

48TC Gas Heat Packaged Rooftop 3 to 10 Nominal Tons



Turn to the Experts.™

Product Data



(Unit shown with optional economizer and louvered hail guards.)



This product has been designed and manufactured to meet Energy Star® criteria for energy efficiency. However, proper refrigerant charge and proper air flow are critical to achieve rated capacity and efficiency. Installation of this product should follow all manufacturer's refrigerant charging and air flow instructions. **Failure to confirm proper charge and air flow may reduce energy efficiency and shorten equipment life.**

Carrier developed the first modern air conditioner in 1902. Carrier has more rooftop units installed than any other brand. Carrier was the first to use environmentally safe Puron® refrigerant, releasing the first unit in 1998 - ahead of the competition and the government mandate.

We are the experts. We have the experience. Trust us with your application.

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48TC



Turn to the Experts™

Your Carrier rooftop unit (RTU) was designed by customers for customers. With “no-strip screw” collars, handled access panels, and more we’ve made your unit easy to install, easy to maintain, easy to use, and easy to love.

Easy to install:

All WeatherMaker units are convertible to horizontal air flow; no special adapter curbs are necessary. Convertible airflow design makes it easy to adjust to unexpected job-site complications. Lighter units make easy replacement. Carrier 3-10 ton 48TC rooftops fit on existing Carrier curbs dating back to 1989. Also, our large control box gives you room to work and room to mount Carrier accessory controls.

Easy to maintain:

Carrier’s easy access handles provide quick and easy access to all 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 on. Simply remove the black, composite plug, route your gauge line(s) through the hole, and connect them to the refrigeration service valve(s). Now, you can take refrigeration system pressure readings without affecting the condenser airflow.

Easy to use:

Carrier’s newly designed, master terminal board 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. Carrier rooftops have high and low pressure switches, a filter drier, and 2” filters standard.

FEATURES AND BENEFITS

- Up to 28% lighter than similar industry units. Lighter rooftops make easier replacement jobs.
- 3-10 ton units fit on existing Carrier small rooftop curb. This saves time and money on replacement jobs.
- Standardized components and layout. Standardized components and controls make service and stocking parts easier.
- Scroll compressors on all units. This makes service, stocking parts, replacement, and trouble-shooting easier.
- Field convertible airflow (3-10 tons). Being able to convert a unit from vertical airflow to horizontal makes it easy to overcome job site complications.
- Easy-adjust, belt-drive motor available. Carrier provides a factory solution for most points in the fan performance table. There's no need for field-supplied drives or motors.
- Provisions for bottom or side condensate drain.
- Capable of thru-the-base or thru-the-curb gas-line routing.
- Single-point gas / electrical connection.
- Sloped, composite drain pan. 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.
- Clean, easy to use control box.
- Color-coded wiring.
- Large, laminated wiring and power 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.
- Exclusive, newly-design indoor refrigerant header for easier maintenance and replacement.
- Mechanical cooling (115°F - 25°F or 46°C - -4°C) on Direct Digital Controller (DDC) with Winter Start Kit (PremierLink™ or RTU-MP controller).
- Mechanical cooling (115°F - 25°F or 46°C - -4°C) on Electro-Mechanical (E/M) models, with Winter Start Kit.
- High efficiency, gas heat with induced-draft flue exhaust (3-10 tons).
- Induce draft motor ensures no flue gas can escape into the indoor air stream.
- Carrier's naturally draining heat exchanger, unlike positive pressure heat exchangers, do not need to be periodically, manually drained. This saves labor and maintenance expense.
- 2" (51mm) throw away filters on all units.
- Refrigerant filter-drier.
- High and low pressure switches. Added reliability with high pressure switch and low pressure switch.



