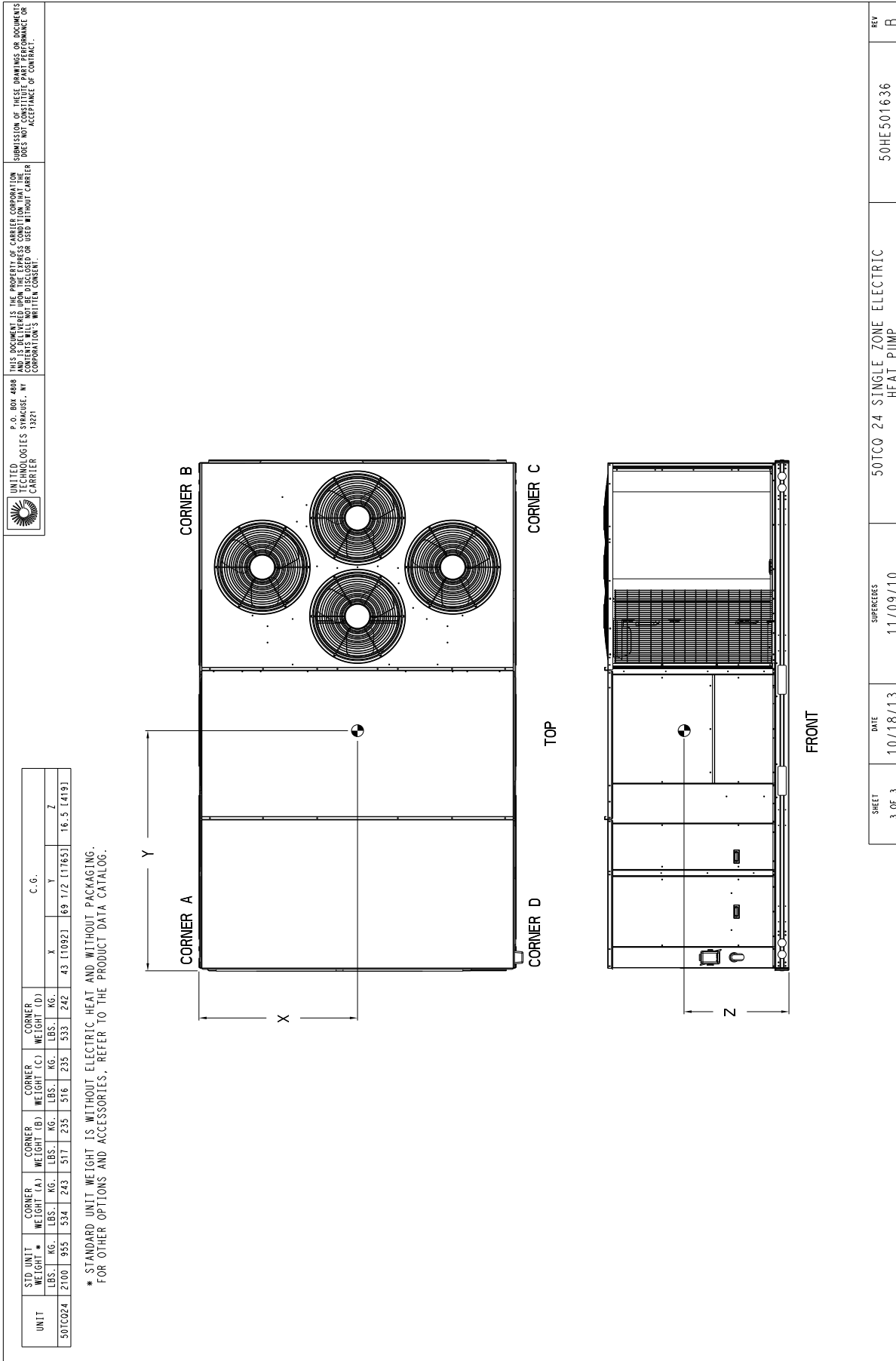
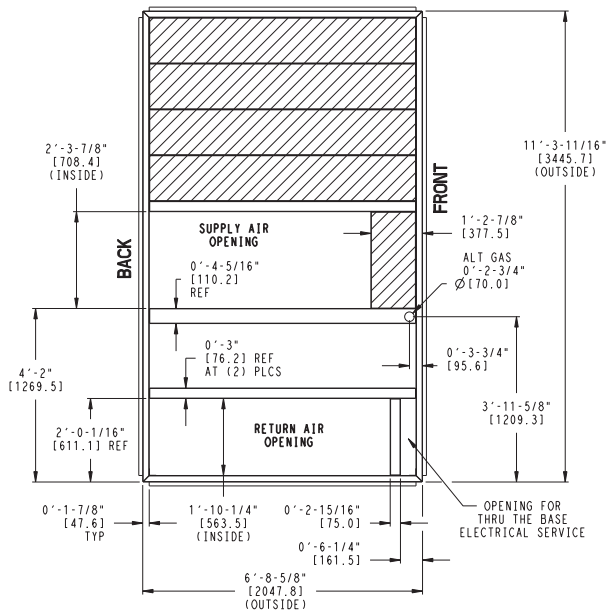


Fig. 3 - Unit Dimensional Drawing – Size 24 Units, Sheet 3 of 3

# DIMENSIONS (cont.)

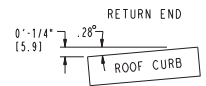
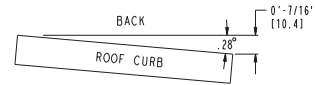
UNIT SIZE	"A"	ROOF CURB ACCESSORY
24	1'-2" [356.0] 2'-0" [610.0]	CRRFCURB047A00 CRRFCURB048A00

**50TCQD**



- NOTES:
- 1 ROOF CURB ACCESSORY IS SHIPPED UNASSEMBLED.
  - 2 DIMENSIONS IN [ ] ARE IN MILLIMETERS.
  - 3 ROOF CURB GALVANIZED STEEL.
  - 4 ATTACH DUCTWORK TO CURB (FLANGES ON DUCT REST ON CURB)
  - 5 SERVICE CLEARANCE 4 FT ON EACH SIDE

➔ DIRECTION OF AIR FLOW



MAX CURB LEVELING TOLERANCES

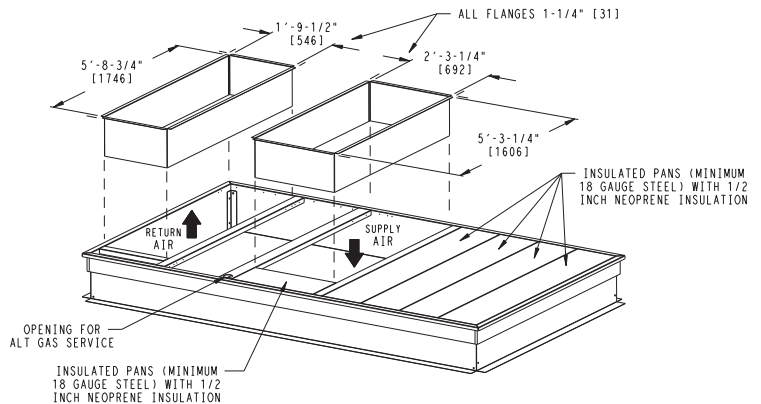
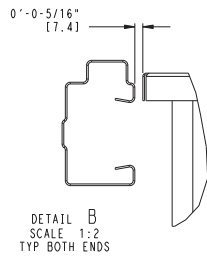
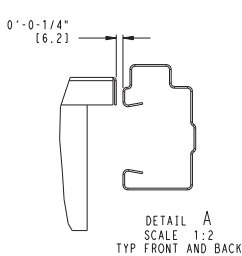
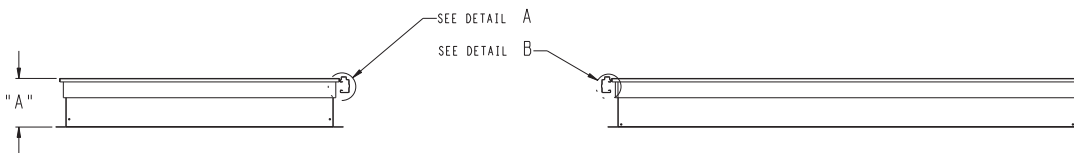
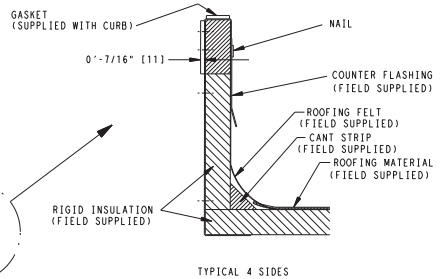
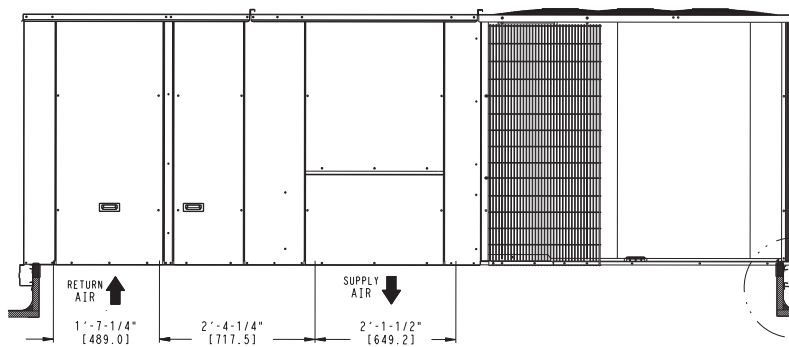
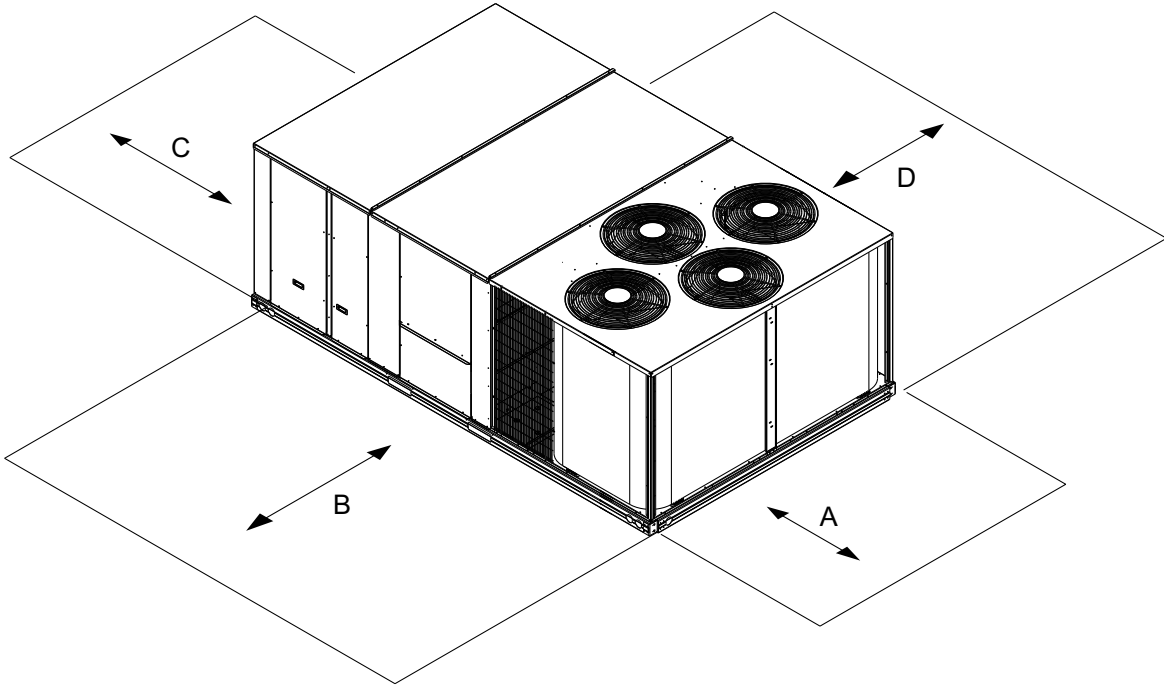


Fig. 4 - Roof Curb Dimensions 50TCQD24

C10140

## DIMENSIONS (cont.)



50TCQD

C12392

LOCATION	DIMENSION	CONDITION
A	36-in (914 mm)	<ul style="list-style-type: none"> <li>Recommended clearance for air flow and service</li> </ul>
B	42-in (1067 mm)	<ul style="list-style-type: none"> <li>Recommended clearance for air flow and service</li> </ul>
C	18-in (457 mm)	<ul style="list-style-type: none"> <li>No Convenience Outlet</li> <li>No Economizer</li> <li>No field installed disconnect on economizer hood side (Factory-installed disconnect installed).</li> </ul>
	36-in (914 mm)	<ul style="list-style-type: none"> <li>Convenience Outlet installed.</li> <li>Vertical surface behind servicer is electrically non-conductive (e.g.: wood, fiberglass).</li> </ul>
	42-in (1067 mm)	<ul style="list-style-type: none"> <li>Convenience Outlet installed.</li> <li>Vertical surface behind servicer is electrically conductive (e.g.: metal, masonry).</li> </ul>
	96-in (2438 mm)	<ul style="list-style-type: none"> <li>Economizer and/or Power Exhaust installed.</li> <li>Check for sources of flue products with 10 feet (3 meters) of economizer fresh air intake.</li> </ul>
D	42-in (1067 mm)	<ul style="list-style-type: none"> <li>Recommended clearance for service.</li> </ul>

**NOTE:** Unit not designed to have overhead obstruction. Contact Application Engineering for guidance on any application planning overhead obstruction or for vertical clearances.

**Fig. 5 - Service Clearance Dimensional Drawing**

## OPTION / ACCESSORY WEIGHTS

BASE UNIT WITH OPTIONS AND ACCESSORIES (Weight Adders)	MAX WEIGHT ADD			
	50TCQD17		50TCQD24	
	lb	kg	lb	kg
Power Exhaust	125	57	125	57
Economizer	170	77	170	77
Copper Tube/Fin Evaporator Coil	110	50	135	61
Roof Curb (14 inch)	240	109	255	116
Roof Curb (24 inch)	340	154	355	161
Louvered Hail Guard	60	27	120	54
CO <sub>2</sub> sensor	5	2	5	2
Return Smoke Detector	5	2	5	2
Supply Smoke Detector	5	2	5	2
Fan/Filter Status Switch	2	1	2	1
Non – Fused Disconnect	15	7	15	7
Powered Convenience outlet	35	16	35	16
Non – Powered Convenience outlet	5	2	5	2
Enthalpy Sensor	2	1	2	1
Differential Enthalpy Sensor	3	1	3	1
Two Position Motorized Damper	50	23	50	23
Manual Damper	35	16	35	16
4 – in Field Filter Track	12	5	12	5
MotorMaster Controller	35	16	35	16
Medium Static Motor/Drive	5	2	6	3
High Static Motor/Drive	11	5	16	7
SAV System with VFD	20	9	30	14

**NOTE:** Where multiple variations are available, the heaviest combination is listed.

50TCQD

## APPLICATION/SELECTION DATA

### Min operating ambient temp (cooling):

In mechanical cooling mode, your Carrier rooftop can safely operate down to an outdoor ambient temperature of 30°F (-1°C). It is possible to provide cooling at lower outdoor ambient temperatures by using less outside air, economizers, and/or accessory low ambient kits.

### Max operating ambient temp (cooling):

The maximum operating ambient temperature for cooling mode is 115°F (46°C). While cooling operation above 115°F (46°C) may be possible, it could cause either a reduction in performance, reliability, or a protective action by the unit's internal safety devices.

### Min and max airflow (cooling mode):

To maintain safe and reliable operation of your rooftop, operate within the cooling airflow limits. Operating above the max may cause blow-off, undesired airflow noise, or airflow related problems with the rooftop unit. Operating below the min may cause problems with coil freeze-up.

### Airflow:

All units are draw-through in cooling mode.

### Outdoor air application strategies:

Economizers reduce operating expenses and compressor run time by providing a free source of cooling and a means of ventilation to match application changing needs. In fact, they should be considered for most applications. Also, consider the various economizer control methods and their benefits, as well as sensors required to accomplish your application goals. Please contact your local Carrier representative for assistance.

### Motor limits, break horsepower (BHP):

Due to Carrier's internal unit design, air path, and specially designed motors, the full horsepower (maximum continuous BHP) band, as listed in the Physical Data, can be used with the utmost confidence. There is no need for extra safety factors, as Carrier's motors are designed and rigorously tested to use the entire, listed BHP range without either nuisance tripping or premature motor failure.

### Sizing a rooftop

Bigger isn't necessarily better. While an air conditioner needs to have enough capacity to meet the load, it doesn't need excess capacity. In fact, having excess capacity typically results in very poor part load performance and humidity control.

Using higher design temperatures than ASHRAE recommends for your location, adding "safety factors" to the calculated load, and rounding up to the next largest unit, are all signs of oversizing air conditioners. Oversizing can cause short-cycling, and short cycling leads to poor humidity control, reduced efficiency, higher utility bills, drastic indoor temperature swings, excessive noise, and increased wear and tear on the air conditioner.

Rather than oversizing an air conditioner, wise contractors and engineers "right-size" or even slightly undersize air conditioners. Correctly sizing an air conditioner controls humidity better; promotes efficiency; reduces utility bills; extends equipment life, and maintains even, comfortable temperatures.

### Low ambient applications

When equipped with a Carrier economizer, your rooftop unit can cool your space by bringing in fresh, cool outside air. In fact, when so equipped, accessory low-ambient kit may not be necessary. In low ambient conditions, unless the outdoor air is excessively humid or contaminated, economizer-based "free cooling" is the preferred less costly and energy conscious method.

In low ambient applications where outside air might not be desired (such as contaminated or excessively humid outdoor environments), your Carrier rooftop can operate to ambient temperatures down to -20°F (-29°C) using the recommended accessory Motormaster low ambient controller.

### Application/Selection Option

Selection software by Carrier saves time by performing many of the steps above. Contact your Carrier sales representative for assistance.

Table 7 – COOLING CAPACITIES

2-STAGE COOLING

15 TONS

50TCQD

50TCQD17				AMBIENT TEMPERATURE											
				85			95			105			115		
				EAT (db)			EAT (db)			EAT (db)			EAT (db)		
CFM	EAT (wb)	TC	SHC	75	80	85	75	80	85	75	80	85	75	80	85
				4500	58	152.7	153.6	161.2	145.9	147.8	155.6	138.8	141.9	149.5	131.2
		135.5	153.6	161.2	132.0	147.8	155.6	128.4	141.9	149.5	124.4	135.6	143.0		
	62	164.1	163.9	164.2	156.9	156.7	157.1	149.2	149.0	150.0	141.0	140.8	143.1		
		118.5	139.2	158.6	115.2	135.9	155.1	111.7	132.3	150.0	108.1	128.4	143.1		
	67	179.4	179.2	179.0	171.6	171.4	171.1	163.2	162.9	162.7	154.2	154.0	153.6		
		96.7	117.5	138.3	93.5	114.3	135.0	90.0	110.8	131.6	86.5	107.2	127.9		
	72	195.8	195.6	195.3	187.2	187.0	186.7	178.0	177.8	177.5	168.2	167.9	167.6		
		74.1	95.4	116.2	71.1	92.1	113.0	67.9	88.8	109.6	64.5	85.2	106.0		
	76	-	209.5	209.2	-	200.2	199.9	-	190.2	190.0	-	179.6	179.3		
		-	77.4	98.2	-	74.2	95.0	-	70.9	91.7	-	67.4	88.2		
5250	58	157.5	161.1	169.6	150.4	155.2	163.5	143.0	148.9	156.9	135.1	142.0	149.8		
		146.1	161.1	169.6	142.4	155.2	163.5	138.2	148.9	156.9	133.5	142.0	149.8		
	62	169.1	168.8	170.2	161.5	161.2	163.7	153.3	153.2	157.1	144.6	144.6	149.9		
		127.1	150.6	170.2	123.7	147.0	163.7	120.1	143.1	157.1	116.4	138.7	149.9		
	67	184.7	184.4	184.1	176.3	176.1	175.7	167.5	167.2	166.8	158.0	157.7	157.3		
		102.2	126.0	149.7	98.9	122.6	146.3	95.4	119.1	142.7	91.7	115.4	138.8		
	72	201.2	201.0	200.7	192.1	191.9	191.5	182.4	182.2	181.8	172.1	171.8	171.3		
		77.0	100.7	124.5	73.7	97.4	121.2	70.3	94.0	117.8	66.7	90.4	114.1		
	76	-	215.0	214.7	-	205.1	204.8	-	194.7	194.3	-	183.5	183.1		
		-	80.3	104.1	-	77.0	100.8	-	73.7	97.4	-	70.1	93.9		
6000	58	161.4	167.8	176.7	154.1	161.5	170.2	146.9	154.7	163.1	139.3	147.4	155.5		
		155.5	167.8	176.7	151.8	161.5	170.2	145.6	154.7	163.1	139.3	147.4	155.5		
	62	172.9	172.7	176.9	164.9	164.9	170.3	156.4	156.7	163.3	147.4	148.2	155.6		
		135.1	160.8	176.9	131.7	156.8	170.3	128.0	152.3	163.3	124.2	146.4	155.6		
	67	188.7	188.3	187.9	180.0	179.6	179.2	170.7	170.4	170.0	160.9	160.5	160.2		
		107.3	133.9	160.4	103.9	130.5	156.8	100.4	126.9	152.9	96.6	123.2	148.7		
	72	205.4	205.1	204.7	195.9	195.6	195.1	185.8	185.5	185.0	175.1	174.7	174.2		
		79.1	105.7	132.4	75.8	102.4	129.0	72.3	98.9	125.5	68.7	95.2	121.8		
	76	-	219.2	218.9	-	209.0	208.5	-	198.0	197.6	-	186.5	186.0		
		-	82.9	109.6	-	79.7	106.3	-	76.2	102.8	-	72.7	99.2		
6750	58	165.1	173.4	182.8	158.0	166.8	175.9	150.9	159.6	168.4	143.5	151.9	160.3		
		163.2	173.4	182.8	158.0	166.8	175.9	150.9	159.6	168.4	143.5	151.9	160.3		
	62	176.0	176.2	182.9	167.7	168.2	176.0	158.9	160.0	168.5	149.6	152.0	160.4		
		142.8	169.9	182.9	139.3	165.7	176.0	135.6	160.0	168.5	131.6	152.0	160.4		
	67	191.9	191.5	191.1	182.9	182.5	182.1	173.3	172.9	172.7	163.2	162.7	162.8		
		112.2	141.5	170.3	108.7	138.1	166.5	105.1	134.4	162.2	101.3	130.6	157.1		
	72	208.8	208.4	207.9	198.9	198.5	198.0	188.5	188.1	187.5	177.4	177.0	176.4		
		81.1	110.5	139.9	77.8	107.1	136.5	74.3	103.6	132.9	70.6	99.9	129.2		
	76	-	222.6	222.2	-	212.0	211.5	-	200.7	200.2	-	188.8	188.3		
		-	85.4	114.8	-	82.1	111.5	-	78.7	108.0	-	75.1	104.4		
7500	58	168.7	178.2	187.9	161.9	171.2	180.7	154.7	163.7	172.8	147.0	155.6	164.4		
		168.7	178.2	187.9	161.9	171.2	180.7	154.7	163.7	172.8	147.0	155.6	164.4		
	62	178.5	179.4	188.1	170.0	171.6	180.8	160.9	163.8	172.9	151.4	155.8	164.5		
		150.2	177.3	188.1	146.6	171.6	180.8	142.6	163.8	172.9	138.3	155.8	164.5		
	67	194.5	194.1	193.8	185.3	184.8	184.6	175.5	174.9	175.1	165.0	164.5	165.4		
		116.8	148.8	179.5	113.3	145.3	175.2	109.7	141.7	170.2	105.8	137.8	163.5		
	72	211.5	211.1	210.6	201.4	201.0	200.3	190.7	190.2	189.6	179.4	178.8	178.2		
		83.1	115.1	147.2	79.7	111.6	143.7	76.1	108.1	140.1	72.4	104.3	136.3		
	76	-	225.4	224.9	-	214.5	213.9	-	202.9	202.3	-	190.8	190.1		
		-	87.8	119.9	-	84.5	116.5	-	81.0	113.0	-	77.4	109.3		