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MODEL NUMBER NOMENCLATURE

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

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Unit Heat Type

48 = Gas heat pkg rooftop

Tier / Model

TC = Entry tier (with Puron refrigerant)

Heat Size

- D = Low heat
- E = Medium heat
- F = High heat
- L = Low NO_x, low heat
- M = Low NO_x, medium heat
- N = Low NO_x, high heat
- S = Stainless steel, low heat
- R = Stainless steel, medium heat
- T = Stainless steel, high heat

Refrig. System Options

A = Standard refrigeration system

Cooling Tons

- 04 = 3 Ton 08 = 7.5 Ton
- 05 = 4 Ton 09 = 8.5 Ton
- 06 = 5 Ton 12 = 10 Ton
- 07 = 6 Ton

Sensor Options

- A = None
- B = RA smoke detector
- C = SA smoke detector
- D = RA & SA smoke detector
- E = CO₂ sensor¹
- F = RA smoke detector & CO₂¹
- G = SA smoke detector & CO₂¹
- H = RA & SA smoke detector & CO₂¹

Indoor Fan Options

- 1 = Standard static option
- 2 = Medium static option
- 3 = High static option

Brand / Packaging

- 0 = Standard
- 1 = LTL

Electrical Options

- A = None
- C = Non-fused disc
- D = Thru the base
- F = Non-fused & thru the base

Service Options

- 0 = None
- 1 = Unpowered convenience outlet
- 2 = Powered convenience outlet

Intake / Exhaust Options

- A = None
- B = Temp econo w/ baro relief
- F = Enthalpy econo w/ baro relief

Base Unit Controls

- 0 = Electromechanical
- 1 = PremierLink DDC controller
- 2 = RTU-MP multi protocol controller

Design Rev

Factory assigned

Voltage

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

Coil Options (Outdoor Coil – Indoor Coil)

- 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

¹ Future availability

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

CATEGORY	ITEM	FACTORY INSTALLED OPTION	FIELD INSTALLED ACCESSORY
Cabinet	Thru-the-base electrical or gas-line connections	X	X
Coil Options	Cu/Cu indoor and/or outdoor coils	X	
	Pre-coated outdoor coils	X	
	Premium, E-coated outdoor coils	X	
Condenser Protection	Condenser coil hail guard (louvered design)	X	X
Controls	Thermostats, temperature sensors, and subbases		X
	PremierLink DDC communicating controller	X	X
	RTU-MP open-protocol controller	X	
	Smoke detector (supply and/or return air)	X	X
	Time Guard II compressor delay control circuit		X
	Phase Monitor		X
	Filter status switch ¹		X
Economizers & Outdoor Air Dampers	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		X
	Barometric relief ²	X	X
	Power exhaust		X
Economizer Sensors & IAQ Devices	Single dry bulb temperature sensors ³	X	X
	Differential dry bulb temperature sensors ³		X
	Single enthalpy sensors ³	X	X
	Differential enthalpy sensors ³		X
	CO ₂ sensor (wall, duct, or unit mounted) ³	X ⁵	X
	UV-C lights		X
Gas Heat	Liquid propane (LP) conversion kit		X
	High altitude conversion kit		X
	Flue Shield		X
	Flue Discharge Deflector		X
Indoor Motor & Drive	Multiple motor and drive packages	X	
Low Ambient Control	Winter start kit ⁴		X
	Motormaster® head pressure controller ⁴		X
Power Options	Convenience outlet (powered)	X	
	Convenience outlet (unpowered)	X	
	Non-fused disconnect	X	
Roof Curbs	Roof curb 14" (356mm)		X
	Roof curb 24" (610mm)		X

NOTES:

1. Use in conjunction with specialized thermostat or controls device.
2. Included with economizer.
3. Sensors used to optimize economizer performance.
4. See application data for assistance.
5. Future availability.

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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 CO₂ 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.

CO₂ 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 CO₂ sensor detects their presence through increasing CO₂ levels, and opens the economizer appropriately.

When the occupants leave, the CO₂ 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's 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)

Lower service bills by including a convenience outlet in your specification. Carrier will install this service feature at our factory, powered. Provides a convenient, 15 amp, 115v GFCI receptacle.

Non-fused Disconnect

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

Barometric Relief

Gravity controlled, barometric relief equalizes building pressure and ambient air pressures. This can be a cost effective solution to prevent building pressurization.

Power Exhaust with Barometric Relief.

Superior internal building pressure control. This field-installed accessory 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-MP, Multi-Protocol Controller

Connect the rooftop to an existing BAS without needing complicated translators or adapter modules using the RTU-MP 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 PC, RTU-MP, 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

Carrier's new, 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.