LEGEND:

- Do not operate
- Cfm - Cubic feet per minute (supply air)
- EAT(db) - Entering air temperature (dry bulb)
- EAT(wb) - Entering air temperature (wet bulb)
- SHC - Sensible heat capacity
- TC - Total capacity



Table 8 – COOLING CAPACITIES

2-STAGE COOLING

20 TONS

50TCQD24				AMBIENT TEMPERATURE											
				85			95			105			115		
				EAT (db)			EAT (db)			EAT (db)			EAT (db)		
				75	80	85	75	80	85	75	80	85	75	80	85
6000 CFM	EAT (wb)	58	TC	211.1	214.4	225.9	201.2	206.2	217.5	190.5	197.3	208.3	179.4	187.7	198.3
			SHC	191.5	214.4	225.9	186.3	206.2	217.5	180.6	197.3	208.3	173.1	187.7	198.3
		62	TC	227.4	227.1	228.8	216.8	216.4	219.2	205.2	204.9	208.6	192.8	192.6	198.5
			SHC	168.0	197.4	222.1	163.1	192.4	215.5	157.8	186.9	208.6	152.3	180.9	198.5
		67	TC	249.2	248.8	248.4	237.7	237.2	236.8	225.1	224.6	224.1	211.5	211.0	210.5
	SHC	137.5	167.2	196.8	132.7	162.4	191.9	127.5	157.2	186.7	122.0	151.7	181.0		
		72	TC	272.6	272.1	271.6	259.9	259.5	258.9	246.2	245.7	245.1	231.3	230.8	230.2
			SHC	106.0	136.2	165.9	101.4	131.4	161.1	96.4	126.3	156.0	91.2	120.9	150.6
		76	TC	-	291.8	291.3	-	278.2	277.6	-	263.3	262.7	-	247.4	246.7
			SHC	-	110.8	140.7	-	106.1	136.0	-	101.1	130.9	-	95.8	125.6
7000 CFM	EAT (wb)	58	TC	218.0	225.8	238.1	207.9	217.0	229.0	197.5	207.4	219.0	186.3	196.9	208.1
			SHC	206.7	225.8	238.1	199.7	217.0	229.0	192.4	207.4	219.0	184.6	196.9	208.1
		62	TC	234.3	234.0	238.5	223.0	222.9	229.2	210.8	211.0	219.2	197.6	199.1	208.3
			SHC	180.8	214.0	238.5	175.7	208.4	229.2	170.3	201.5	219.2	164.6	193.2	208.3
		67	TC	256.5	256.0	255.4	244.2	243.7	243.1	230.9	230.4	229.8	216.6	216.0	215.6
	SHC	145.7	179.8	213.7	140.8	174.8	208.6	135.5	169.5	203.0	129.9	163.9	196.9		
		72	TC	280.1	279.5	278.9	266.7	266.1	265.4	252.2	251.6	250.9	236.6	236.0	235.2
			SHC	109.9	144.2	178.3	105.1	139.3	173.4	99.9	134.1	168.2	94.4	128.6	162.6
		76	TC	-	299.4	298.7	-	285.0	284.2	-	269.4	268.6	-	252.6	251.7
			SHC	-	115.2	149.4	-	110.4	144.6	-	105.3	139.5	-	99.9	134.0
8000 CFM	EAT (wb)	58	TC	224.7	235.3	248.4	214.6	225.9	238.6	203.6	215.6	227.9	192.8	204.4	216.2
			SHC	218.0	235.3	248.4	211.0	225.9	238.6	203.6	215.6	227.9	192.8	204.4	216.2
		62	TC	239.6	239.8	248.6	227.8	229.0	238.8	215.0	217.3	228.1	201.4	204.7	216.4
			SHC	192.9	228.6	248.6	187.7	220.5	238.8	182.1	212.7	228.1	176.2	204.7	216.4
		67	TC	262.1	261.5	260.9	249.2	248.6	248.1	235.4	234.7	234.5	220.5	219.8	220.1
	SHC	153.4	191.8	229.5	148.4	186.7	224.0	143.0	181.3	217.8	137.3	175.6	209.5		
		72	TC	285.9	285.2	284.4	271.9	271.2	270.4	256.9	256.1	255.2	240.7	239.9	239.0
			SHC	113.2	151.7	190.2	108.3	146.8	185.2	103.0	141.5	179.9	97.5	135.9	174.2
		76	TC	-	305.2	304.4	-	290.2	289.3	-	274.0	273.0	-	256.6	255.6
			SHC	-	119.2	157.8	-	114.3	152.9	-	109.1	147.6	-	103.7	142.1
9000 CFM	EAT (wb)	58	TC	230.7	243.3	256.9	220.3	233.4	246.5	209.9	222.5	235.2	198.6	210.7	222.8
			SHC	228.5	243.3	256.9	220.3	233.4	246.5	209.9	222.5	235.2	198.6	210.7	222.8
		62	TC	243.8	245.9	257.1	231.6	234.7	246.7	218.5	222.7	235.4	204.5	210.8	223.0
			SHC	204.4	238.9	257.1	199.0	231.3	246.7	193.2	222.7	235.4	186.8	210.8	223.0
		67	TC	266.5	265.8	265.4	253.2	252.5	252.4	239.0	238.1	239.0	223.6	222.7	224.9
	SHC	160.8	203.3	243.9	155.6	198.2	237.6	150.2	192.6	228.9	144.4	186.7	219.9		
		72	TC	290.5	289.7	288.8	276.1	275.3	274.3	260.6	259.7	258.6	243.9	243.0	241.9
			SHC	116.3	159.0	201.6	111.3	154.0	196.5	106.0	148.6	191.2	100.4	142.9	185.4
		76	TC	-	309.8	308.8	-	294.3	293.2	-	277.6	276.5	-	259.8	258.6
			SHC	-	123.0	165.8	-	118.1	160.8	-	112.8	155.5	-	107.3	149.9
10,000 CFM	EAT (wb)	58	TC	236.3	250.2	264.2	226.3	239.7	253.3	215.4	228.3	241.4	203.6	216.0	228.5
			SHC	236.3	250.2	264.2	226.3	239.7	253.3	215.4	228.3	241.4	203.6	216.0	228.5
		62	TC	247.3	251.2	264.4	234.8	239.9	253.5	221.4	228.5	241.6	207.2	216.1	228.7
			SHC	215.3	249.0	264.4	209.6	239.9	253.5	203.4	228.5	241.6	196.2	216.1	228.7
		67	TC	270.1	269.3	269.5	256.5	255.6	256.9	241.8	240.9	243.4	226.1	225.2	229.0
	SHC	167.8	214.4	256.5	162.7	209.1	247.6	157.1	203.4	238.8	151.3	197.1	229.0		
		72	TC	294.3	293.4	292.3	279.5	278.5	277.4	263.5	262.5	261.3	246.5	245.4	244.2
			SHC	119.1	165.9	212.7	114.1	160.9	207.5	108.8	155.5	202.0	103.1	149.7	196.1
		76	TC	-	313.5	312.4	-	297.6	296.4	-	280.5	279.2	-	262.3	261.0
			SHC	-	126.6	173.5	-	121.7	168.5	-	116.4	163.1	-	110.8	157.5

50TCQD

LEGEND:

- Do not operate
- Cfm - Cubic feet per minute (supply air)
- EAT(db) - Entering air temperature (dry bulb)
- EAT(wb) - Entering air temperature (wet bulb)
- SHC - Sensible heat capacity
- TC - Total capacity

**Table 9 – HEATING CAPACITIES**

**15 TONS**

50TCQD17 RETURN AIR (°F db)	CFM (STANDARD AIR)		TEMPERATURE AIR ENTERING OUTDOOR COIL (° F db at 70% RH)								
			-5	0	10	17	30	40	47	50	60
55	4500	Capacity	72.8	80.1	95.8	107.6	132.6	155.3	171.2	175.7	195.4
		Int. Cap.	67.1	73.7	87.9	98.1	116.2	155.3	171.2	175.7	195.4
	6000	Capacity	75.8	83.1	99.3	111.6	137.6	160.5	174.1	178.4	197.5
		Int. Cap.	69.9	76.5	91.1	101.7	120.6	160.5	174.1	178.4	197.5
	7500	Capacity	79.4	86.7	103.2	116.0	142.4	164.0	176.9	181.1	199.6
		Int. Cap.	73.2	79.8	94.7	105.8	124.8	164.0	176.9	181.1	199.6
70	4500	Capacity	65.8	73.0	88.9	100.5	124.7	145.1	163.1	168.7	190.3
		Int. Cap.	60.6	67.2	81.6	91.6	109.2	145.1	163.1	168.7	190.3
	6000	Capacity	68.9	76.4	92.6	104.5	129.6	151.5	169.0	174.0	193.0
		Int. Cap.	63.5	70.3	85.0	95.3	113.6	151.5	169.0	174.0	193.0
	7500	Capacity	72.6	80.2	96.6	108.8	134.5	157.3	173.2	177.4	195.7
		Int. Cap.	66.9	73.8	88.7	99.2	117.9	157.3	173.2	177.4	195.7
80	4500	Capacity	60.3	67.5	83.8	95.4	118.8	139.0	156.5	162.2	186.4
		Int. Cap.	55.5	62.1	76.9	87.0	104.1	139.0	156.5	162.2	186.4
	6000	Capacity	63.3	70.8	87.5	99.4	123.8	144.7	163.0	168.5	189.9
		Int. Cap.	58.4	65.2	80.3	90.6	108.5	144.7	163.0	168.5	189.9
	7500	Capacity	67.0	74.7	91.5	103.6	128.8	149.9	168.5	173.6	192.8
		Int. Cap.	61.7	68.7	84.0	94.5	112.8	149.9	168.5	173.6	192.8

**LEGEND**

- Capacity – Instantaneous Capacity (1000 Btuh) includes indoor fan motor heat @AHRI static conditions
- Int. Cap. – Integrated Capacity is Instantaneous Capacity minus the effects of frost on the outdoor coil and the heat required to defrost
- RH – Relative Humidity
- db – Dry Bulb

**Table 10 – HEATING CAPACITIES**

**20 TONS**

50TCQD24 RETURN AIR (°F db)	CFM (STANDARD AIR)		TEMPERATURE AIR ENTERING OUTDOOR COIL (° F db at 70% RH)								
			-5	0	10	17	30	40	47	50	60
55	6000	Capacity	93.4	104.1	125.2	141.7	177.0	206.9	229.0	235.4	261.4
		Int. Cap.	86.1	95.8	114.9	129.2	155.1	206.9	229.0	235.4	261.4
	8000	Capacity	98.8	109.5	131.2	160.8	184.4	214.6	233.4	238.4	264.3
		Int. Cap.	91.0	100.8	120.4	146.6	161.6	214.6	233.4	238.4	264.3
	10000	Capacity	104.8	115.7	137.8	155.0	191.2	221.0	236.8	242.2	267.3
		Int. Cap.	96.65	106.4	126.4	141.4	167.5	221.0	236.8	242.2	267.3
70	6000	Capacity	81.1	92.2	114.9	131.1	165.6	195.1	219.1	226.5	256.2
		Int. Cap.	74.7	84.9	105.5	119.5	145.1	195.1	219.1	226.5	256.2
	8000	Capacity	86.1	97.5	120.3	137.0	173.1	203.3	227.0	233.8	259.2
		Int. Cap.	79.3	89.7	110.4	124.9	151.7	203.3	227.0	233.8	259.2
	10000	Capacity	91.9	103.5	126.4	143.5	179.7	211.8	233.6	239.8	262.9
		Int. Cap.	84.7	95.2	116.0	130.8	157.5	211.8	233.6	239.8	262.9
80	6000	Capacity	72.6	84.0	107.3	124.4	157.7	187.2	210.7	218.5	250.8
		Int. Cap.	66.9	77.3	98.5	113.5	138.2	187.2	210.7	218.5	250.8
	8000	Capacity	77.2	88.9	112.8	129.9	164.8	195.8	219.6	227.2	256.7
		Int. Cap.	71.2	81.8	103.5	118.4	144.4	195.8	219.6	227.2	256.7
	10000	Capacity	82.8	94.7	118.9	136.0	172.0	203.8	227.4	234.5	261.7
		Int. Cap.	76.3	87.1	109.2	124.0	150.7	203.8	227.4	234.5	261.7

**LEGEND**

- Capacity – Instantaneous Capacity (1000 Btuh) includes indoor fan motor heat @AHRI static conditions
- Int. Cap. – Integrated Capacity is Instantaneous Capacity minus the effects of frost on the outdoor coil and the heat required to defrost
- RH – Relative Humidity
- db – Dry Bulb

**Table 11 – STATIC PRESSURE ADDERS (FACTORY OPTIONS AND/OR ACCESSORIES)**

**Economizer - Vertical and Horizontal Duct Configuration**

Model Sizes 17 and 24								
CFM	4500	5000	5500	6000	6500	7000	7500	8000
	0.047	0.052	0.057	0.062	0.067	0.072	0.077	0.082

Model Sizes 17 and 24									
CFM	8500	9000	9500	10000	10500	11000	11500	12000	12500
	0.088	0.093	0.098	0.103	0.109	0.114	0.119	0.125	0.131

**Electric Heaters - Vertical and Horizontal Duct Configuration**

Model Sizes 17 and 24								
CFM	4500	5000	5500	6000	6500	7000	7500	8000
25 kW Heater	0.010	0.010	0.015	0.020	0.025	0.030	0.035	0.040
50 kW Heater	0.020	0.020	0.030	0.040	0.050	0.060	0.070	0.080
75 kW Heater	0.030	0.040	0.050	0.060	0.070	0.080	0.100	0.120

Model Sizes 17 and 24									
CFM	8500	9000	9500	10000	10500	11000	11500	12000	12500
25 kW Heater	0.045	0.050	0.055	0.060	0.070	0.080	0.090	0.100	0.105
50 kW Heater	0.090	0.100	0.120	0.130	0.150	0.160	0.180	0.200	0.230
75 kW Heater	0.140	0.150	0.180	0.200	0.230	0.250	0.270	0.300	0.330

**50TCQD**

**GENERAL FAN PERFORMANCE NOTES**

1. Interpolation is permissible. Do not extrapolate.
2. External static pressure is the static pressure difference between the return duct and the supply duct plus the static pressure caused by any FIOPs or accessories.
3. Tabular data accounts for pressure loss due to clean filters, unit casing, and wet coils. Factory options and accessories may add static pressure losses, as shown in the tables above. Selection software is available, through your salesperson, to help you select the best motor/drive combination for your application.
4. The Fan Performance tables offer motor/drive recommendations. In cases when two motor/drive combinations would work, Carrier recommended the lower horsepower option.
5. For information on the electrical properties of Carrier motors, please see the Electrical information section of this book.
6. For more information on the performance limits of Carrier motors, see the Application Data section of this book.

# FAN PERFORMANCE

**Table 12 – 50TCQD17**

**15 TON VERTICAL SUPPLY / RETURN**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
4500	<b>436</b>	<b>0.60</b>	530	0.90	611	1.22	684	1.57	751	1.94
4900	<b>456</b>	<b>0.71</b>	546	1.03	625	1.37	695	1.73	760	2.12
5250	<b>473</b>	<b>0.83</b>	560	1.16	637	1.51	706	1.89	770	2.30
5600	<b>491</b>	<b>0.95</b>	575	1.30	650	1.67	717	2.07	780	2.48
6000	513	1.11	593	1.48	665	1.87	731	2.28	792	2.71
6400	534	1.29	611	1.68	681	2.09	745	2.52	805	2.97
6750	553	1.46	628	1.87	696	2.29	758	2.74	817	3.20
7100	573	1.65	645	2.07	711	2.51	772	2.98	829	3.46
7500	595	1.88	<b>665</b>	<b>2.33</b>	729	2.79	788	3.27	<b>844</b>	<b>3.77</b>

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
4500	812	2.33	869	2.74	924	3.17	975	3.62	<b>1024</b>	<b>4.08</b>
4900	821	2.53	877	2.95	931	3.40	981	3.86	<b>1030</b>	<b>4.34</b>
5250	829	2.72	885	3.16	938	3.61	988	4.09	<b>1036</b>	<b>4.57</b>
5600	838	2.92	893	3.37	945	3.84	994	4.33	<b>1042</b>	<b>4.83</b>
6000	849	3.17	903	3.63	954	4.12	1003	4.62	1050	5.14
6400	861	3.43	914	3.92	964	4.42	<b>1012</b>	<b>4.94</b>	1058	5.47
6750	872	3.69	924	4.18	973	4.70	1021	5.23	1066	5.78
7100	883	3.95	934	4.47	983	5.00	1030	5.54	-----	-----
7500	897	4.28	947	4.81	995	5.36	1041	5.92	-----	-----

Std Static Motor and Drive – 514–680 RPM, Max BHP 2.2	Medium Static Motor and Drive – 679–863 RPM, Max BHP 3.3
High Static Motor and Drive – 826–1009 RPM, Max BHP 4.9	----- Outside operating range
<b>Boldface</b> – Field Supplied Drive	<i>ITALIC</i> – Field Supplied Motor and Drive

**50TCQD**

**Table 13 – 50TCQD17**

**15 TON HORIZONTAL SUPPLY / RETURN**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
4500	<b>451</b>	<b>0.84</b>	533	1.21	605	1.63	668	2.12	726	2.67
4900	<b>476</b>	<b>1.01</b>	554	1.40	623	1.84	685	2.34	742	2.89
5250	<b>498</b>	<b>1.18</b>	573	1.60	640	2.05	701	2.55	756	3.11
5600	520	1.37	593	1.82	658	2.28	717	2.79	771	3.35
6000	546	1.61	616	2.10	679	2.58	736	3.10	789	3.67
6400	572	1.88	640	2.41	700	2.91	756	3.45	808	4.03
6750	595	2.13	661	2.70	720	3.23	774	3.79	825	4.38
7100	619	2.41	683	3.02	<b>740</b>	<b>3.59</b>	793	4.16	842	4.76
7500	646	2.75	<b>708</b>	<b>3.42</b>	764	4.02	815	4.62	863	5.23

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
4500	778	3.25	826	3.86	871	4.49	913	5.15	-----	-----
4900	794	3.49	842	4.12	887	4.78	-----	-----	-----	-----
5250	808	3.72	856	4.36	900	5.04	-----	-----	-----	-----
5600	822	3.97	870	4.62	-----	-----	-----	-----	-----	-----
6000	839	4.29	886	4.96	-----	-----	-----	-----	-----	-----
6400	857	4.65	-----	-----	-----	-----	-----	-----	-----	-----
6750	873	5.01	-----	-----	-----	-----	-----	-----	-----	-----
7100	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
7500	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Standard Static Motor and Drive – 514 – 680 RPM, Max BHP 2.2	Medium Static Motor and Drive – 614 – 780 RPM, Max BHP 3.3
High Static Motor and Drive – 746 – 912 RPM, Max BHP 4.9	----- Outside operating range
<b>Boldface</b> – Field Supplied Drive	<i>ITALIC</i> – Field Supplied Motor and Drive

## FAN PERFORMANCE (cont.)

**Table 14 – 50TCQD24**

**20 TON VERTICAL SUPPLY / RETURN**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
6000	<b>506</b>	<b>1.12</b>	<b>593</b>	<b>1.43</b>	<b>668</b>	<b>1.74</b>	736	2.07	798	2.40
6500	<b>533</b>	<b>1.36</b>	<b>616</b>	<b>1.70</b>	689	2.04	754	2.39	815	2.74
7000	<b>561</b>	<b>1.64</b>	<b>640</b>	<b>2.01</b>	710	2.37	774	2.74	833	3.11
7500	<b>588</b>	<b>1.96</b>	<b>664</b>	<b>2.35</b>	732	2.74	795	3.13	852	3.53
8000	<b>617</b>	<b>2.32</b>	689	2.74	755	3.15	816	3.57	872	3.99
8500	<b>645</b>	<b>2.73</b>	715	3.17	779	3.60	837	4.04	892	4.49
9000	<b>674</b>	<b>3.18</b>	741	3.64	803	4.10	860	4.57	913	5.04
9500	703	3.67	767	4.16	827	4.65	883	5.14	935	5.64
10000	732	4.22	794	4.74	852	5.25	906	5.77	957	6.29

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
6000	855	2.75	909	3.11	959	3.47	1008	3.85	<b>1054</b>	<b>4.24</b>
6500	871	3.11	924	3.48	974	3.87	<b>1022</b>	<b>4.26</b>	1067	4.67
7000	888	3.50	940	3.89	989	4.30	1036	4.71	1081	5.13
7500	906	3.94	957	4.35	1005	4.77	1052	5.20	1096	5.64
8000	925	4.42	975	4.85	<b>1022</b>	5.29	1068	5.74	1111	6.20
8500	944	4.94	993	5.40	1040	5.86	1084	6.33	1127	6.81
9000	964	5.51	<b>1012</b>	<b>5.99</b>	1058	6.48	1102	6.97	1144	7.46
9500	984	6.13	1032	6.64	1077	7.14	1120	7.65	1161	8.17
10000	1006	6.81	1052	7.33	1096	7.86	1138	8.40	-----	-----

Std Static Motor and Drive – 690–863 RPM, Max BHP 4.9	Medium Static Motor and Drive – 835–1021 RPM, Max BHP 6.5
High Static Motor and Drive – 941–1176 RPM, Max BHP 8.7	----- Outside operating range
<b>Boldface</b> – Field Supplied Drive	

**50TCQD**

**Table 15 – 50TCQD24**

**20 TON HORIZONTAL SUPPLY / RETURN**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
6000	<b>546</b>	<b>1.57</b>	617	2.10	680	2.67	738	3.29	790	3.93
6500	<b>579</b>	<b>1.90</b>	646	2.46	707	3.07	763	3.71	814	4.39
7000	613	2.28	677	2.87	735	3.51	789	4.19	839	4.89
7500	648	2.71	708	3.34	764	4.01	816	4.72	865	5.46
8000	683	3.20	740	3.86	794	4.57	846	5.30	892	6.08
8500	718	3.76	773	4.45	825	5.18	873	5.95	<b>919</b>	<b>6.75</b>
9000	754	4.37	814	5.10	856	5.87	<u>903</u>	<u>6.67</u>	947	7.50
9500	790	5.06	840	5.82	<u>887</u>	<u>6.51</u>	<u>933</u>	<u>7.45</u>	976	8.31
10000	826	5.82	874	6.50	<u>920</u>	<u>7.44</u>	965	8.30	-----	-----

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
6000	839	4.60	885	5.29	928	6.01	969	6.75	1008	7.51
6500	862	5.09	907	5.82	950	6.57	990	7.34	1028	8.13
7000	886	5.63	930	6.39	972	7.17	1012	7.97	1050	8.70
7500	911	6.22	954	7.01	995	7.83	1035	8.66	-----	-----
8000	<u>936</u>	<u>6.87</u>	979	7.69	1019	8.54	-----	-----	-----	-----
8500	965	7.58	1004	8.44	-----	-----	-----	-----	-----	-----
9000	990	8.36	-----	-----	-----	-----	-----	-----	-----	-----
9500	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
10000	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Field Supplied Drive changes with Medium Static Motor required: blower pulley p/n KR51BN615, belt p/n KR29BF052 602–756 RPM	Field Supplied Drive changes with Medium Static Motor required: motor pulley p/n KR11HY186 688–868 RPM
Medium Static Motor and Drive – 835 – 1021 RPM, Max BHP 6.5	<u>Underscore</u> – Field Supplied Drive changes with High Static Motor required: blower pulley p/n KR51BL017
High Static Motor and Drive – 941 – 1176 RPM, Max BHP 8.7	----- Outside operating range
<b>Boldface</b> – Field Supplied Drive	

**Table 16 – PULLEY ADJUSTMENT - VERTICAL AIRFLOW UNITS**

UNIT	MOTOR/DRIVE COMBO	MOTOR PULLEY TURNS OPEN										
		0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
17	Standard Static	680	663	647	630	614	597	580	564	547	531	514
	Medium Static	863	845	826	808	789	771	753	734	716	697	679
	High Static	1009	991	972	954	936	918	899	881	863	844	826
24	Standard Static	863	846	828	811	794	777	759	742	725	707	690
	Medium Static	1021	1002	984	965	947	928	909	891	872	854	835
	High Static	1176	1153	1129	1106	1082	1059	1035	1012	988	965	941

**NOTE:** Do not adjust pulley further than 5 turns open.

■ – Factory settings

**Table 17 – PULLEY ADJUSTMENT - HORIZONTAL AIRFLOW UNITS**

UNIT	MOTOR/DRIVE COMBO	MOTOR PULLEY TURNS OPEN										
		0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
17	Standard Static	680	663	647	630	614	597	580	564	547	531	514
	Medium Static	780	763	747	730	714	697	680	664	647	631	614
	High Static	912	895	879	862	846	829	812	796	779	763	746
24	Standard Static	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Medium Static	1021	1002	984	965	947	928	909	891	872	854	835
	High Static	1176	1153	1129	1106	1082	1059	1035	1012	988	965	941

**NOTE:** Do not adjust pulley further than 5 turns open.

■ – Factory settings

50TCQD

# DAMPER, BAROMETRIC RELIEF AND PE PERFORMANCE

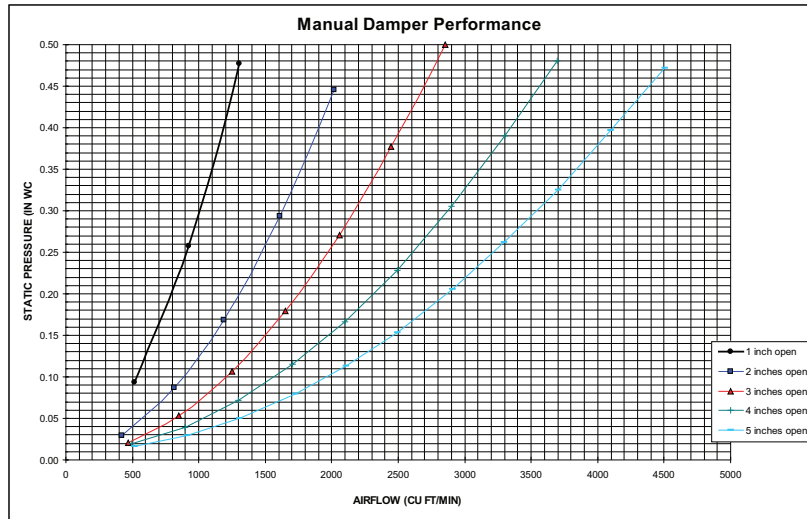


Fig. 6 - Manual Damper Performance

C09264

50TCQD

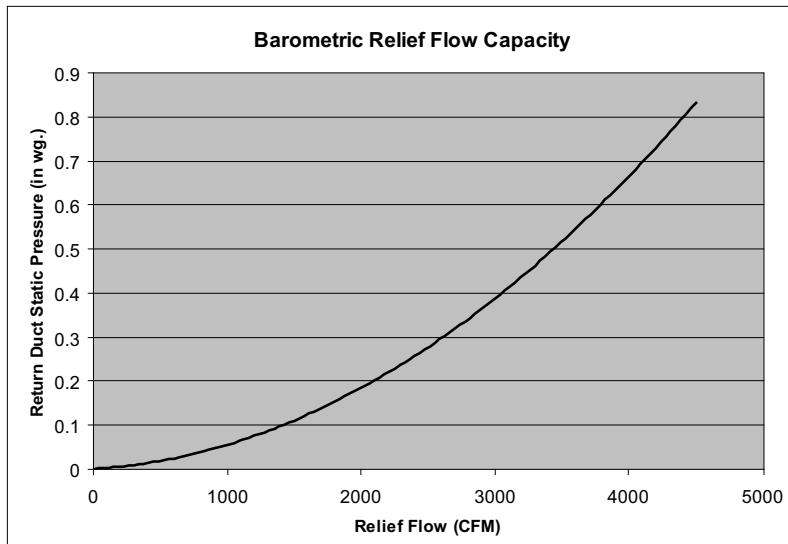


Fig. 7 - Barometric Relief Flow Capacity

C14079

## Power Exhaust Fan Performance - 50TCQ 17, 24

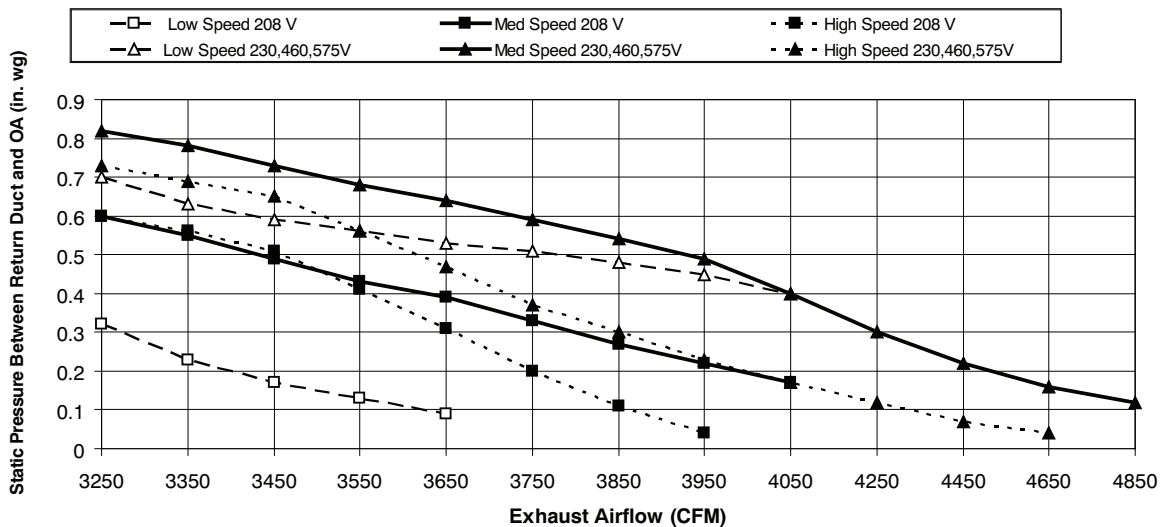


Fig. 8 - Power Exhaust Fan Performance

C10584

## ELECTRICAL INFORMATION

**Table 18 – 50TCQD17**
**2-STAGE COOLING WITH SINGLE SPEED INDOOR FAN MOTOR**

V-Ph-Hz	VOLTAGE RANGE		COMP 1		COMP 2		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208-3-60	187	253	25.0	164	25.0	164	350	1.5	STD	88.6%	8.4
									MED	87.0%	10.6
									HIGH	82.9%	13.6
230-3-60	187	253	25.0	164	25.0	164	350	1.5	STD	88.6%	8.3
									MED	87.0%	10.6
									HIGH	82.9%	12.7
460-3-60	414	506	12.2	100	12.2	100	277	0.9	STD	88.6%	4.2
									MED	87.0%	5.3
									HIGH	82.9%	6.4
575-3-60	518	633	9.0	78	9.0	78	397	0.6	STD	81.1%	2.8
									MED	81.1%	2.8
									HIGH	83.6%	5.6

**50TCQD**
**Table 19 – 50TCQD17**
**2-STAGE COOLING WITH 2-SPEED INDOOR FAN MOTOR**

V-Ph-Hz	VOLTAGE RANGE		COMP 1		COMP 2		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208-3-60	187	253	25.0	164	25.0	164	350	1.5	STD	85.0%	8.6
									MED	81.5%	10.8
									HIGH	83.6%	13.6
230-3-60	187	253	25.0	164	25.0	164	350	1.5	STD	85.0%	7.8
									MED	81.5%	9.8
									HIGH	83.6%	12.7
460-3-60	414	506	12.2	100	12.2	100	277	0.9	STD	85.0%	3.8
									MED	81.5%	4.9
									HIGH	83.6%	6.4
575-3-60	518	633	9.0	78	9.0	78	397	0.6	STD	81.1%	4.5
									MED	81.1%	4.5
									HIGH	83.6%	6.2



## ELECTRICAL INFORMATION (cont.)

**Table 20 – 50TCQD24**

### 2-STAGE COOLING WITH SINGLE SPEED INDOOR FAN MOTOR

V-Ph-Hz	VOLTAGE RANGE		COMP 1		COMP 2		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208-3-60	187	253	30.1	225	33.3	239	350	1.5	STD**	82.9%	13.6
									MED-High Efficiency	89.5%	17.1
									HIGH-High Efficiency	91.7%	28.5
230-3-60	187	253	30.1	225	33.3	239	350	1.5	STD**	82.9%	12.7
									MED-High Efficiency	89.5%	17.1
									HIGH-High Efficiency	91.7%	28.5
460-3-60	414	506	16.7	114	17.9	125	277	0.9	STD**	82.9%	6.4
									MED-High Efficiency	89.5%	8.6
									HIGH-High Efficiency	91.7%	14.3
575-3-60	518	633	12.2	80	12.8	80	397	0.6	STD**	83.6%	5.6
									MED-High Efficiency	89.5%	7.6
									HIGH-High Efficiency	91.7%	9.5

\*\* STD IFM not available on horizontal 50TCQD24. STD IFM is available on vertical 50TCQD24

**Table 21 – 50TCQD24**

### 2-STAGE COOLING WITH 2-SPEED INDOOR FAN MOTOR

V-Ph-Hz	VOLTAGE RANGE		COMP 1		COMP 2		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208-3-60	187	253	30.1	225	33.3	239	350	1.5	STD**	83.6%	13.6
									MED	89.5%	17.1
									HIGH	91.7%	28.5
230-3-60	187	253	30.1	225	33.3	239	350	1.5	STD**	83.6%	12.7
									MED	89.5%	17.1
									HIGH	91.7%	28.5
460-3-60	414	506	16.7	114	17.9	125	277	0.9	STD**	83.6%	6.4
									MED	89.5%	8.6
									HIGH	91.7%	14.3
575-3-60	518	633	12.2	80	12.8	80	397	0.6	STD**	83.6%	6.2
									MED	89.5%	7.6
									HIGH	91.7%	9.5

\*\* STD IFM not available on horizontal 50TCQD24. STD IFM is available on vertical 50TCQD24

**50TCQD**

# ELECTRICAL DATA FOR UNITS PRODUCED ON OR AFTER JULY 30, 2012

**NOTE:** Check the serial number of unit to verify production date.

To confirm the date of manufacture, locate the unit nameplate and check the first four digits of the Serial Number. If the number listed in the first 4 digits of the Serial Number is 3112 or higher, the unit was produced on or after July 30, 2012.

Position:	1	2	3	4	5	6	7	8	9	10
Example:	3	1	1	2	U	1	2	3	4	5

Week of manufacture  
(fiscal calendar)

Sequence number

Year of manufacture  
("12" = 2012)

Manufacturing location

C12562A

50TCQD

## Legend and Notes for Tables 22 - 25

### LEGEND:

- BRKR - Circuit breaker
- CO - Convenient outlet
- DD - Direct drive indoor fan motor
- DISC - Disconnect
- FLA - Full load amps
- IFM - Indoor fan motor
- LRA - Locked rotor amps
- MCA - Minimum circuit amps
- PE - Power exhaust
- PWRD CO - Powered convenient outlet
- UNPWR CO - Unpowered convenient outlet



Example: Supply voltage is 230-3-60



- AB = 224 v
- BC = 231 v
- AC = 226 v

$$\text{Average Voltage} = \frac{(224 + 231 + 226)}{3} = \frac{681}{3} = 227$$

Determine maximum deviation from average voltage.

(AB)  $227 - 224 = 3 \text{ v}$

(BC)  $231 - 227 = 4 \text{ v}$

(AC)  $227 - 226 = 1 \text{ v}$

Maximum deviation is 4 v.

Determine percent of voltage imbalance.

$$\begin{aligned} \% \text{ Voltage Imbalance} &= 100 \times \frac{4}{227} \\ &= 1.76\% \end{aligned}$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

**IMPORTANT:** If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

### NOTES:

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

### 2. Unbalanced 3-Phase Supply Voltage

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

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

Table 22 – Unit Wire/Fuse or HACR Breaker Sizing Data

UNIT	IFM-TYPE	ELEC. HTR				NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
		CRHEATER**A00 VERT/HORZ	Nom(KW)	FLA	MCA	NO PE.				w/ P.E. (pwrd fr/unit)				NO PE.				w/ P.E. (pwrd fr/unit)			
						MAX FUSE or HACR BRKR	FLA	DISC. SIZE	MCA	MAX FUSE or HACR BRKR	FLA	DISC. SIZE	MCA	MAX FUSE or HACR BRKR	FLA	DISC. SIZE	MCA	MAX FUSE or HACR BRKR	FLA	DISC. SIZE	MCA
208/230-3-60	STD	NONE	-	-	68.2/68.1	90/90	72/72	409	81.0/80.9	100/100	86/86	429	74.0/73.9	90/90	78/78	414	85.8/85.7	100/100	91/91	484	
		279/270A00	18.8/25.0	52.1/60.1	134.3/144.2	150/150	132/141	461/469	146.1/156.0	150/175	146/155	481/489	139.1/149.0	150/150	138/147	466/474	150.9/160.8	175/175	151/160	486/494	
		280/271A00	37.6/50.0	104.2/120.3	199.4/189.4	200/200	192/211	513/529	211.3/201.2	225/225	206/224	533/549	204.2/194.2	225/225	198/216	518/534	216.0/206.0	225/225	211/230	538/554	
		281/272A00	56.3/75.0	156.4/180.4	225.6/249.5	250/300	252/280	565/589	237.4/261.3	250/300	266/293	585/609	230.4/254.3	250/300	258/285	570/594	242.2/266.1	250/300	271/299	590/614	
208/230-3-60	MED	NONE	-	-	71.4	90	75	423	83.2	100	88	443	76.2	100	80	428	88.0	100	94	448	
		279/270A00	18.8/25.0	52.1/60.1	136.5/146.5	150/150	135/144	475/483	148.3/158.3	150/175	148/158	495/503	141.3/151.3	150/175	140/150	480/488	153.1/163.1	175/175	154/163	500/508	
		280/271A00	37.6/50.0	104.2/120.3	201.6/191.7	225/200	195/213	527/543	213.4/203.5	225/225	208/227	547/563	206.4/196.5	225/225	200/219	532/548	218.2/208.3	225/225	214/232	552/568	
		281/272A00	56.3/75.0	156.4/180.4	227.8/251.8	250/300	255/282	579/603	239.6/263.6	250/300	288/296	599/623	232.6/256.6	250/300	260/288	584/608	244.4/268.4	300/300	274/301	604/628	
460-3-60	HIGH	NONE	-	-	74.4/73.5	90/90	78/77	425	86.2/85.3	100/100	92/91	445	79.2/78.3	100/100	84/83	430	91.0/90.1	100/100	97/96	450	
		279/270A00	18.8/25.0	52.1/60.1	139.5/148.6	150/150	138/146	477/485	151.3/160.4	175/175	152/160	497/505	144.3/153.4	150/175	144/152	482/490	156.1/165.2	175/175	157/165	502/510	
		280/271A00	37.6/50.0	104.2/120.3	204.6/193.8	225/225	198/216	529/545	216.4/205.6	225/225	212/229	549/565	209.4/198.6	225/225	204/221	534/550	221.2/210.4	225/225	217/235	554/570	
		281/272A00	56.3/75.0	156.4/180.4	230.8/253.9	250/300	258/285	581/605	242.6/265.7	250/300	272/298	601/625	235.6/258.7	250/300	264/290	586/610	247.4/270.5	300/300	277/304	606/630	
507CQ*17	STD	NONE	-	-	84.4	45	36	242	40.6	50	43	254	36.6	50	39	244	42.8	50	46	256	
		282/273A00	25.0	30.1	72.0	80	71	272	78.2	80	78	284	74.2	80	73	274	80.4	90	80	286	
		283/274A00	50.0	60.1	94.5	100	105	302	100.7	110	112	314	96.7	100	108	304	102.9	110	115	316	
		284/275A00	75.0	90.2	124.6	150	140	332	130.8	150	147	344	126.8	150	142	334	133.0	150	149	346	
507CQ*17	MED	NONE	-	-	35.5	45	37	249	41.7	50	44	261	37.7	45	40	251	43.9	50	47	263	
		282/273A00	25.0	30.1	73.1	80	72	279	79.3	80	79	291	75.3	80	74	281	81.5	90	82	293	
		283/274A00	50.0	60.1	95.6	100	106	309	101.8	110	114	321	97.8	110	109	311	104.0	110	116	323	
		284/275A00	75.0	90.2	125.7	150	141	339	131.9	150	148	351	127.9	150	144	341	134.1	150	151	353	
575-3-60	HIGH	NONE	-	-	36.6	45	39	250	42.8	50	46	282	38.8	50	41	252	45.0	50	48	264	
		282/273A00	25.0	30.1	74.2	80	73	280	80.4	90	80	292	76.4	80	76	282	82.6	90	83	294	
		283/274A00	50.0	60.1	96.7	100	108	310	102.9	110	115	322	98.9	110	110	312	105.1	110	117	324	
		284/275A00	75.0	90.2	126.8	150	142	340	133.0	150	149	352	129.0	150	145	342	135.2	150	152	354	
575-3-60	STD	NONE	-	-	24.9	30	26	184	29.7	35	32	192	26.6	30	28	186	31.4	40	33	194	
		285/276A00	24.8	23.9	54.7	60	53	208	59.5	60	59	216	56.4	60	55	210	61.2	70	61	218	
		286/277A00	49.6	47.7	84.5	90	81	232	89.3	90	86	240	86.2	90	83	234	91.0	100	88	242	
		287/278A00	74.4	71.6	96.5	100	108	256	101.3	110	114	264	98.2	110	110	258	103.0	110	116	266	
575-3-60	MED	NONE	-	-	24.9	30	26	184	29.7	35	32	192	26.6	30	28	186	31.4	40	33	194	
		285/276A00	24.8	23.9	54.7	60	53	208	59.5	60	59	216	56.4	60	55	210	61.2	70	61	218	
		286/277A00	49.6	47.7	84.5	90	81	232	89.3	90	86	240	86.2	90	83	234	91.0	100	88	242	
		287/278A00	74.4	71.6	96.5	100	108	256	101.3	110	114	264	98.2	110	110	258	103.0	110	116	266	
575-3-60	HIGH	NONE	-	-	27.7	30	29	198	32.5	40	35	206	29.4	35	31	200	34.2	40	37	208	
		285/276A00	24.8	23.9	57.5	60	57	222	62.3	70	62	230	59.2	60	59	224	64.0	70	64	232	
		286/277A00	49.6	47.7	87.3	90	84	246	92.1	100	90	254	89.0	90	86	248	93.8	100	92	256	
		287/278A00	74.4	71.6	99.3	110	112	270	104.1	110	117	278	101.0	110	114	272	105.8	110	119	280	

See: \*Legend and Notes for Tables 22 – 25\* on page 34.



Table 22 - Unit Wire/Fuse or HACR Breaker Sizing Data (cont)

UNIT	NO. M. V-PH-HZ	ELEC. HTR				NO C.O. or UNPWR C.O.						w/ PWRD C.O.						
		CRHEATER**A00 VERT/HORZ	Nom(KW)	FLA	NO P.E.			w/ P.E. (pwrd fr/unit)			NO P.E.			w/ P.E. (pwrd fr/unit)				
					MCA	MAX FUSE or HACR BRKR	DISC. SIZE FLA LRA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE FLA LRA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE FLA LRA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE FLA LRA		
STD**	208/230-3-60	NONE	-	-	95/94	564	103.1/102.2	125/125	109/108	584	96.1/95.2	125/125	101/100	569	107.9/107.0	125/125	115/114	589
		279/-/-A00	18.8/25.0	52.1/60.1	155/164	616/624	168.3/177.4	175/200	169/177	636/644	161.3/170.4	175/175	161/169	621/629	173.1/182.2	175/200	174/183	641/649
		280/-/-A00	37.6/50.0	104.2/120.3	215/233	668/684	233.4/222.5	250/250	229/246	688/704	226.4/215.5	250/225	221/238	673/689	238.2/227.3	250/250	234/252	693/709
MED-High Efficiency	208/230-3-60	281/-/-A00	56.3/75.0	156.4/180.4	275/302	720/744	259.5/282.6	300/300	289/315	740/764	252.5/275.6	300/300	281/307	725/749	264.3/287.4	300/300	294/321	745/769
		NONE	-	-	99	560	106.6	125	113	580	99.6	125	105	565	111.4	125	119	585
		279/270A00	18.8/25.0	52.1/60.1	159/169	612/620	171.8/181.8	175/200	173/182	632/640	164.8/174.8	175/175	165/174	617/625	176.6/186.6	200/200	178/188	637/645
HIGH-High Efficiency	208/230-3-60	280/271A00	37.6/50.0	104.2/120.3	219/238	664/680	236.9/226.9	250/250	233/251	684/700	229.9/219.9	250/250	225/243	669/685	241.7/231.7	250/250	238/257	689/705
		281/272A00	56.3/75.0	156.4/180.4	279/307	716/740	263.0/287.0	300/300	293/321	736/760	256.0/280.0	300/300	285/312	721/745	267.8/291.8	300/350	298/326	741/765
		NONE	-	-	113	639	118.0	150	126	659	111.0	125	118	644	122.8	150	132	664
STD**	460-3-60	279/270A00	18.8/25.0	52.1/60.1	173/182	691/699	183.2/193.2	200/200	186/195	711/719	176.2/186.2	200/200	178/187	696/704	188.0/198.0	200/200	192/201	716/724
		280/271A00	37.6/50.0	104.2/120.3	232/251	743/759	248.3/238.3	250/250	246/265	763/779	241.3/231.3	250/250	238/256	748/764	253.1/243.1	300/300	252/270	768/784
		281/272A00	56.3/75.0	156.4/180.4	292/320	795/819	274.4/298.4	300/350	306/334	815/839	267.4/291.4	300/300	298/326	800/824	279.2/303.2	300/350	312/339	820/844
MED-High Efficiency	460-3-60	NONE	-	-	51	291	55.3	60	58	303	51.3	60	54	293	57.5	70	61	305
		282/-/-A00	25.0	30.1	86	321	92.9	100	93	333	88.9	90	88	323	95.1	100	96	335
		283/-/-A00	50.0	60.1	120	351	115.4	125	128	363	113.6	125	123	353	117.6	125	130	365
HIGH-High Efficiency	460-3-60	284/-/-A00	75.0	90.2	155	381	145.5	150	162	393	141.5	150	158	383	147.7	175	165	395
		NONE	-	-	54	289	57.5	70	61	301	55.5	60	56	291	59.7	70	63	303
		282/273A00	25.0	30.1	88	319	95.1	100	96	331	91.1	100	91	321	97.3	100	98	333
STD**	575-3-60	283/274A00	50.0	60.1	123	349	117.6	125	130	361	113.6	125	125	351	119.8	125	133	363
		284/275A00	75.0	90.2	158	379	147.7	175	175	391	143.7	150	160	381	149.9	175	167	393
		NONE	-	-	60	329	63.2	80	68	341	59.2	70	63	331	65.4	80	70	343
MED-High Efficiency	575-3-60	282/273A00	25.0	30.1	95	359	100.8	110	102	371	96.8	100	98	361	103.0	110	105	373
		283/274A00	50.0	60.1	129	389	123.3	150	137	401	119.3	125	132	391	125.5	150	139	403
		284/275A00	75.0	90.2	164	419	153.4	175	171	431	149.4	150	167	421	155.6	175	174	433
STD**	575-3-60	NONE	-	-	38	204	41.0	50	43	212	37.9	50	40	206	42.7	50	45	214
		285/-/-A00	24.8	23.9	65	228	70.9	80	71	236	67.8	80	67	230	72.6	80	73	238
		286/-/-A00	49.6	47.7	93	252	100.6	110	98	260	97.5	100	95	254	102.3	110	100	262
MED-High Efficiency	575-3-60	287/-/-A00	74.4	71.6	120	276	112.6	125	126	284	109.5	125	122	278	114.3	125	128	286
		NONE	-	-	40	202	43.0	50	46	210	39.9	50	42	204	44.7	50	48	212
		285/276A00	24.8	23.9	68	226	72.9	80	73	234	69.8	80	70	228	74.6	80	75	236
HIGH-High Efficiency	575-3-60	286/277A00	49.6	47.7	95	250	102.6	110	101	258	99.5	100	97	252	104.3	110	103	260
		287/278A00	74.4	71.6	123	274	114.6	125	125	282	111.5	125	125	276	116.3	125	130	284
		NONE	-	-	42	229	44.9	50	48	237	41.8	50	44	231	46.6	50	50	239
STD**	575-3-60	285/276A00	24.8	23.9	70	253	74.8	80	75	261	71.7	80	72	255	76.5	80	77	263
		286/277A00	49.6	47.7	97	277	104.5	110	103	285	101.4	110	99	279	106.2	110	105	287
		287/278A00	74.4	71.6	125	301	116.5	125	125	309	113.4	125	127	303	118.2	125	132	311

See: "Legend and Notes for Tables 22 - 25" on page 34.

\*\* STD IFM not available on horizontal 50TCQ\*24. STD IFM is available on vertical 50TCQ\*24

**Table 23 – Unit Wire/Fuse or HACR Breaker Sizing Data with Factory Installed 2 Speed Indoor Fan Option**

UNIT	NO M, V - Ph - HZ	ELEC. HTR										NO C.O. or UNPWR C.O.										w/ PWRD C.O.									
		CFHEATER***A00 VERT/HORZ	Nom(kW)	FLA	NO PE.			w/ P.E. (pwrd fr/unit)			NO PE.			w/ P.E. (pwrd fr/unit)			NO PE.			w/ P.E. (pwrd fr/unit)											
					MCA	MAX FUSE or HACR BRKR	FLA	LRA	MCA	MAX FUSE or HACR BRKR	FLA	LRA	MCA	MAX FUSE or HACR BRKR	FLA	LRA	MCA	MAX FUSE or HACR BRKR	FLA	LRA	MCA	MAX FUSE or HACR BRKR	FLA	LRA							
STD	208/230-3-60	NONE	-	-	79/72	390	81.2/80.4	100/100	86/85	410	74.2/73.4	90/90	78/77	395	86.0/85.2	100/100	92/91	415	86.0/85.2	100/100	92/91	415	86.0/85.2	100/100	92/91	415					
		279/270A00	18.8/25.0	52.1/60.1	132/141	442/450	146.3/155.5	150/175	146/154	462/470	139.3/148.5	150/150	138/146	447/455	151.1/160.3	175/175	152/160	467/475	151.1/160.3	175/175	152/160	467/475	151.1/160.3	175/175	152/160	467/475					
		280/271A00	37.6/50.0	104.2/120.3	192/210	494/510	211.4/200.7	225/225	206/224	514/530	204.4/193.7	225/200	198/216	499/515	216.2/205.5	225/225	211/229	519/535	216.2/205.5	225/225	211/229	519/535	216.2/205.5	225/225	211/229	519/535					
MED	208/230-3-60	NONE	-	-	252/279	546/570	237.6/260.8	250/300	266/293	566/590	230.6/253.8	250/300	268/295	575/599	242.4/267.6	250/300	272/298	571/595	242.4/267.6	250/300	272/298	571/595	242.4/267.6	250/300	272/298	571/595					
		279/270A00	18.8/25.0	52.1/60.1	135/143	466/474	148.5/157.5	150/175	149/157	486/494	141.5/150.5	150/175	141/149	471/479	153.3/162.3	175/175	154/162	491/499	153.3/162.3	175/175	154/162	491/499	153.3/162.3	175/175	154/162	491/499					
		280/271A00	37.6/50.0	104.2/120.3	195/212	518/534	213.8/202.7	225/225	208/226	538/554	206.6/195.7	225/225	200/218	523/539	218.4/207.5	225/225	214/231	543/559	218.4/207.5	225/225	214/231	543/559	218.4/207.5	225/225	214/231	543/559					
HIGH	208/230-3-60	NONE	-	-	255/281	570/594	239.8/262.8	250/300	269/295	590/614	232.8/255.8	250/300	269/295	590/614	232.8/255.8	250/300	274/300	595/619	232.8/255.8	250/300	274/300	595/619	232.8/255.8	250/300	274/300	595/619					
		279/270A00	18.8/25.0	52.1/60.1	138/146	477/485	151.3/160.4	175/175	152/160	497/505	144.3/153.4	150/175	144/152	482/490	156.1/165.2	175/175	157/165	492/510	156.1/165.2	175/175	157/165	492/510	156.1/165.2	175/175	157/165	492/510					
		280/271A00	37.6/50.0	104.2/120.3	198/216	529/545	216.4/205.6	225/225	212/229	549/565	209.4/198.6	225/225	204/221	534/550	221.2/210.4	225/225	217/235	554/570	221.2/210.4	225/225	217/235	554/570	221.2/210.4	225/225	217/235	554/570					
STD	460-3-60	NONE	-	-	36	233	40.2	50	43	245	36.2	45	38	235	42.4	50	45	247	42.4	50	45	247	42.4	50	45	247					
		282/273A00	25.0	30.1	70	263	77.8	80	77	275	73.8	80	73	265	80.0	80	80	277	80.0	80	80	277	80.0	80	80	277					
		283/274A00	50.0	60.1	105	293	100.3	110	112	305	96.3	100	107	295	102.5	110	114	307	102.5	110	114	307	102.5	110	114	307					
MED	460-3-60	NONE	-	-	139	323	130.4	150	146	335	126.4	150	142	325	132.6	150	149	337	132.6	150	149	337	132.6	150	149	337					
		282/273A00	25.0	30.1	71	275	78.9	80	79	287	74.9	80	74	277	81.1	90	81	289	81.1	90	81	289	81.1	90	81	289					
		283/274A00	50.0	60.1	106	305	101.4	110	113	317	97.4	110	108	307	103.6	110	116	319	103.6	110	116	319	103.6	110	116	319					
HIGH	460-3-60	NONE	-	-	141	335	131.5	150	148	347	127.5	150	143	337	133.7	150	150	349	133.7	150	150	349	133.7	150	150	349					
		282/273A00	25.0	30.1	73	280	80.4	90	80	292	76.4	80	76	282	82.6	90	83	284	82.6	90	83	284	82.6	90	83	284					
		283/274A00	50.0	60.1	108	310	102.9	110	115	322	98.9	110	110	312	105.1	110	117	324	105.1	110	117	324	105.1	110	117	324					
STD	575-3-60	NONE	-	-	142	340	133.0	150	149	352	129.0	150	145	342	135.2	150	152	354	135.2	150	152	354	135.2	150	152	354					
		282/273A00	25.0	30.1	74.2	280	80.4	90	80	292	76.4	80	76	282	82.6	90	83	284	82.6	90	83	284	82.6	90	83	284					
		283/274A00	50.0	60.1	108	310	102.9	110	115	322	98.9	110	110	312	105.1	110	117	324	105.1	110	117	324	105.1	110	117	324					
MED	575-3-60	NONE	-	-	184	356	143.0	170	166	368	136.0	170	162	360	142.2	170	170	366	142.2	170	170	366	142.2	170	170	366					
		282/273A00	25.0	30.1	74.2	280	80.4	90	80	292	76.4	80	76	282	82.6	90	83	284	82.6	90	83	284	82.6	90	83	284					
		283/274A00	50.0	60.1	108	310	102.9	110	115	322	98.9	110	110	312	105.1	110	117	324	105.1	110	117	324	105.1	110	117	324					
HIGH	575-3-60	NONE	-	-	184	356	143.0	170	166	368	136.0	170	162	360	142.2	170	170	366	142.2	170	170	366	142.2	170	170	366					
		282/273A00	25.0	30.1	74.2	280	80.4	90	80	292	76.4	80	76	282	82.6	90	83	284	82.6	90	83	284	82.6	90	83	284					
		283/274A00	50.0	60.1	108	310	102.9	110	115	322	98.9	110	110	312	105.1	110	117	324	105.1	110	117	324	105.1	110	117	324					

See: "Legend and Notes for Tables 22 - 25" on page 34.



Table 23 - Unit Wire/Fuse or HACR Breaker Sizing Data with Factory Installed 2 Speed Indoor Fan Option (cont)

UNIT	NO. M. V-PH-HZ	ELEC. HTR				NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
		CRHEATER**A00 VERT/HORZ	Nom(KW)	FLA	MCA	NO P.E.		w/ P.E. (pwrd fr/unit)		NO P.E.		w/ P.E. (pwrd fr/unit)		NO P.E.		w/ P.E. (pwrd fr/unit)					
						MAX FUSE or HACR BRKR	DISC. SIZE FLA	DISC. SIZE LRA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE FLA	DISC. SIZE LRA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE FLA	DISC. SIZE LRA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE FLA	DISC. SIZE LRA	
STD**	208/230-3-60	NONE	-	-	91.3/90.4	100/100	95/94	564	103.1/102.2	125/125	109/108	584	96.1/95.2	125/125	101/100	569	107.9/107.0	125/125	115/114	589	
		279/-/-A00	18.8/25.0	52.1/60.1	156.5/165.6	175/175	155/164	616/624	168.3/177.4	175/200	169/177	636/644	161.3/170.4	175/200	161/169	621/629	173.1/182.2	175/200	174/183	641/649	
		280/-/-A00	37.6/50.0	104.2/120.3	221.6/210.7	225/225	215/233	668/684	233.4/222.5	250/250	229/246	688/704	226.4/215.5	250/225	221/238	673/689	238.2/227.3	250/250	234/252	693/709	
		281/-/-A00	56.3/75.0	156.4/180.4	247.7/270.8	300/300	275/302	720/744	259.5/282.6	300/300	289/315	740/764	252.5/275.6	300/300	281/307	725/749	264.3/287.4	300/300	294/321	745/769	
MED	208/230-3-60	NONE	-	-	94.8	125	99	560	106.6	125	113	580	99.6	125	105	565	111.4	125	119	585	
		279/270A00	18.8/25.0	52.1/60.1	160.0/170.0	175/175	159/169	612/620	171.8/181.8	175/200	173/182	632/640	164.8/174.8	175/175	165/174	617/625	176.6/186.6	200/200	178/188	637/645	
		280/271A00	37.6/50.0	104.2/120.3	225.1/215.1	250/225	219/238	664/680	236.9/226.9	250/250	233/251	684/700	229.9/219.9	250/250	225/243	669/685	241.7/231.7	250/250	238/257	689/705	
		281/273A00	56.3/75.0	156.4/180.4	251.2/275.2	300/300	279/307	716/740	263.0/287.0	300/300	293/321	736/760	256.0/280.0	300/300	285/312	721/745	267.9/291.8	300/350	298/326	741/765	
HIGH	208/230-3-60	NONE	-	-	108.2	125	113	639	118.0	150	126	659	111.0	125	118	644	122.8	150	132	664	
		279/270A00	18.8/25.0	52.1/60.1	171.4/181.4	175/200	173/182	691/699	183.2/193.2	200/200	186/195	711/719	176.2/186.2	200/200	178/187	696/704	188.0/198.0	200/200	192/201	716/724	
		280/271A00	37.6/50.0	104.2/120.3	236.5/226.5	250/250	232/251	743/759	248.3/238.3	250/250	246/265	763/779	241.3/231.3	250/250	238/256	748/764	253.1/243.1	300/300	252/270	768/784	
		281/272A00	56.3/75.0	156.4/180.4	262.6/286.6	300/300	292/320	795/819	274.4/298.4	300/350	306/334	815/839	267.4/291.4	300/300	298/326	800/824	279.2/303.2	300/350	312/339	820/844	
STD**	460-3-60	NONE	-	-	49.1	60	51	291	55.3	60	58	303	51.3	60	54	293	57.5	70	61	305	
		282/-/-A00	25.0	30.1	86.7	90	86	321	92.9	100	93	333	88.9	90	88	323	95.1	100	96	335	
		283/-/-A00	50.0	60.1	109.2	125	120	351	115.4	125	125	363	111.4	125	123	353	117.6	125	130	365	
		284/-/-A00	75.0	90.2	139.3	150	155	381	145.5	150	162	393	143.7	150	158	383	147.7	175	165	395	
MED	460-3-60	NONE	-	-	51.3	60	54	289	57.5	70	61	301	53.5	60	56	291	59.7	70	63	303	
		282/273A00	25.0	30.1	88.9	90	88	319	95.1	100	96	331	91.1	100	91	321	97.3	100	98	333	
		283/274A00	50.0	60.1	111.4	125	123	349	117.6	125	130	361	113.6	125	125	351	119.8	125	133	363	
		284/275A00	75.0	90.2	141.5	150	158	379	147.7	175	165	391	143.7	150	160	381	149.9	175	167	393	
HIGH	460-3-60	NONE	-	-	57.0	70	60	329	63.2	80	68	341	59.2	70	63	331	65.4	80	70	343	
		282/273A00	25.0	30.1	94.6	100	95	359	100.8	110	102	371	96.8	100	98	361	103.0	110	105	373	
		283/274A00	50.0	60.1	117.1	125	129	389	123.3	150	137	401	119.3	125	132	391	125.5	150	139	403	
		284/275A00	75.0	90.2	147.2	175	164	419	153.4	175	171	431	149.4	175	167	421	155.6	175	174	433	
STD**	575-3-60	NONE	-	-	36.8	45	39	204	41.6	50	44	212	38.5	50	42	206	43.3	50	46	214	
		285/-/-A00	24.8	23.9	66.7	70	66	228	71.5	80	72	236	68.4	70	68	230	73.2	80	74	238	
		286/-/-A00	49.6	47.7	96.4	100	93	252	101.2	110	99	260	98.1	100	95	254	102.9	110	101	262	
		287/-/-A00	74.4	71.6	108.4	125	121	276	113.2	125	127	284	110.1	125	123	278	114.9	125	128	286	
MED	575-3-60	NONE	-	-	38.2	50	40	202	43.0	50	46	210	39.9	50	42	204	44.7	50	48	212	
		285/276A00	24.8	23.9	68.1	70	68	226	72.9	80	73	234	69.8	70	70	228	74.6	80	75	236	
		286/277A00	49.6	47.7	97.8	100	95	250	102.6	110	101	258	99.5	100	97	252	104.3	110	103	260	
		287/278A00	74.4	71.6	109.8	125	123	274	114.6	125	128	282	111.5	125	125	276	116.3	125	130	284	
HIGH	575-3-60	NONE	-	-	40.1	50	42	229	44.9	50	48	237	41.8	50	44	231	46.6	50	50	239	
		285/276A00	24.8	23.9	70.0	70	70	253	74.8	80	75	261	71.7	80	72	255	76.5	80	77	263	
		286/277A00	49.6	47.7	99.7	100	97	277	104.5	110	103	285	101.4	110	99	279	106.2	110	105	287	
		287/278A00	74.4	71.6	111.7	125	125	301	116.5	125	130	309	113.4	125	127	303	118.2	125	132	311	

See: "Legend and Notes for Tables 22 - 25" on page 34.

\*\* STD IFM not available on horizontal 50TCQ\*24. STD IFM is available on vertical 50TCQ\*24

## ELECTRICAL DATA FOR UNITS PRODUCED PRIOR TO JULY 30, 2012

**NOTE:** Check the serial number of unit to verify production date.

To confirm the date of manufacture, locate the unit nameplate and check the first four digits of the Serial Number. If the number listed in the first 4 digits of the Serial Number is 3012 or lower, the unit was produced prior to July 30, 2012.

Position:	1	2	3	4	5	6	7	8	9	10
Example:	3	0	1	2	U	1	2	3	4	5

Week of manufacture (fiscal calendar)			Sequence number
Year of manufacture ("12" = 2012)		Manufacturing location	

C13784

**50TCQD**

Table 24 – Unit Wire/Fuse or HACR Breaker Sizing Data - Prior to July 30, 2012

UNIT	NOM. V-PH-HZ	ELEC. HTR				NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
		CRHEATER***A00 VERT/HORZ	Nom(KW)	FLA	MCA	NO PE.		w/ P.E. (pwrd fr/unit)		NO PE.		w/ P.E. (pwrd fr/unit)		NO PE.		w/ P.E. (pwrd fr/unit)					
						MAX FUSE or HACR BRKR	DISC. SIZE FLA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE FLA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE FLA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE FLA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE FLA	MCA	
STD		NONE	-	-	68.3	90.0	71	393	80.1	100.0	85	413	73.1	90.0	77	398	84.9	100.0	90	418	
		279/270A00	18.8/25.0	52.1/60.1	133.4/143.4	150/150	131/140	445/453	145.2/155.2	150/175	145/154	145/154	465/473	138.2/148.2	150/150	137/146	450/458	150.0/160.0	150/175	150/160	470/478
		280/271A00	37.6/50.0	104.2/120.3	196.5/188.6	200/200	191/210	487/513	210.3/200.4	225/225	205/223	205/223	517/533	203.3/193.4	225/200	197/215	502/518	215.1/205.2	225/225	210/229	522/538
MED	208/230-3-60	281/272A00	56.3/75.0	156.4/180.4	224.7/248.7	250/300	251/279	549/573	236.5/260.5	250/300	265/292	569/593	229.5/253.5	250/300	257/284	554/578	241.3/265.3	250/300	270/298	574/598	
		NONE	-	-	71.0	90.0	74	410	82.8	100.0	88	430	75.8	100.0	80	415	87.6	100.0	93	435	
		279/270A00	18.8/25.0	52.1/60.1	136.1/146.1	150/150	134/144	462/470	147.9/157.9	150/175	148/157	482/490	140.9/150.9	150/175	140/149	467/475	152.7/162.7	175/175	153/163	487/495	
HIGH	208/230-3-60	280/271A00	37.6/50.0	104.2/120.3	201.2/191.3	225/200	194/213	514/530	213.0/203.1	225/225	208/226	534/550	206.0/196.1	225/225	200/218	519/535	217.8/207.9	225/225	213/232	539/555	
		281/272A00	56.3/75.0	156.4/180.4	227.4/251.4	250/300	254/282	566/590	239.2/263.2	250/300	268/295	586/610	232.2/256.2	250/300	260/287	571/595	244.0/268.0	300/300	273/301	591/615	
		NONE	-	-	75.8	100.0	80	419	87.6	100.0	93	439	80.6	100.0	85	424	92.4	100.0	99	444	
STD		279/270A00	18.8/25.0	52.1/60.1	140.9/150.9	150/175	140/149	471/479	152.7/162.7	175/175	153/163	491/499	145.7/155.7	150/175	145/155	476/484	157.5/167.5	175/175	159/168	496/504	
		282/273A00	25.0	30.1	71.2	80.0	70	264	77.4	80.0	77	276	73.4	80.0	72	266	79.6	80.0	79	278	
		283/274A00	50.0	60.1	93.7	100.0	104	294	99.9	110.0	111	306	95.9	100.0	107	296	102.1	110.0	114	308	
MED	460-3-60	284/275A00	75.0	90.2	123.8	150	139	324	130.0	150	146	336	126.0	150	141	326	132.2	150	148	338	
		NONE	-	-	33.6	45.0	35	234	39.8	50.0	42	246	35.8	45.0	38	236	42.0	50.0	45	248	
		282/273A00	25.0	30.1	71.2	80.0	70	264	77.4	80.0	77	276	73.4	80.0	72	266	79.6	80.0	79	278	
HIGH		283/274A00	50.0	60.1	93.7	100.0	106	303	101.3	110.0	113	315	97.3	110.0	108	305	103.5	110.0	115	317	
		284/275A00	75.0	90.2	125.2	150	140	333	131.4	150	148	345	127.4	150	143	335	133.6	150	150	347	
		NONE	-	-	37.6	45.0	40	247	43.8	50.0	47	259	39.8	50.0	42	249	46.0	50.0	49	261	
STD		285/276A00	24.8	23.9	54.7	60.0	53	208	59.5	60.0	59	216	56.4	60.0	55	210	61.2	70.0	61	218	
		286/277A00	49.6	47.7	84.5	90.0	81	232	89.3	90.0	86	240	86.2	90.0	83	234	91.0	100.0	88	242	
		287/278A00	74.4	71.6	96.5	100	108	256	101.3	110	114	264	96.2	110	110	258	103.0	110	116	266	
MED	575-3-60	NONE	-	-	24.9	30.0	26	184	29.7	35.0	32	192	26.6	30.0	28	186	31.4	40.0	33	194	
		285/276A00	24.8	23.9	54.7	60.0	53	208	59.5	60.0	59	216	56.4	60.0	55	210	61.2	70.0	61	218	
		286/277A00	49.6	47.7	84.5	90.0	81	232	89.3	90.0	86	240	86.2	90.0	83	234	91.0	100.0	88	242	
HIGH		287/278A00	74.4	71.6	96.5	100	108	256	101.3	110	114	264	96.2	110	110	258	103.0	110	116	266	
		NONE	-	-	27.7	30.0	29	198	32.5	40.0	35	206	29.4	35.0	31	200	34.2	40.0	37	208	
		285/276A00	24.8	23.9	54.7	60.0	53	208	59.5	60.0	59	216	56.4	60.0	55	210	61.2	70.0	61	218	
STD		286/277A00	49.6	47.7	84.5	90.0	84	246	92.1	100.0	90	254	89.0	90.0	86	248	93.8	100.0	92	256	
		287/278A00	74.4	71.6	96.5	100	112	270	104.1	110	117	278	101.0	110	114	272	105.8	110	119	280	
		NONE	-	-	27.7	30.0	29	198	32.5	40.0	35	206	29.4	35.0	31	200	34.2	40.0	37	208	

See: "Legend and Notes for Tables 22 - 25" on page 34.



Table 24 - Unit Wire/Fuse or HACR Breaker Sizing Data - Prior to July 30, 2012(cont)

UNIT	NO. M. V.-PH. HZ	ELEC. HTR				NO. C.O. or UNPWR C.O.								w/ PWRD C.O.							
		CRHEATER***A00 VERT/HORZ	Nom(KW)	FLA	MCA	NO PE.		DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	FLA	LRA
						MAX FUSE or HACR BRKR	FLA	FLA	LRA			FLA	LRA			FLA	LRA				
STD		NONE	-	-	92.7	125.0	97	558	104.5	125.0	111	578	97.5	125.0	103	563	109.3	125.0	116	583	
		279/270A00	18.8/25.0	52.1/60.1	157.9/167.9	175/175	157/166	610/618	169.7/179.7	175/200	171/180	630/638	162.7/172.7	175/175	162/172	615/623	174.5/184.5	175/200	176/185	635/643	
		280/271A00	37.6/50.0	104.2/120.3	223.0/213.0	225/225	217/235	662/678	234.8/224.8	250/250	230/249	682/698	227.8/217.8	250/250	222/241	667/683	239.6/229.6	250/250	236/254	687/703	
		281/272A00	55.3/75.0	156.4/180.4	249.1/273.1	300/300	277/305	714/738	260.9/284.9	300/300	290/318	734/758	253.9/277.9	300/300	282/310	719/743	265.7/289.7	300/300	296/324	739/763	
MED	208/230-3-60	NONE	-	-	98.1	125	103	568	109.9	125	117	588	102.9	125.0	109	573	114.7	125.0	122	593	
		279/270A00	18.8/25.0	52.1/60.1	163.3/173.3	175/175	163/172	620/628	175.1/185.1	200/200	177/186	640/648	168.1/178.1	175/200	169/178	625/633	179.9/189.9	200/200	182/191	645/653	
		280/271A00	37.6/50.0	104.2/120.3	228.4/218.4	250/250	223/242	672/688	240.2/230.2	250/250	237/255	692/708	233.2/223.2	250/250	229/247	677/693	245.0/235.0	250/250	242/261	697/713	
		281/272A00	55.3/75.0	156.4/180.4	254.5/278.5	300/300	283/311	724/748	266.3/290.3	300/300	297/324	744/768	259.3/283.3	300/300	289/316	729/753	271.1/295.1	300/350	302/330	749/773	
HIGH		NONE	-	-	110.8	125	118	642	122.6	150	131	682	115.6	125.0	123	647	127.4	150	137	667	
		279/270A00	18.8/25.0	52.1/60.1	176.0/186.0	200/200	178/187	684/702	187.8/197.8	200/200	191/201	714/722	180.8/190.8	200/200	183/193	699/707	192.6/202.6	200/225	197/206	719/727	
		280/271A00	37.6/50.0	104.2/120.3	241.1/231.1	250/250	238/256	746/762	252.9/242.9	300/300	251/270	766/782	245.9/235.9	250/250	243/262	751/767	257.7/247.7	300/300	297/275	771/787	
		281/272A00	55.3/75.0	156.4/180.4	267.2/291.2	300/300	298/325	798/822	279.0/303.0	300/350	311/339	818/842	272.0/296.0	300/350	303/331	803/827	283.8/307.8	300/350	317/344	823/847	
STD	460-3-60	NONE	-	-	50.1	60.0	52	288	56.3	70.0	60	300	52.3	60.0	55	290	58.5	70.0	62	302	
		282/273A00	25.0	30.1	87.7	90	87	318	93.9	100	94	330	89.9	100.0	90	320	96.1	100.0	97	332	
		283/274A00	50.0	60.1	110.2	125	122	348	116.4	125	129	360	112.4	125.0	124	350	118.6	125.0	131	362	
		284/275A00	75.0	90.2	140.3	150	156	378	146.5	175	163	390	142.5	150	159	380	148.7	175	166	392	
MED	575-3-60	NONE	-	-	52.9	60	56	293	59.1	70	63	305	55.1	60.0	58	295	61.3	70.0	65	307	
		282/273A00	25.0	30.1	90.5	100	90	323	96.7	100	97	335	92.7	100.0	93	325	98.9	100.0	100	337	
		283/274A00	50.0	60.1	113.0	125	125	353	119.2	125	132	365	115.2	125.0	127	355	121.4	150.0	134	367	
		284/275A00	75.0	90.2	143.1	150	159	383	149.3	175	167	395	145.3	150	162	385	151.5	175	169	397	
HIGH		NONE	-	-	58.9	70	63	330	65.1	80	70	342	61.1	70.0	65	332	67.3	80	72	344	
		282/273A00	25.0	30.1	96.5	100	97	360	102.7	110	104	372	98.7	100.0	100	362	104.9	110.0	107	374	
		283/274A00	50.0	60.1	119.0	125	132	390	125.2	150	139	402	121.2	150.0	134	392	127.4	150.0	141	404	
		284/275A00	75.0	90.2	149.1	175	166	420	155.3	175	173	432	151.3	175	169	422	157.5	175	176	434	
STD		NONE	-	-	36.2	45.0	38	204	41.0	50.0	43	210	37.9	50.0	44	206	42.7	50.0	45	214	
		285/276A00	24.8	23.9	66.1	70	65	228	70.9	80	71	236	67.8	70.0	67	230	72.6	80.0	73	238	
		286/277A00	49.6	47.7	95.8	100	93	252	100.6	110	98	260	97.5	100.0	95	254	102.3	110.0	100	262	
		287/278A00	74.4	71.6	107.8	125	120	276	112.6	125	126	284	109.5	125	122	278	114.3	125	128	286	
MED	575-3-60	NONE	-	-	39.6	50	42	202	44.4	50	47	210	41.3	50.0	44	204	46.1	50.0	49	212	
		285/276A00	24.8	23.9	69.5	70	69	226	74.3	80	75	234	71.2	80.0	71	228	76.0	80.0	77	236	
		286/277A00	49.6	47.7	99.2	100	97	250	104.0	110	102	258	100.9	110.0	99	252	105.7	110.0	104	260	
		287/278A00	74.4	71.6	111.2	125	124	274	116.0	125	130	282	112.9	125	126	276	117.7	125	132	284	
HIGH		NONE	-	-	40.1	50	42	229	44.9	50	48	237	41.8	50.0	44	231	46.6	50	50	239	
		285/276A00	24.8	23.9	70.0	70	70	253	74.8	80	75	261	71.7	80.0	72	255	76.5	80.0	77	263	
		286/277A00	49.6	47.7	99.7	100	97	277	104.5	110	103	285	101.4	110.0	99	279	106.2	110.0	105	287	
		287/278A00	74.4	71.6	111.7	125	125	301	116.5	125	130	309	113.4	125	127	303	118.2	125	132	311	

See: "Legend and Notes for Tables 22 - 25" on page 34.



Table 25 – Unit Wire/Fuse or HACR Breaker Sizing Data with Factory Installed 2 Speed Indoor Fan Option – Units Produced Prior to July 30, 2012

UNIT	NO M V-PH-HZ	IFM-TYPE	ELEC. HTR		NO C.O. or UNPWR C.O.										w/ PWRD C.O.									
			ELEC. HTR	FLA	NO PE.			w/ P.E. (pwrd fr/unit)			NO PE.			w/ P.E. (pwrd fr/unit)			NO PE.			w/ P.E. (pwrd fr/unit)				
					CRHEATER ***A00 VERT/HORZ	Norm(kw)	MCA	MAX FUSE or HACR BRKR	FLA	DISC. SIZE	MCA	MAX FUSE or HACR BRKR	MCA	FLA	DISC. SIZE	MCA	MAX FUSE or HACR BRKR	MCA	FLA	DISC. SIZE	MCA	MAX FUSE or HACR BRKR	FLA	DISC. SIZE
STD	208/230-3-60	NONE	-	-	-	279/270A00	18.8/25.0	68.4/68.6	90/90	73/72	390	81.2/80.4	100/100	86/85	410	78/77	395	86.0/85.2	100/100	92/91	415			
						280/271A00	37.6/50.0	134.5/143.7	150/150	132/141	442/450	146.3/155.5	150/175	146/154	462/470	139.3/148.5	150/150	138/146	447/455	151.1/160.3	175/175	152/160	467/475	
						281/272A00	56.3/75.0	225.8/249.0	250/300	252/279	546/570	237.6/260.8	250/300	266/293	566/590	204.4/193.7	225/200	198/216	499/515	216.2/205.5	225/225	211/229	519/535	
MED	208/230-3-60	NONE	-	-	-	279/270A00	18.8/25.0	71.6/70.6	90/90	75/74	414	83.4/82.4	100/100	89/88	434	81/79	419	88.2/87.2	100/100	94/93	439			
						280/271A00	37.6/50.0	201.8/190.9	225/200	195/143	466/474	148.5/157.5	150/175	149/157	486/494	141.5/150.5	150/175	141/149	471/479	153.3/162.3	175/175	154/162	491/489	
						281/272A00	56.3/75.0	228.0/251.0	250/300	255/281	570/594	239.8/262.8	250/300	269/295	590/614	206.6/195.7	225/225	200/218	523/539	218.4/207.5	225/225	214/231	543/559	
HIGH	208/230-3-60	NONE	-	-	-	279/270A00	18.8/25.0	74.4/73.5	90/90	78/77	425	86.2/85.3	100/100	92/91	445	84/83	430	91.0/90.1	100/100	97/96	450			
						280/271A00	37.6/50.0	204.6/193.8	225/225	138/146	477/485	151.3/160.4	175/175	152/160	497/505	144.3/153.4	150/175	144/152	482/490	156.1/165.2	175/175	157/165	502/510	
						281/272A00	56.3/75.0	230.8/253.9	250/300	258/285	581/605	242.6/265.7	250/300	272/298	601/625	209.4/198.6	225/225	204/221	534/550	221.2/210.4	225/225	217/235	544/570	
STD	460-3-60	NONE	-	-	-	282/273A00	25.0	34.0	45	36	233	40.2	50	43	245	38	235	42.4	50	45	247			
						283/274A00	50.0	94.1	100	105	293	100.3	110	112	305	96.3	100	107	295	102.5	110	114	307	
						284/275A00	75.0	124.2	150	139	323	130.4	150	146	335	126.4	150	142	325	132.6	150	149	337	
MED	460-3-60	NONE	-	-	-	282/273A00	25.0	35.1	45	37	245	41.3	50	44	245	39	247	43.5	50	46	259			
						283/274A00	50.0	95.2	100	106	305	101.4	110	113	317	97.4	110	108	307	103.6	110	116	319	
						284/275A00	75.0	125.3	150	141	335	131.5	150	148	347	127.5	150	143	337	133.7	150	150	349	
HIGH	460-3-60	NONE	-	-	-	282/273A00	25.0	36.6	45	39	250	42.8	50	46	262	41	252	45.0	50	48	264			
						283/274A00	50.0	96.7	100	108	310	102.9	110	115	322	98.9	110	110	312	105.1	110	117	324	
						284/275A00	75.0	126.8	150	142	340	133.0	150	149	352	129.0	150	145	342	135.2	150	152	354	
STD	575-3-60	NONE	-	-	-	285/276A00	24.8	26.6	30	28	184	31.4	40	33	192	30	186	33.1	40	35	194			
						286/277A00	49.6	86.2	90	83	232	91.0	100	88	240	87.9	90	85	234	92.9	100	90	242	
						287/278A00	74.4	98.2	110	110	256	103.0	110	116	264	99.9	110	112	258	104.7	110	118	266	
MED	575-3-60	NONE	-	-	-	285/276A00	24.8	56.4	60	55	208	61.2	70	61	216	58.1	60	62.9	70	63	218			
						286/277A00	49.6	86.2	90	83	232	91.0	100	88	240	87.9	90	85	234	92.7	100	90	242	
						287/278A00	74.4	98.2	110	110	256	103.0	110	116	264	99.9	110	112	258	104.7	110	118	266	
HIGH	575-3-60	NONE	-	-	-	285/276A00	24.8	28.3	35	30	198	33.1	40	35	206	30.0	35	34.8	40	37	208			
						286/277A00	49.6	87.9	90	85	246	92.7	100	90	254	89.6	90	87	248	94.4	100	92	256	
						287/278A00	74.4	99.9	110	112	270	104.7	110	118	278	101.6	110	114	272	106.4	110	120	280	

See: "Legend and Notes for Tables 22 – 25" on page 34.

**Table 25 - Unit Wire/Fuse or HACR Breaker Sizing Data with Factory Installed 2 Speed Indoor Fan Option - Units Produced Prior to July 30, 2012 (cont)**

UNIT	NO M - V - PH - HZ	IFM- TYPE	ELEC. HTR		NO C.O. or UNPWR C.O.						w/ PWRD C.O.										
			CRHEATER ***400 VERT/HORZ	Nom(KW)	FLA	NO PE.			w/ PE. (pwrd fr/unit)			NO PE.			w/ PE. (pwrd fr/unit)						
						MCA	MAX FUSE or BRKR	DISC. SIZE FLA LRA	MCA	MAX FUSE or BRKR	DISC. SIZE FLA LRA	MCA	MAX FUSE or BRKR	DISC. SIZE FLA LRA	MCA	MAX FUSE or BRKR	DISC. SIZE FLA LRA				
50TCQ*24	460-3-60	STD	NONE	-	-	91.3/90.4	100/100	95/94	564	109/108	584	96.1/95.2	125/125	101/100	569	107.9/107.0	125/125	115/114	589		
						18.8/25.0	175/175	155/164	616/624	169/177	636/644	161.3/170.4	175/200	161/169	621/629	173.1/182.2	175/200	174/183	641/649		
						37.6/50.0	225/225	215/233	668/684	229/246	688/704	226.4/215.5	250/250	221/238	673/689	238.2/227.3	250/250	234/252	693/709		
						56.3/75.0	300/300	275/302	720/744	289/315	740/764	252.5/275.6	300/300	281/307	725/749	264.3/287.4	300/300	294/321	745/769		
						-	125	99	560	113	580	99.6	125	105	565	111.4	125	119	585		
						18.8/25.0	175/175	159/169	612/620	173/182	632/640	164.8/174.8	175/200	165/174	617/625	176.6/186.6	200/200	178/188	637/645		
50TCQ*24	460-3-60	MED	NONE	-	-	160.0/170.0	300/300	279/307	716/740	293/321	736/760	229.9/219.9	300/300	225/243	669/685	241.7/231.7	250/250	238/257	689/705		
						37.6/50.0	250/225	219/238	664/680	236.9/226.9	250/250	233/251	684/700	229.9/219.9	250/250	225/243	669/685	241.7/231.7	250/250	238/257	689/705
						56.3/75.0	300/300	279/307	716/740	293/321	736/760	256.0/280.0	300/300	285/312	721/745	267.8/291.8	300/350	298/326	741/765		
						-	125	113	639	126	659	111.0	150	118	644	122.8	150	132	664		
						18.8/25.0	175/200	173/182	691/699	183.2/193.2	200/200	176.2/186.2	200/200	178/187	696/704	188.0/198.0	200/200	192/201	716/724		
						37.6/50.0	250/250	232/251	743/759	248.3/238.3	250/250	246/265	246/265	783/779	241.3/231.3	253.1/243.1	300/300	252/270	768/784		
50TCQ*24	460-3-60	HIGH	NONE	-	-	262.6/286.6	300/300	292/320	795/819	306/334	815/839	267.4/291.4	300/350	298/326	800/824	279.2/303.2	300/350	312/339	820/844		
						49.1	60	51	291	58	303	51.3	60	54	293	57.5	70	61	305		
						25.0	90	86	321	93	333	88.9	100	88	323	95.1	100	96	335		
						50.0	125	120	351	128	363	111.4	125	123	353	117.6	125	130	365		
						75.0	150	155	381	145.5	393	141.5	150	162	393	147.7	175	165	395		
						-	60	54	289	57.5	301	53.5	70	56	291	59.7	70	63	303		
50TCQ*24	460-3-60	MED	NONE	-	-	88.9	90	88	319	91.1	98.1	91.1	100	91	321	97.3	100	98	333		
						50.0	125	123	349	117.6	361	113.6	125	130	361	119.8	125	133	363		
						75.0	150	158	379	147.7	391	143.7	175	165	391	149.4	175	167	393		
						-	70	60	329	63.2	341	59.2	80	68	341	65.4	80	70	343		
						25.0	100	95	359	100.8	371	96.8	110	102	371	103.0	110	105	373		
						50.0	125	129	389	123.3	401	119.3	150	137	401	125.5	150	139	403		
50TCQ*24	460-3-60	HIGH	NONE	-	-	147.2	175	164	419	153.4	431	149.4	175	167	421	155.6	175	174	433		
						36.8	45	39	204	41.6	412	38.5	50	44	412	43.3	50	46	214		
						24.8	70	66	228	71.5	236	68.4	80	72	236	73.2	80	74	238		
						49.6	100	93	252	101.2	260	98.1	110	99	260	102.9	110	101	262		
						74.4	125	121	276	113.2	284	110.1	125	127	284	114.9	125	128	286		
						-	50	40	202	43.0	210	39.9	50	46	210	44.7	50	48	212		
50TCQ*24	460-3-60	STD	NONE	-	-	38.2	50	40	202	43.0	210	39.9	50	46	210	44.7	50	48	212		
						24.8	70	68	226	72.9	234	69.8	80	73	234	74.6	80	75	236		
						49.6	100	95	250	102.6	258	99.5	110	101	258	104.3	110	103	260		
						74.4	125	123	274	114.6	282	111.5	125	125	282	116.3	125	130	284		
						-	50	42	229	44.9	237	41.8	50	44	231	46.6	50	50	239		
						24.8	70	70	253	74.8	261	71.7	80	72	255	76.5	80	77	263		
50TCQ*24	460-3-60	MED	NONE	-	-	40.1	50	42	229	44.9	237	41.8	50	44	231	46.6	50	50	239		
						24.8	70	70	253	74.8	261	71.7	80	72	255	76.5	80	77	263		
						49.6	100	97	277	104.5	285	101.4	110	103	285	106.2	110	105	287		
						74.4	125	125	301	116.5	309	113.4	125	127	303	118.2	125	132	311		
						-	125	125	301	116.5	309	113.4	125	127	303	118.2	125	132	311		
						24.8	70	70	253	74.8	261	71.7	80	72	255	76.5	80	77	263		

See: "Legend and Notes for Tables 22 - 25" on page 34.



# TYPICAL WIRING DIAGRAMS

PAC/HP POWER 208/230V 3 PH

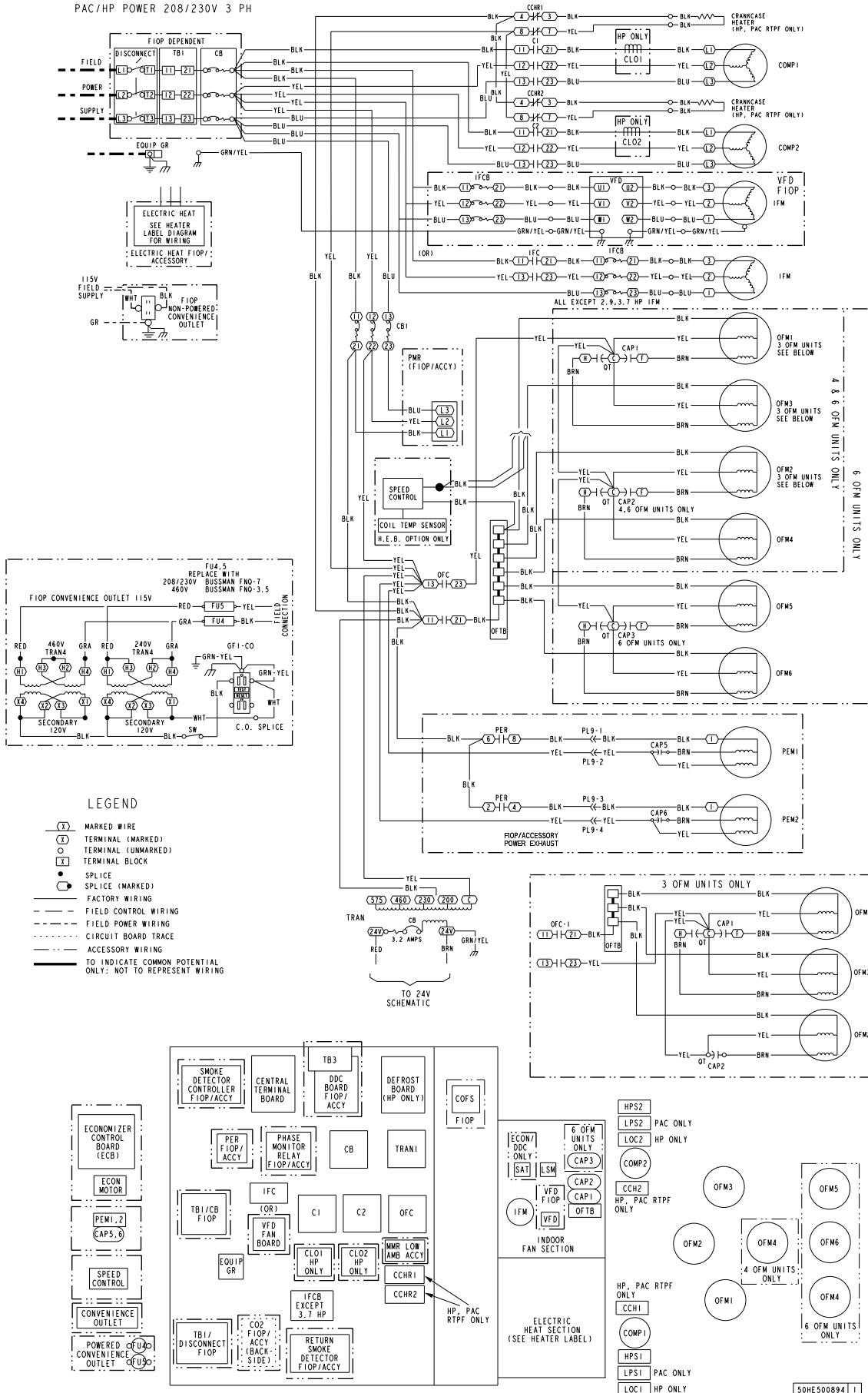


Fig. 9 - Typical Power Diagram, 208/230V

50TCQD

# TYPICAL WIRING DIAGRAMS (cont.)

STD TIER PAC/HP POWER 460V, 575V 3 PH

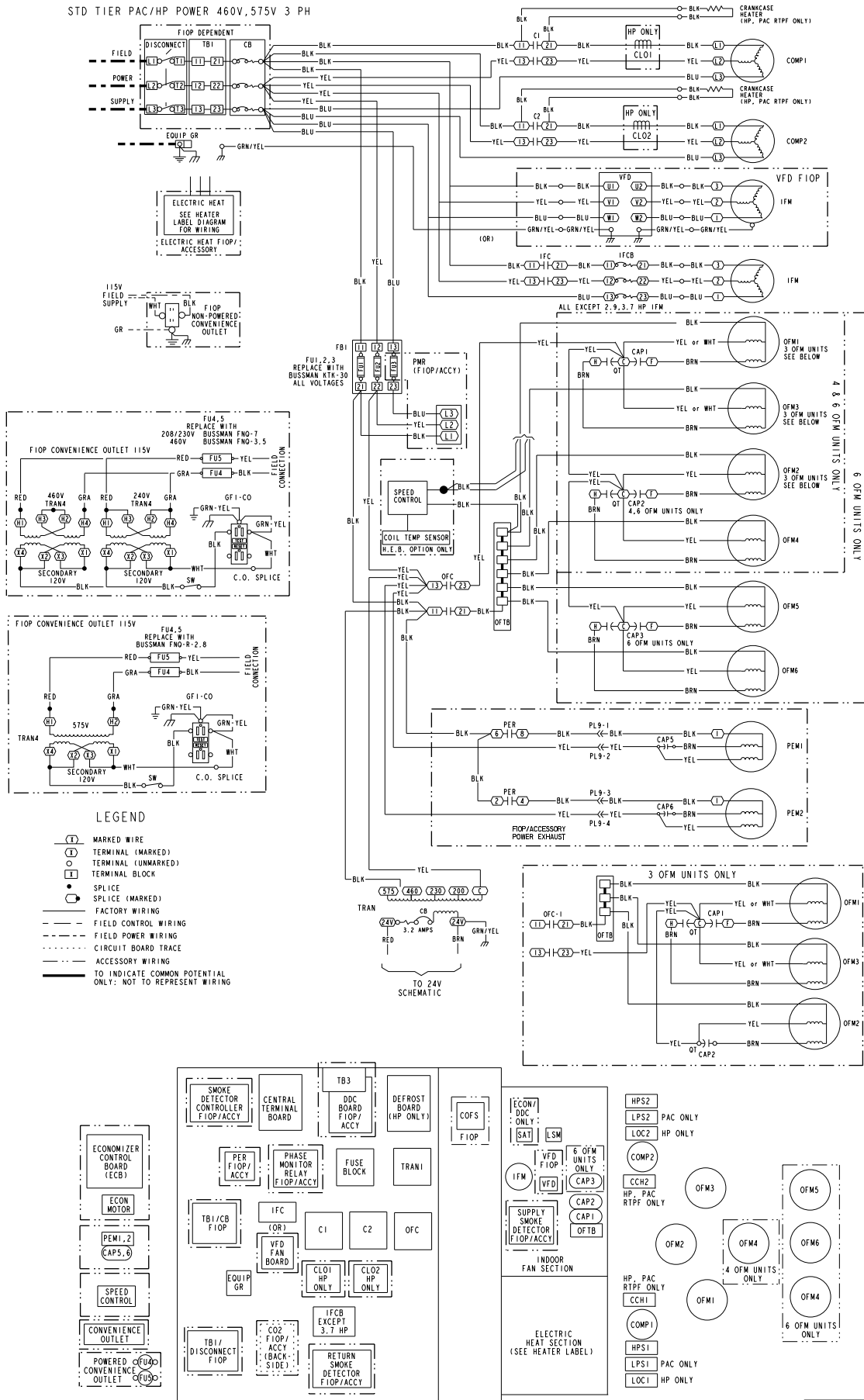


Fig. 10 - Typical Power Wiring Diagram 460/575V

# TYPICAL WIRING DIAGRAMS (cont.)

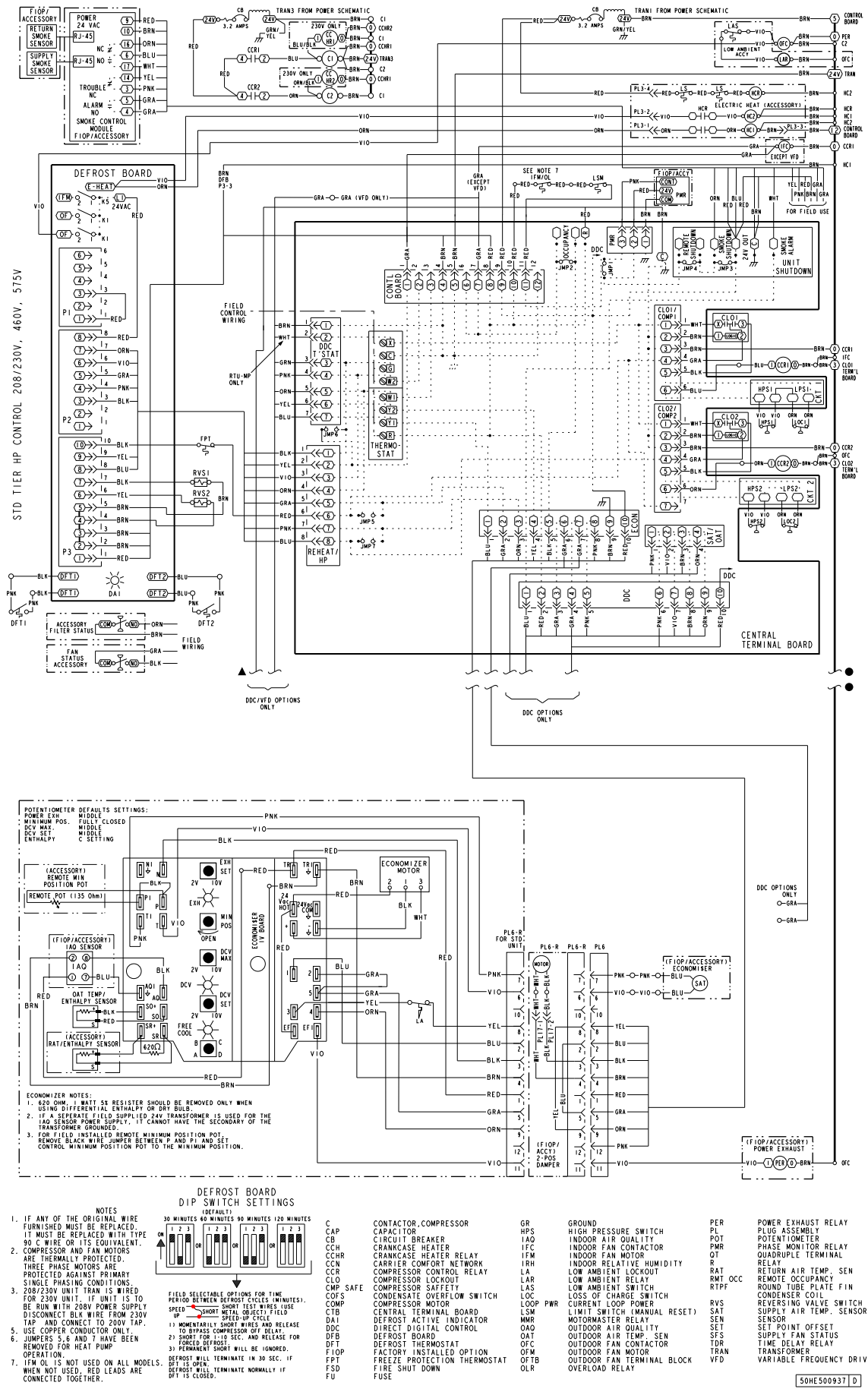
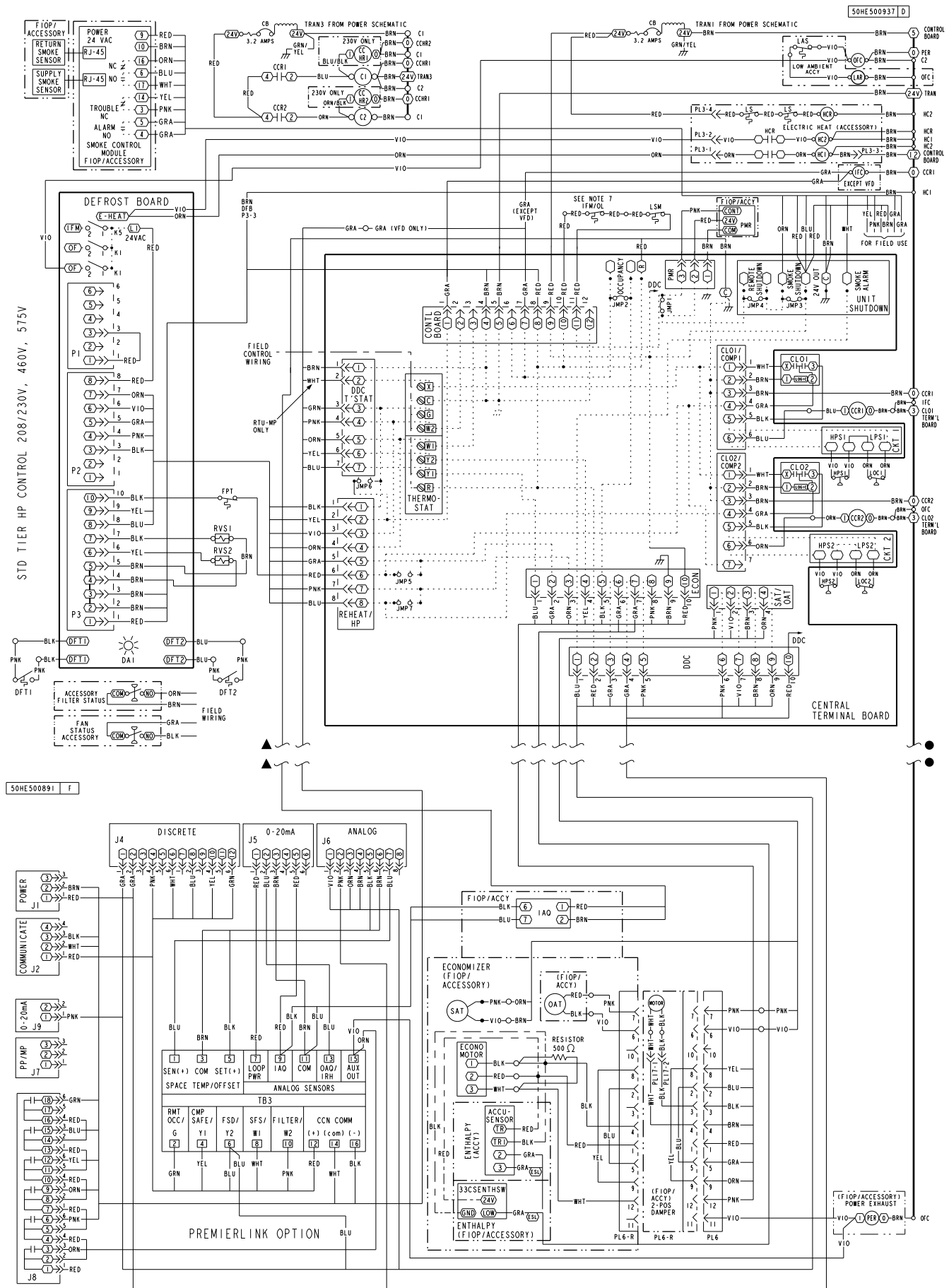


Fig. 11 - Typical Control Diagram

# TYPICAL WIRING DIAGRAMS (cont.)



50TCQD

Fig. 12 - PremierLink™ Diagram

# TYPICAL WIRING DIAGRAMS (cont.)

50TCQD

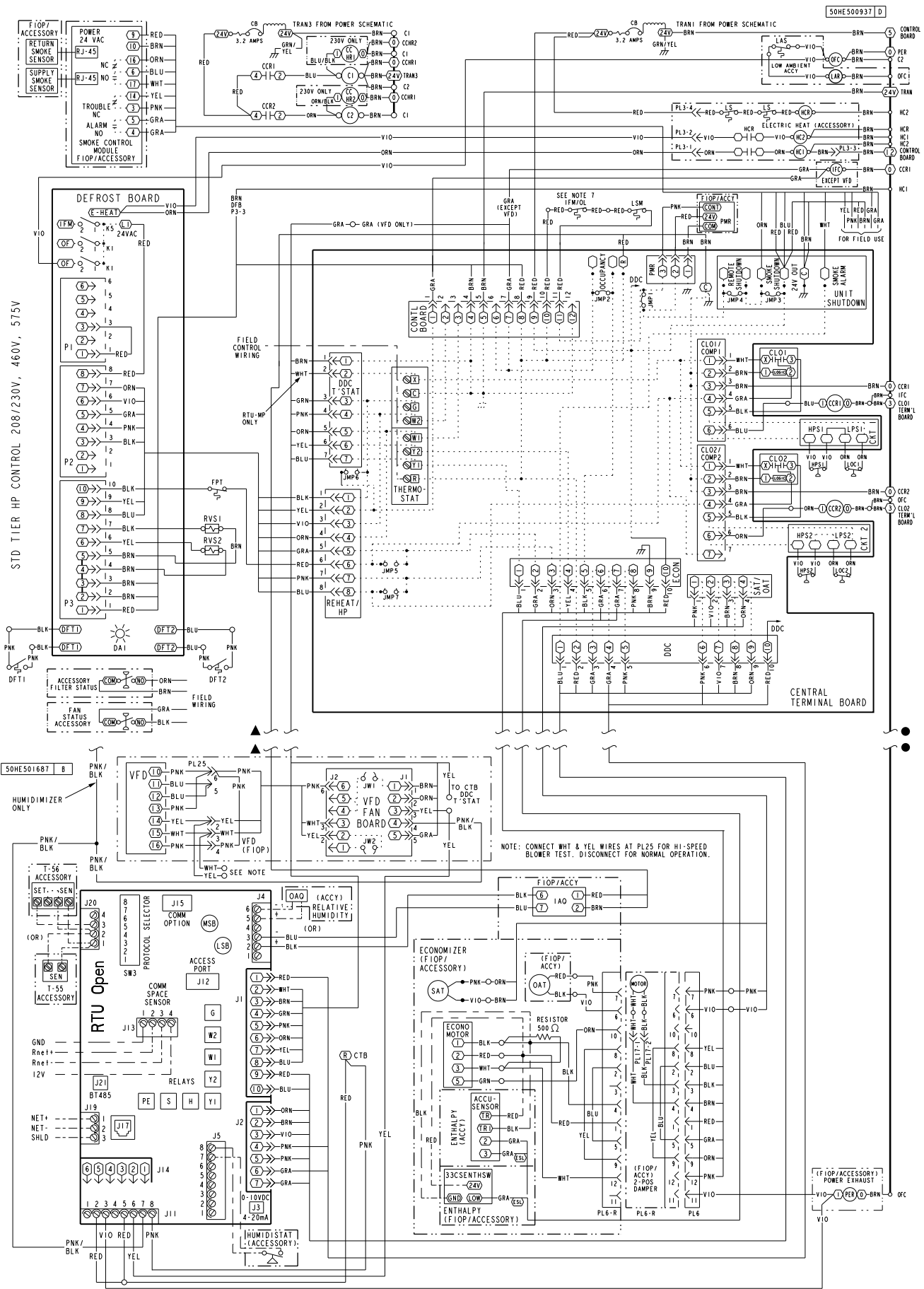


Fig. 13 - RTU Open System Control Wiring Diagram



# SEQUENCE OF OPERATION

## Cooling, unit without economizer

### Cooling (Single speed indoor fan motor) —

When thermostat calls for cooling, terminals G and Y1 are energized. The indoor fan contactor (IFC), reversing valve solenoid (RVS) and compressor contactor are energized and indoor fan motor, compressor, and outdoor fan starts. The outdoor fan motor runs continuously while unit is cooling.

Two-stage models: If Stage 1 cooling does not satisfy the space load, the space temperature will rise until thermostat calls for Stage 2 cooling (Y2 closes). Defrost Board activates Stage 2 Compressor. Reversing valve 2 switches to Cooling position. Compressor 2 contactor is energized; Compressor 2 starts and Circuit 2 operates in Cooling mode.

When Cooling Stage 2 is satisfied, thermostat Y2 opens. Compressor 2 contactor is de-energized; Compressor 2 stops. Reversing Valve 2 remains energized.

When Cooling Stage 1 is satisfied, thermostat Y1 opens. Compressor 1 contactor is de-energized; Compressor 1 stops. Outdoor fan relay is de-energized; outdoor fans stop. After the Fan Delay period, the Indoor fan contactor is de-energized; indoor fan stops (unless Continuous Fan operation has been selected). Reversing Valve 1 remains energized.

Reversing valve solenoids are energized in Cooling modes. Each solenoid will remain energized until the next Heating mode is initiated for this circuit.

### Cooling (2-speed indoor fan motor) —

Per ASHRAE 90.1 2010 standard section 6.4.3.10.b, during the first stage of cooling operation the VFD will adjust the fan motor to provide 2/3rd of the total cfm established for the unit. When a call for the second stage of cooling is required, the VFD will allow the total cfm for the unit established (100%).

## Heating, unit without economizer

Upon a request for heating from the space thermostat, terminal W1 will be energized with 24V. The IFC, outdoor fan contactor (OFC), C1, and C2 will be energized. The indoor fan, outdoor fans, and compressor no. 1, and compressor no. 2 are energized and reversing valves are de-energized and switch position.

If the space temperature continues to fall while W1 is energized, W2 will be energized with 24V, and the heater contactor(s) (HC) will be energized, which will energize the electric heater(s).

When the space thermostat is satisfied, W2 will be de-energized first, and the electric heater(s) will be de-energized.

Upon a further rise in space temperature, W1 will be de-energized.

Two compressor models: When the thermostat calls for heating, terminal W1 is energized. Defrost Board de-energizes both reversing valve solenoids and reversing valves move to Heating position. The indoor fan contactor is energized; indoor fan motor starts. Outdoor fan relay is energized; both outdoor fan motors run. Compressor contactors C1 and C2 are energized; both refrigeration circuits operate in Heating mode.

If Stage 1 heating does not satisfy the space load, the space temperature will fall until thermostat calls for Stage 2 heating (W2 closes). Terminal W2 is energized. Defrost Board issues an output at EHEAT. Heater contactor 1 and heater contactor 2 (if installed) are energized; all electric heaters are energized.

When space heating load is partially satisfied, thermostat terminal W2 is de-energized; heater contactors are de-energized and all electric heat is terminated. Stage 1 heating continues.

When the space heating load is fully satisfied, thermostat terminal W1 is also de-energized.

Reversing valve solenoids remain de-energized until the next call for Cooling mode is initiated.

## Cooling, unit with EconoMi\$er™ IV or EconoMi\$er X

When free cooling is not available, the compressors will be controlled by the zone thermostat. When free cooling is available, the outdoor air damper is modulated by the EconoMi\$er IV or X control to provide a 50 to 55°F (10° to 13°C) mixed air temperature into the zone. As the mixed air temperature fluctuates above 55 or below 50°F (13° to 10°C), the dampers will be modulated (open or close) to bring the mixed air temperature back within control.

If mechanical cooling is utilized with free cooling, the outdoor air damper will maintain its current position at the time the compressor is started. If the increase in cooling capacity causes the mixed air temperature to drop below 45°F (7°C), then the outdoor air damper position will be decreased to the minimum position. If the mixed air temperature continues to fall, the outdoor air damper will close. Control returns to normal once the mixed air temperature rises above 48°F (9°C).

If optional power exhaust is installed, as the outdoor air damper opens and closes, the power exhaust fans will be energized and de-energized.

If field-installed accessory CO<sub>2</sub> sensors are connected to the EconoMi\$er IV or X control, a demand controlled ventilation strategy will begin to operate. As the CO<sub>2</sub> level in the zone increases above the CO<sub>2</sub> setpoint, the minimum position of the damper will be increased proportionally. As the CO<sub>2</sub> level decreases because of the increase in fresh air, the outdoor air damper will be proportionally closed.

## SEQUENCE OF OPERATION (cont.)

For EconoMi\$er IV or X operation, there must be a thermostat call for the fan (G). If the unit is occupied and the fan is on, the damper will operate at minimum position. Otherwise, the damper will be closed.

When the EconoMi\$er IV or X control is in the occupied mode and a call for cooling exists (Y1 on the thermostat), the control will first check for indoor fan operation. If the fan is not on, then cooling will not be activated. If the fan is on, then the control will open the EconoMi\$er IV or X damper to the minimum position.

On the initial power to the EconoMi\$er IV or X control, it will take the damper up to 2<sup>1</sup>/<sub>2</sub> minutes before it begins to position itself. Any change in damper position will take up to 30 seconds to initiate. Damper movement from full closed to full open (or vice versa) will take between 1<sup>1</sup>/<sub>2</sub> and 2<sup>1</sup>/<sub>2</sub> minutes.

If free cooling can be used as determined from the appropriate changeover command (switch, dry bulb, enthalpy curve, differential dry bulb, or differential enthalpy), then the control will modulate the dampers open to maintain the mixed air temperature setpoint at 50° to 55°F (10° to 13°C).

If there is a further demand for cooling (cooling second stage — Y2 is energized), then the control will bring on compressor stage 1 to maintain the mixed air temperature setpoint. The EconoMi\$er IV or X damper will be open at maximum position. EconoMi\$er IV or X operation is limited to a single compressor.

2-Speed Note: When operating in ventilation mode only, the indoor fan motor will automatically adjust to 2/3rd of the total cfm established.

### Heating, unit with EconoMi\$er

When the room temperature calls for heat through terminal W1, the indoor (evaporator) fan contactor (IFC) and heater contactor no. 1 (HC1) are energized and the reversing valve(s) de-energize and switches position. On units equipped for 2 stages of heat, when additional heat is needed, heater contactor no. 2 is energized through W2. The economizer damper moves to the minimum position. When the thermostat is satisfied, the damper moves to the fully closed position.

### Cooling, unit with EconoMi\$er2, PremierLink™ control and a thermostat

When free cooling is not available, the compressors will be controlled by the PremierLink control in response to the Y1 and Y2 inputs from the thermostat.

The PremierLink control will use the following information to determine if free cooling is available:

- Indoor fan has been on for at least 30 seconds.
- The SPT, SAT, and OAT inputs must have valid readings.
- OAT must be less than 75°F (24°C).
- OAT must be less than SPT.

- Enthalpy must be LOW (may be jumpered if an enthalpy sensor not available).
- Economizer position is NOT forced.

Pre-cooling occurs when there is no call from the thermostat except G. Pre-cooling is defined as the economizer modulates to provide 70°F (21°C) supply air.

When free cooling is available the PremierLink control will control the compressors, energize the reversing valve(s) and economizer to provide a supply air temperature determined to meet the Y1 and Y2 calls from the thermostat.

If optional power exhaust is installed, as the outdoor air damper opens and closes, the power exhaust fans will be energized and de-energized.

If field-installed accessory CO<sub>2</sub> sensors are connected to the PremierLink control, a PID controlled demand ventilation strategy will begin to operate. As the CO<sub>2</sub> level in the zone increases above the CO<sub>2</sub> setpoint, the minimum position of the damper will be increased proportionally. As the CO<sub>2</sub> level decreases because of the increase in fresh air, the outdoor air damper will be proportionally closed.

### Heating, unit with EconoMi\$er2, PremierLink control and a thermostat

When the thermostat calls for heating, terminal W1 is energized. The PremierLink control will move the economizer damper to the minimum position if there is a call for G and closed if there is a call for W1 without G. In order to prevent thermostat from short cycling, the unit is locked into the heating mode for at least 10 minutes when W1 is energized. The reversing valve solenoid(s) de-energizes and switches position.

On units equipped for two stages of heat, when additional heat is needed, W2 is energized and the electric heat (if used) comes on. When the thermostat is satisfied and W1 is de-energized, the IFM stops.

### Cooling, unit with EconoMi\$er2, PremierLink control and a room sensor

When free cooling is not available, the compressors will be controlled by the PremierLink controller using a PID Error reduction calculation.

The PremierLink controller will use the following information to determine if free cooling is available:

- Indoor fan has been on for at least 30 seconds.
- The SPT, SAT, and OAT inputs must have valid readings.
- OAT must be less than 75°F (24°C).
- OAT must be less than SPT.
- Enthalpy must be LOW (may be jumpered if an enthalpy sensor is not available).
- Economizer position is NOT forced.

## SEQUENCE OF OPERATION (cont.)

When free cooling is available, the outdoor air damper is positioned through the use of a Proportional Integral (PID) control process to provide a calculated supply air temperature into the zone. The supply air will maintain the space temperature between the heating and cooling setpoints.

The PremierLink control will integrate the compressors stages with the economizer based on similar logic as the three routines listed in the previous section. The SASP will float up and down based on the error reduction calculations that compare space temperature and space setpoint. The reversing valves will be energized.

If an optional power exhaust is installed, as the outdoor air damper opens and closes, the power exhaust fans will be energized and de-energized.

If field- installed accessory CO<sub>2</sub> sensors are connected to the PremierLink™ control, a PID-controlled demand ventilation strategy will begin to operate. As the CO<sub>2</sub> level in the zone increases above the CO<sub>2</sub> setpoint, the minimum position of the damper will be increased proportionally. As the CO<sub>2</sub> level decreases because of the increase in fresh air, the outdoor air damper will be proportionally closed.

### Heating, unit with EconMi\$er2, PremierLink control and a room sensor

Every 40 seconds the controller will calculate the required heat stages (maximum of 3) to maintain Supply Air Temperature (SAT) if the following qualifying conditions are met:

- Indoor fan has been on for at least 30 seconds.
- COOL mode is not active.
- OCCUPIED, TEMP.COMPENSATED START or HEAT mode is active.
- SAT reading is available.
- Fire shutdown mode is not active.

If all of the above conditions are met, the number of heat stages is calculated; otherwise the required number of heat stages will be set to 0.

If the PremierLink controller determines that heat stages are required, the economizer damper will be moved to minimum position if occupied and closed if unoccupied.

### Defrost

When the temperature of the outdoor coil drops below 28°F (-2°C) as sensed by the defrost thermostat (DFT2) and the defrost timer is at the end of a timed period (adjustable at 30, 60, 90 or 120 minutes), reversing valve solenoids (RVS1 and RVS2) are energized and the OFC is de-energized. This switches the position of the reversing valves and shuts off the outdoor fan. The electric heaters (if installed) will be energized.

The unit continues to defrost until the coil temperature as measured by DFT2 reaches 65°F (18°C), or the duration of defrost cycle completes a 10-minute period.

During the Defrost mode, if circuit 1 defrosts first, RVS1 will oscillate between Heating and Cooling modes until the Defrost mode is complete.

At the end of the defrost cycle, the electric heaters (if installed) will be de-energized; the reversing valves switch and the outdoor fan motor will be energized. The unit will now operate in the Heating mode.

If the space thermostat is satisfied during a defrost cycle, the unit will continue in the Defrost mode until the time or temperature constraints are satisfied.

### Automatic changeover

When the system selection switch is set at AUTO. position, unit automatically changes from heating operation to cooling operation when the temperature of the conditioned space rises to the cooling level setting. When the temperature of the conditioned space falls to the heating level setting, unit automatically changes from cooling to heating operation (with a 3°F deadband in between).

### Continuous air circulation

Turn unit power on. Set system control at OFF position. Set fan switch at ON position. The indoor fan contactor is energized through the thermostat switch and the indoor fan runs continuously.

### Emergency heat

When the switch is on (thermostat is set to the EM HT position), compressor circuit and outdoor thermostats are bypassed, and the second stage of thermostat energizes the indoor blower and the electric resistance heaters.

# GUIDE SPECIFICATIONS - 50TCQD17, 24

Note about this specification:

These specifications are written in “Masterformat” as published by the Construction Specification Institute. Please feel free to copy this specification directly into your building spec.

## Cooling Only/Electric Heat Packaged Rooftop

### HVAC Guide Specifications

Size Range: 15 and 20 Nominal Tons



50TCQD

<u>Section</u>	<u>Description</u>
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<b>23 06 80</b>	<b>Schedules for Decentralized HVAC Equipment</b>
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- |                |   |
|----------------|---|
| 23 06 80.13    | Decentralized Unitary HVAC Equipment Schedule           |
| 23 06 80.13.A. | Rooftop unit schedule                                   |
| 1.             | Schedule is per the project specification requirements. |

<b>23 07 16</b>	<b>HVAC Equipment Insulation</b>
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- |                |   |
|----------------|---|
| 23 07 16.13    | Decentralized, Rooftop Units:   |
| 23 07 16.13.A. | Evaporator fan compartment:   |
| 1.             | Interior cabinet surfaces shall be insulated with a minimum 1/2-in. thick, minimum 1 1/2 lb density, flexible fiberglass insulation bonded with a phenolic binder, neoprene coated on the air side. |
| 2.             | Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.   |
| 23 07 16.13.B. | Electric heat compartment:  |
| 1.             | Aluminum foil-faced fiberglass insulation shall be used.  |
| 2.             | Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.   |

<b>23 09 13</b>	<b>Instrumentation and Control Devices for HVAC</b>
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- |                |   |
|----------------|---|
| 23 09 13.23    | Sensors and Transmitters  |
| 23 09 13.23.A. | Thermostats   |
| 1.             | Thermostat must   |
| a.             | energize both “W” and “G” when calling for heat.  |
| b.             | have capability to energize 2 different stages of cooling, and 2 different stages of heating. |
| c.             | include capability for occupancy scheduling.  |

<b>23 09 23</b>	<b>Direct-digital Control system for HVAC</b>
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- |                |  |
|----------------|--|
| 23 09 23.13    | Decentralized, Rooftop Units:  |
| 23 09 23.13.A. | PremierLink™ controller  |
| 1.             | Shall be ASHRAE 62-2001 compliant.   |
| 2.             | Shall accept 18-32VAC input power.   |
| 3.             | Shall have an operating temperature range from -40°F (-40°C) to 158°F (70°C), 10% - 95% RH (non-condensing).   |
| 4.             | Shall include an integrated economizer controller to support an economizer with 4 to 20 mA actuator input and no microprocessor controller.  |
| 5.             | Controller shall accept the following inputs: space temperature, setpoint adjustment, outdoor air temperature, indoor air quality, outdoor air quality, indoor relative humidity, compressor lock-out, fire shutdown, enthalpy, fan status, remote time clock/door switch. |
| 6.             | Shall accept a CO <sub>2</sub> sensor in the conditioned space, and be Demand Control Ventilation (DCV) ready.   |
| 7.             | Shall provide the following outputs: Economizer, fan, cooling stage 1, cooling stage 2, heat stage 1, heat stage 2, heat stage 3/ exhaust/ reversing valve/ dehumidify/ occupied.  |
| 8.             | Unit shall provide surge protection for the controller through a circuit breaker.  |
| 9.             | Shall be Internet capable, and communicate at a Baud rate of 38.4K or faster   |
| 10.            | Shall have an LED display independently showing the status of activity on the communication bus, and processor operation.  |

11. Shall include an EIA-485 protocol communication port, an access port for connection of either a computer or a Carrier technician tool, an EIA-485 port for network communication to intelligent space sensors and displays, and a port to connect an optional LonWorks plug-in communications card.
12. Shall have built-in Carrier Comfort Network (CCN) protocol, and be compatible with other CCN devices, including ComfortVIEW controllers.
13. Shall have built-in support for Carrier technician tool.
14. Software upgrades will be accomplished by local download. Software upgrades through chip replacements are not allowed.
15. Shall be shock resistant in all planes to 5G peak, 11ms during operation, and 100G peak, 11ms during storage.
16. Shall be vibration resistant in all planes to 1.5G @ 20-300 Hz.
17. Shall support a bus length of 4000 ft max, 60 devices per 1000 ft section, and 1 RS-485 repeater per 1000ft sections.

23 09 23.13.B. RTU Open Multi protocol, direct digital controller:

1. Shall be ASHRAE 62-2001 compliant.
2. Shall accept 18-30VAC, 50-60Hz, and consumer 15VA or less power.
3. Shall have an operating temperature range from -40°F (-40°C) to 130°F (54°C), 10% - 90% RH (non-condensing).
4. Shall include built-in protocol for BACNET (MS/TP and PTP modes), Modbus (RTU and ASCII), Johnson N2 and LonWorks. LonWorks Echelon processor required for all Lon applications shall be contained in separate communication board.
5. Shall allow access of up to 62 network variables (SNVT). Shall be compatible with all open controllers
6. Baud rate Controller shall be selectable using a dipswitch.
7. Shall have an LED display independently showing the status of serial communication, running, errors, power, all digital outputs, and all analog inputs.
8. Shall accept the following inputs: space temperature, setpoint adjustment, outdoor air temperature, indoor air quality, outdoor air quality, compressor lock-out, fire shutdown, enthalpy switch, and fan status/filter status/humidity/ remote occupancy.
9. Shall provide the following outputs: economizer, fan, cooling stage 1, cooling stage 2, heat stage 1, heat stage 2, heat stage 3/ exhaust/ reversing valve.
10. Shall have built-in surge protection circuitry through solid state polyswitches. Polyswitches shall be used on incoming power and network connections. Polyswitches will return to normal when the “trip” condition clears.
11. Shall have a battery back-up capable of a minimum of 10,000 hours of data and time clock retention during power outages.
12. Shall have built-in support for Carrier technician tool.
13. Shall include an EIA-485 protocol communication port, an access port for connection of either a computer or a Carrier technician tool, an EIA-485 port for network communication to intelligent space sensors and displays, and a port to connect an optional LonWorks communications card.
14. Software upgrades will be accomplished by either local or remote download. No software upgrades through chip replacements are allowed.

**23 09 33 Electric and Electronic Control System for HVAC**

23 09 33.13 Decentralized, Rooftop Units:

23 09 33.13.A. General:

1. Shall be complete with self-contained low-voltage control circuit protected by a resettable circuit breaker on the 24-v transformer side. Transformer shall have 75VA capability.
2. Shall utilize color-coded wiring.
3. Shall include a central control terminal board to conveniently and safely provide connection points for vital control functions such as: smoke detectors, phase monitor, economizer, thermostat, DDC control options, and low and high pressure switches.
4. Unit shall include a minimum of one 8-pin screw terminal connection board for connection of control wiring.
5. Shall include integrated defrost system to prevent excessive frost accumulation during heating duty, and shall be controlled as follows:
  - a. Defrost shall be initiated on the basis of time and coil temperature.
  - b. A 30,60,90,120 minute timer shall activate the defrost cycle only if the coil temperature is low enough to indicate a heavy frost condition.
  - c. Defrost cycle shall terminate when defrost thermostat is satisfied and shall have a positive termination time of 10 minutes.
6. Defrost system shall also include:

- a. Defrost Cycle Indicator LED.
- b. Dip switch selectable defrost time between 30, 60, 90 and 120 minutes. Factory set at 30 minutes.
- c. Molded plug connection to insure proper connection.

23 09 33.23.B. Safeties:

1. Compressor over-temperature, over current.
2. Loss of charge switch.
  - a. Units with 2 compressors shall have different sized connectors for the circuit 1 and circuit 2 loss of charge switches. They shall physically prevent the cross-wiring of the safety switches between circuits 1 and 2.
  - b. Loss of charge switch shall use different color wire than the high pressure switch. The purpose is to assist the installer and service technician to correctly wire and or troubleshoot the rooftop unit.
3. High pressure switch
  - a. Units with 2 compressors shall have different sized connectors for the circuit 1 and circuit 2 high pressure switches. They shall physically prevent the cross-wiring of the safety switches between circuits 1 and 2.
  - b. High pressure switch shall use different color wire than the low pressure switch. The purpose is to assist the installer and service technician to correctly wire and or troubleshoot the rooftop unit.
4. Freeze protection thermostat, evaporator coil.
5. Automatic reset, motor thermal overload protector.

**23 09 93 Sequence of Operations for HVAC Controls**

23 09 93.13 Decentralized, Rooftop Units:

23 09 93.13.A INSERT SEQUENCE OF OPERATION

**23 40 13 Panel Air Filters**

23 40 13.13 Decentralized, Rooftop Units:

23 40 13.13.A. Standard filter section

1. Shall consist of factory-installed, low velocity, throwaway 2-in. thick fiberglass filters of commercially available sizes.
2. Unit shall use only one filter size. Multiple sizes are not acceptable.
3. Filters shall be accessible through a dedicated, weather tight panel.
4. 4-in. filter capabilities shall be capable with pre engineered and approved Carrier filter track field installed accessory. This kit requires field furnished filters.

**23 81 19 Self-Contained Air Conditioners**

23 81 19.13 Medium-Capacity Self-Contained Air Conditioners (50TCQD17, 24)

23 81 19.13.A. General

1. Outdoor, rooftop mounted, electrically controlled, heating and cooling unit utilizing a(n) hermetic scroll compressor(s) for cooling duty and gas combustion for heating duty.
2. Factory assembled, single-piece heating and cooling rooftop unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, and special features required prior to field start-up.
3. Unit shall use environmentally safe, Puron refrigerant.
4. Unit shall be installed in accordance with the manufacturer's instructions.
5. Unit must be selected and installed in compliance with local, state, and federal codes.

23 81 19.13.B. Quality Assurance

1. Unit meets ASHRAE 90.1-2007 minimum efficiency requirements.
2. Unit shall be rated in accordance with AHRI Standard 340/360.
3. Unit shall be designed to conform to ASHRAE 15.
4. Unit shall be ETL-tested and certified in accordance with ANSI Z21.47 Standards and ETL-listed and certified under Canadian standards as a total package for safety requirements.
5. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
6. Unit casing shall be capable of withstanding 500-hour salt spray exposure per ASTM B117 (scribed specimen).
7. Unit casing shall be capable of withstanding Federal Test Method Standard No. 141 (Method 6061) 5000-hour salt spray.
8. Unit shall be designed in accordance with ISO 9001.
9. Roof curb shall be designed to conform to NRCA Standards.
10. Unit shall be subjected to a completely automated run test on the assembly line. The data for each unit will be stored at the factory, and must be available upon request.

11. Unit shall be designed in accordance with UL Standard 1995, including tested to withstand rain.
  12. Unit shall be constructed to prevent intrusion of snow and tested to prevent snow intrusion into the control box up to 40 mph.
  13. Unit shake tested to assurance level 1, ASTM D4169 to ensure shipping reliability.
  14. High Efficient Motors listed shall meet section 313 of the Energy Independence and Security Act of 2007 (EISA 2007).
- 23 81 19.13.C. Delivery, Storage, and Handling
1. Unit shall be stored and handled per manufacturer's recommendations.
  2. Lifted by crane requires either shipping top panel or spreader bars.
  3. Unit shall only be stored or positioned in the upright position.
- 23 81 19.13.D. Project Conditions
1. As specified in the contract.
- 23 81 19.13.E. Operating Characteristics
1. Unit shall be capable of starting and running at 115°F (46°C) ambient outdoor temperature, meeting maximum load criteria of AHRI Standard 340/360 at ± 10% voltage.
  2. Compressor with standard controls shall be capable of operation from 30°F (-1°C) , ambient outdoor temperatures. Accessory kits are necessary if mechanically cooling at ambient temperatures below 30°F (-1°C).
  3. Unit shall discharge supply air vertically or horizontally as shown on contract drawings.
  4. Unit shall be factory configured and ordered for vertical supply & return configurations.
  5. Unit shall be factory furnished for either vertical or horizontal configuration without the use of special conversion kits. No field kits conversion is possible.
  6. Unit shall be capable of mixed operation: vertical supply with horizontal return or horizontal supply with vertical return.
- 23 81 19.13.F. Electrical Requirements
1. Main power supply voltage, phase, and frequency must match those required by the manufacturer.
- 23 81 19.13.G. Unit Cabinet
1. Unit cabinet shall be constructed of galvanized steel, and shall be bonderized and coated with a pre-painted baked enamel finish on all externally exposed surfaces.
  2. Unit cabinet exterior paint shall be: film thickness, (dry) 0.003 inches minimum, gloss (per ASTM D523, 60°F): 60, Hardness: H-2H Pencil hardness.
  3. Evaporator fan compartment interior cabinet insulation shall conform to AHRI Standards 340/360 minimum exterior sweat criteria. Interior surfaces shall be insulated with a minimum 1/2-in. thick, 1 lb density, flexible fiberglass insulation, neoprene coated on the air side. Aluminum foil-faced fiberglass insulation shall be used in the heat compartment.
  4. Base of unit shall have a minimum of four locations for factory thru-the-base electrical connections. Connections shall be internal to the cabinet to protect from environmental issues.
  5. Base Rail
    - a. Unit shall have base rails on a minimum of 2 sides.
    - b. Holes shall be provided in the base rails for rigging shackles to facilitate maneuvering and overhead rigging.
    - c. Holes shall be provided in the base rail for moving the rooftop by fork truck.
    - d. Base rail shall be a minimum of 16 gauge thickness.
  6. Condensate pan and connections:
    - a. Shall be a sloped condensate drain pan made of a non-corrosive material.
    - b. Shall comply with ASHRAE Standard 62.
    - c. Shall use a 3/4-in -14 NPT drain connection at the end of the drain pan. Connection shall be made per manufacturer's recommendations.
  7. Top panel:
    - a. Shall be a multi-piece top panel linked with water tight flanges and interlocking systems.
  8. Electrical Connections
    - a. All unit power wiring shall enter unit cabinet at a single, factory-prepared, knockout location.
    - b. Thru-the-base capability
      - (1.) Thru-the-base provisions/connections are available as standard with every unit. When bottom connections are required, field furnished couplings are required.
      - (2.) No basepan penetration, other than those authorized by the manufacturer, is permitted.

9. Component access panels (standard)
  - a. Cabinet panels shall be easily removable for servicing.
  - b. Unit shall have one factory installed, tool-less, removable, filter access panel.
  - c. Panels covering control box and filters shall have molded composite handles while the blower access door shall have an integrated flange for easy removal.
  - d. Handles shall be UV modified, composite, permanently attached, and recessed into the panel.
  - e. Screws on the vertical portion of all removable access panel shall engage into heat resistant, molded composite collars.
  - f. Collars shall be removable and easily replaceable using manufacturer recommended parts.

#### 23 81 19.13.H. Coils

1. Standard Aluminum/Copper Coils: on all models.
  - a. Standard evaporator and condenser coils shall have aluminum lanced plate fins mechanically bonded to seamless internally grooved copper tubes with all joints brazed.
  - b. Evaporator coils shall be leak tested to 150 psig, pressure tested to 450 psig, and qualified to UL 1995 burst test at 1775 psig.
  - c. Condenser coils shall be leak tested to 150 psig, pressure tested to 650 psig, and qualified to UL 1995 burst test at 1980 psig.
2. Optional Pre-coated aluminum fin condenser coils: on all models.
  - a. Shall have a durable epoxy-phenolic coating to provide protection in mildly corrosive coastal environments.
  - b. 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.
  - c. Epoxy-phenolic barrier shall minimize galvanic action between dissimilar metals.
3. Optional Copper-fin evaporator and condenser coils: on all models.
  - a. Shall be constructed of copper fins mechanically bonded to copper tubes and copper tube sheets.
  - b. Galvanized steel tube sheets shall not be acceptable.
  - c. A polymer strip shall prevent coil assembly from contacting the sheet metal coil pan to minimize potential for galvanic corrosion between coil and pan.
4. Optional E-coated aluminum-fin evaporator and condenser coils: on all models.
  - a. Shall have a flexible epoxy polymer coating uniformly applied to all coil surface areas without material bridging between fins.
  - b. Coating process shall ensure complete coil encapsulation of tubes, fins and headers.
  - c. Color shall be high gloss black with gloss per ASTM D523-89.
  - d. Uniform dry film thickness from 0.8 to 1.2 mil on all surface areas including fin edges.
  - e. Superior hardness characteristics of 2H per ASTM D3363-92A and cross-hatch adhesion of 4B-5B per ASTM D3359-93.
  - f. Impact resistance shall be up to 160 in.-lb (ASTM D2794-93).
  - g. Humidity and water immersion resistance shall be up to minimum 1000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92).
  - h. Corrosion durability shall be confirmed through testing to be no less than 1000 hours salt spray per ASTM B117-90.

#### 23 81 19.13.I. Refrigerant Components

1. Refrigerant circuit shall include the following control, safety, and maintenance features:
  - a. Thermostatic Expansion Valve (TXV) shall help provide optimum performance across the entire operating range. Shall contain removable power element to allow change out of power element and bulb without removing the valve body.
  - b. High capacity refrigerant filter drier on each refrigerant circuit.
  - c. Service gauge connections on suction and discharge lines.
  - d. Pressure gauge access through a specially designed screen on the side of the unit.
  - e. Precision-sized suction line accumulator on each refrigerant circuit shall protect from oil being removed from the scroll compressor rotating orbiter and plate during the activation of the defrost mode and switching back and forth from cooling and heating operations.
2. Compressors
  - a. Unit shall use one fully hermetic, scroll compressor for each independent refrigeration circuit.
  - b. Models shall be available with 2 compressor/2 stage cooling.
  - c. Compressor motors shall be cooled by refrigerant gas passing through motor windings.



- d. Compressors shall be internally protected from high discharge temperature conditions.
- e. Compressors shall be protected from an over-temperature and over-amperage conditions by an internal, motor overload device.
- f. Compressor shall be factory mounted on rubber grommets.
- g. Compressor motors shall have internal line break thermal, current overload and high pressure differential protection.
- h. Crankcase heaters shall be provided by the factory.

#### 23 81 19.13.J. Filter Section

- 1. Filters access is specified in the unit cabinet section of this specification.
- 2. Filters shall be held in place by a preformed slide out filter tray, facilitating easy removal and installation.
- 3. Shall consist of factory-installed, low velocity, throw-away 2-in. thick fiberglass filters.
- 4. Filters shall be standard, commercially available sizes.
- 5. Only one size filter per unit is allowed.
- 6. 4-in filter capability is possible with a field installed pre engineered slide out filter track accessory. 4-in filters are field furnished.

#### 23 81 19.13.K. Evaporator Fan and Motor

- 1. Evaporator fan motor:
  - a. Shall have inherent automatic-reset thermal overload protection or circuit breaker.
  - b. Shall have a maximum continuous bhp rating for continuous duty operation; no safety factors above that rating shall be required.
- 2. Belt-driven Evaporator Fan:
  - a. Belt drive shall include an adjustable-pitch motor pulley and belt break protection system.
  - b. Shall use rigid pillow block bearing system with lubricate fittings at are accessible or lubrication line.
  - c. Blower fan shall be double-inlet type with forward-curved blades.
  - d. Shall be constructed from steel with a corrosion resistant finish and dynamically balanced.

#### 23 81 19.13.L. Condenser Fans and Motors

- 1. Condenser fan motors:
  - a. Shall be a totally enclosed motor.
  - b. Shall use permanently lubricated bearings.
  - c. Shall have inherent thermal overload protection with an automatic reset feature.
  - d. Shall use a shaft-down design.
- 2. Condenser Fans:
  - a. Shall be a direct-driven propeller type fan.
  - b. Shall have aluminum blades riveted to corrosion-resistant steel spiders and shall be dynamically balanced.

#### 23 81 19.13.M. Special Features, Options and Accessories

- 1. Staged Air Volume System (SAV) for 2-stage cooling models only:
  - a. Evaporator fan motor:
    - (1.) Shall have permanently lubricated bearings.
    - (2.) Shall have a maximum continuous bhp rating for continuous duty operation; no safety factors above that rating.
    - (3.) Shall be Variable Frequency duty and 2-speed control.
    - (4.) Shall contain motor shaft grounding ring to prevent electrical bearing fluting damage by safely diverting harmful shaft voltages and bearing currents to ground.
- 2. Variable Frequency Drive (VFD). Only available on 2-speed indoor fan motor option (SAV):
  - a. Shall be installed inside the unit cabinet, mounted, wired and tested.
  - b. Shall contain Electromagnetic Interference (EMI) frequency protection.
  - c. Insulated Gate Bi-Polar Transistors (IGBT) used to produce the output pulse width modulated (PWM) waveform, allowing for quiet motor operation.
  - d. Self diagnostics with fault and power code LED indicator. Field accessory Display Kit available for further diagnostics and special setup applications.
  - e. RS485 capability standard.
  - f. Electronic thermal overload protection.
  - g. 5% swinging chokes for harmonic reduction and improved power factor.
  - h. All printed circuit boards shall be conformal coated.

3. Standard Integrated Economizers:
  - a. Integrated, gear-driven parallel modulating blade design type capable of simultaneous economizer and compressor operation.
  - b. Independent modules for vertical or horizontal return configurations shall be available. Vertical and horizontal return modules shall be available as a factory installed option.
  - c. Damper blades shall be galvanized steel with composite gears. Plastic or composite blades on intake or return shall not be acceptable.
  - d. Shall include all hardware and controls to provide free cooling with outdoor air when temperature and/or humidity are below setpoints.
  - e. Shall be equipped with gear driven dampers for both the outdoor ventilation air and the return air for positive air stream control.
  - f. Standard models shall be equipped with low-leakage dampers, not to exceed 2% leakage at 1 in. wg pressure differential. Economizer controller on electromechanical units shall be Honeywell W7212 that provides:
    - (1.) Combined minimum and DCV maximum damper position potentiometers with compressor staging relay.
    - (2.) Functions with solid state analog enthalpy or dry bulb changeover control sensing.
    - (3.) Contain LED indicates for:
      - When free cooling is available
      - When module is in DCV mode
      - When exhaust fan contact is closed
  - g. Ultra low leak EconoMiSer X system shall be available on models with SAV 2-speed Variable Frequency Drive (VFD) systems. Only available on 2-speed indoor fan motor systems with electromechanical controls or RTU Open.
    - (1.) Maximum damper leakage rate to be equal to or less than 4.0 cfm/sq. ft. at 1.0 in. w.g., meeting or exceeding ASHRAE 90.1 requirements. Economizer controller on electromechanical units shall be Honeywell W7220 that provides:
      - (2.) 2-line LCD interface screen for setup, configuration and troubleshooting
      - (3.) On-board fault detection and diagnostics
      - (4.) Sensor failure loss of communication identification
      - (5.) Automatic sensor detection
      - (6.) Capabilities for use with multiple-speed indoor fan systems
      - (7.) Utilize digital sensors: Dry bulb and Enthalpy
  - h. Shall be capable of introducing up to 100% outdoor air.
    - i. Shall be equipped with a barometric relief damper capable of relieving up to 100% return air.
    - j. Shall be designed to close damper(s) during loss-of-power situations with spring return built into motor.
  - k. Dry bulb outdoor air temperature sensor shall be provided as standard. Outdoor air sensor setpoint shall be adjustable and shall range from 40 to 100°F / 4 to 38°C. Additional sensor options shall be available as accessories.
    - l. The economizer controller shall also provide control of an accessory power exhaust unit function. Factory set at 100%, with a range of 0% to 100%.
  - m. The economizer shall maintain minimum airflow into the building during occupied period and provide design ventilation rate for full occupancy. A remote potentiometer may be used to override the damper setpoint.
  - n. Dampers shall be completely closed when the unit is in the unoccupied mode.
  - o. Economizer controller shall accept a 2-10 Vdc CO<sub>2</sub> sensor input for IAQ/DCV control. In this mode, dampers shall modulate the outdoor air damper to provide ventilation based on the sensor input.
  - p. Compressor lockout sensor shall open at 35°F (2°C) and close closes at 50°F (10°C).
  - q. Actuator shall be direct coupled to economizer gear. No linkage arms or control rods shall be acceptable.
  - r. Economizer controller shall provide indications when in free cooling mode, in the DCV mode, or the exhaust fan contact is closed.
4. Two-Position Damper
  - a. Damper shall be a Two-Position Damper. Damper travel shall be from the full closed position to the field adjustable %-open setpoint.
  - b. Damper shall include adjustable damper travel from 25% to 100% (full open).
  - c. Damper shall include single or dual blade, gear driven dampers and actuator motor.
  - d. Actuator shall be direct coupled to damper gear. No linkage arms or control rods shall be acceptable.
  - e. Damper will admit up to 100% outdoor air for applicable rooftop units.
  - f. Damper shall close upon indoor (evaporator) fan shutoff and/or loss of power.

- g. The damper actuator shall plug into the rooftop unit's wiring harness plug. No hard wiring shall be required.
  - h. Outside air hood shall include aluminum water entrainment filter.
5. Manual damper
    - a. Manual damper package shall consist of damper, air inlet screen, and rain hood which can be preset to admit up to 25% outdoor air for year round ventilation.
  6. Head Pressure Control Package
    - a. Controller shall control coil head pressure by condenser-fan speed modulation or condenser-fan cycling and wind baffles.
    - b. Shall consist of solid-state control and condenser-coil temperature sensor to maintain condensing temperature between 90°F (32°C) and 110°F (43°C) at outdoor ambient temperatures down to -20°F (-29°C).
  7. Condenser Coil Hail Guard Assembly
    - a. Shall protect against damage from hail.
    - b. Shall be louvered style design.
  8. Unit-Mounted, Non-Fused Disconnect Switch:
    - a. Switch shall be factory-installed, internally mounted.
    - b. National Electric Code (NEC) and UL approved non-fused switch shall provide unit power shutoff.
    - c. Shall be accessible from outside the unit.
    - d. Shall provide local shutdown and lockout capability.
  9. Convenience Outlet:
    - a. Powered convenience outlet.
      - (1.) Outlet shall be powered from main line power to the rooftop unit.
      - (2.) Outlet shall be powered from line side of disconnect by installing contractor, as required by code. If outlet is powered from load side of disconnect, unit electrical ratings shall be ETL certified and rated for additional outlet amperage.
      - (3.) Outlet shall be factory-installed and internally mounted with easily accessible 115-v female receptacle.
      - (4.) Outlet shall include 15 amp GFI receptacles with independent fuse protection.
      - (5.) Voltage required to operate convenience outlet shall be provided by a factory-installed step-down transformer.
      - (6.) Outlet shall be accessible from outside the unit.
      - (7.) Outlet shall include a field-installed "Wet in Use" cover.
    - b. Non-Powered convenience outlet.
      - (1.) Outlet shall be powered from a separate 115/120v power source.
      - (2.) A transformer shall not be included.
      - (3.) Outlet shall be factory-installed and internally mounted with easily accessible 115-v female receptacle.
      - (4.) Outlet shall include 15 amp GFI receptacles with independent fuse protection.
      - (5.) Outlet shall be accessible from outside the unit.
      - (6.) Outlet shall include a field-installed "Wet in Use" cover.
  10. Fan/Filter Status Switch:
    - a. Switch shall provide status of indoor evaporator fan (ON/OFF) or filter (CLEAN/DIRTY).
    - b. Status shall be displayed either over communication bus (when used with direct digital controls) or with an indicator light at the thermostat.
  11. Centrifugal Power Exhaust:
    - a. Power exhaust shall be used in conjunction with an integrated economizer.
    - b. Independent modules for vertical or horizontal return configurations shall be available.
    - c. Horizontal power exhaust is shall be mounted in return ductwork.
    - d. Power exhaust shall be controlled by economizer controller operation. Exhaust fans shall be energized when dampers open past the 0-100% adjustable setpoint on the economizer control.
  12. Roof Curbs (Vertical):
    - a. Full perimeter roof curb with exhaust capability providing separate air streams for energy recovery from the exhaust air without supply air contamination.
    - b. Formed galvanized steel with wood nailer strip and shall be capable of supporting entire unit weight.
    - c. Permits installation and securing of ductwork to curb prior to mounting unit on the curb.
  13. Adapter Curb (Vertical):

- a. Full perimeter, fully assembled and welded roof curb with exhaust capability providing separate air streams for energy recovery from the exhaust air without supply air contamination.
  - b. Formed galvanized steel with wood nailer strip and shall be capable of supporting entire unit weight.
  - c. Permits installation of new 50TCQD17-24 models to past Carrier design curb models: DP,DR,HJ,TM, and TJ. Check with Carrier sales expert of further details and information.
14. High-Static Indoor Fan Motor(s) and Drive(s):
- a. High-static motor(s) and drive(s) shall be factory-installed to provide additional performance range.
15. Outdoor Air Enthalpy Sensor:
- a. The outdoor air enthalpy sensor shall be used to provide single enthalpy control. When used in conjunction with a return air enthalpy sensor, the unit will provide differential enthalpy control. The sensor allows the unit to determine if outside air is suitable for free cooling.
16. Return Air Enthalpy Sensor:
- a. The return air enthalpy sensor shall be used in conjunction with an outdoor air enthalpy sensor to provide differential enthalpy control.
17. Indoor Air Quality (CO<sub>2</sub>) Sensor:
- a. Shall be able to provide demand ventilation indoor air quality (IAQ) control.
  - b. The IAQ sensor shall be available in duct mount, wall mount, or wall mount with LED display. The set-point shall have adjustment capability.
18. Smoke detectors:
- a. Shall be a Four-Wire Controller and Detector.
  - b. Shall be environmental compensated with differential sensing for reliable, stable, and drift-free sensitivity.
  - c. Shall use magnet-activated test/reset sensor switches.
  - d. Shall have tool-less connection terminal access.
  - e. Shall have a recessed momentary switch for testing and resetting the detector.
  - f. Controller shall include:
    - (1.) One set of normally open alarm initiation contacts for connection to an initiating device circuit on a fire alarm control panel.
    - (2.) Two Form-C auxiliary alarm relays for interface with rooftop unit or other equipment.
    - (3.) One Form-C supervision (trouble) relay to control the operation of the Trouble LED on a remote test/reset station.
    - (4.) Capable of direct connection to two individual detector modules.
    - (5.) Can be wired to up to 14 other duct smoke detectors for multiple fan shutdown applications.
19. Time Guard
- a. Shall prevent compressor short cycling by providing a 5-minute delay ( $\pm 2$  minutes) before restarting a compressor after shutdown for any reason.
  - b. One device shall be required per compressor.
20. Barometric Hood (Horizontal Economizer Applications)
- a. Shall be required when a horizontal economizer and barometric relief are required. Barometric relief damper must be installed in the return air (horizontal) duct work. This hood provides weather protection.
21. Electric Heat:
- a. Heating Section
    - (1.) 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.
    - (2.) Heater assemblies are provided with integral fusing for protection of internal heater circuits not exceeding 48 amps each. Auto reset thermo limit controls, magnetic heater contactors (24 v coil) and terminal block all mounted in electric heater control box (minimum 18 ga galvanized steel) attached to end of heater assembly.
22. California OSHPD Seismic Certification Label
- a. Units meet the seismic requirements of the International Code Council Evaluation Service (ICC-ES) document AC156 (Acceptance Criteria for Seismic Qualification by Shake-Table Testing of Nonstructural Components and Systems) and per International Building Code (IBC 2009) at an SDS (g) value of 2.00 z/h=1.0, Ip=1.5 and certified by independent structural engineers.
  - b. Units shall include a certification label that meets the CA OSHPD Special Seismic Certification pre-approval labeling requirements on the external chassis of the unit.
23. Hinged Access Panels
- a. Shall provide easy access through integrated quarter turn latches.

- b. Shall be on major panels of: filters, control box, fan motor and compressor.
24. Display Kit for Variable Frequency Drive
- a. Kit allows the ability to access the VFD controller programs to provide special setup capabilities and diagnostics.
  - b. Kit contains display module, mounting bracket and communication cable.
  - c. Display Kit can be permanently installed in the unit or used on any SAV system VFD controller as needed.