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.

Winter Start Kit

Carrier's winter start kit extends the low ambient limit of your rooftop to 25°F (-9°C). The kit bypasses the low pressure switch, preventing nuisance tripping of the low pressure switch. Other low ambient precautions may still be prudent.

UV-C Lights

Carrier's commercial rooftop ultra-violet germicidal lamps are designed to kill odor causing mold and fungus that may develop in the cool and damp evaporator section of an HVAC unit. The high output, low temperature germicidal lamps are installed in the evaporator section of the HVAC unit, and shine directly on the evaporator coil and condensate pan. The short wave length ultra-violet band light inhibits and kills mold, fungus, and microbial growth.

Liquid Propane Heating

Convert your gas heat rooftop from standard natural gas operation to liquid propane using this field-installed kit.

High Altitude Heating

High altitudes have less oxygen, which means heat exchangers need less fuel. The new gas orifices in this field-installed kit make the necessary adjustment for high altitude applications. They restore the optimal fuel to air mixture and maintain healthy combustion at altitudes above 2000 ft (610m). Kits may not be required in all areas.

Flue Discharge Deflector

The flue discharge deflector is a useful accessory when flue gas recirculation is a concern. By venting the flue discharge upwards, the deflector minimizes the chance for a neighboring unit to intake the flue exhaust.

Flue Discharge Heat Shield

The flue discharge heat shield keeps people from touching the rooftop unit's potentially hot flue discharge. This is especially useful for ground level applications, where more, untrained people could have access to the unit's exterior.

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 connections, available as either an accessory or as a factory option, are necessary to ensure proper connection and seal when routing wire and piping through the rooftop's basepan and curb. These couplings eliminate roof penetration and should be considered for gas lines, main power lines, as well as control power.

Table 2 – ARI COOLING RATING TABLE

UNIT	NOM. CAPACITY (TONS)	NET COOLING CAPACITY (MBH)	TOTAL POWER (KW)	SEER	EER	IPLV	IEER
04	3	34.6	3.1	13.0	11.0	N/A	N/A
05	4	45.0	4.0	13.0	11.0	N/A	N/A
06	5	59.0	5.5	13.0	10.8	N/A	N/A
07	6	70.0	6.4	N/A	11.0	N/A	11.2
08	7.5	88.0	8.0	N/A	11.0	N/A	11.2
09	8.5	97.0	8.8	N/A	11.0	N/A	11.2
12	10	117.0	10.6	N/A	11.0	N/A	11.2

LEGEND

- ARI – Air-Conditioning & Refrigeration Institute
- ASHRAE – American Society of Heating, Refrigerating and Air Conditioning, Inc.
- EER – Energy Efficiency Ratio
- IEER – Integrated Energy Efficiency Ratio
- SEER – Seasonal Energy Efficiency Ratio
- IPLV – Integrated Part Load Value

NOTES:

1. Rated and certified under ARI Standard 210/240–06 or 340/360–04, 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 (35°C) db outdoor air temp.
 - IPLV Standard:** 80°F (27°C) db, 67°F (19°C) wb indoor air temp and 80°F (27°C) db outdoor air temp.
 - IEER Standard:** Procedure described in ARI Standard 340/360.
3. All 48TC units comply with ASHRAE 90.1 2001, 2004 Energy Standard for minimum SEER and EER requirements.
4. 48TC units comply with US Energy Policy Act (2005). To evaluate code compliance requirements, refer to state and local codes or visit the following website: <http://bcap-energy.org>.

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ARI Standard
210/240 UAC



ARI Standard
340/360



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Table 3 – HEATING RATING TABLE - NATURAL GAS & LIQUID PROPANE

UNIT	GAS HEAT	AL / SS HEAT EXCHANGER		TEMP RISE (DEG F)	THERMAL EFFICIENCY (%)	AFUE (%)	
		INPUT / OUTPUT STAGE 1 (MBH)	INPUT / OUTPUT STAGE 2 (MBH)				
Single Phase	04	LOW	-	72.0 / 59.0	25 – 55	82%	81%
		MED	-	115.0 / 93.0	55 – 85	80%	80%
		HIGH	-	-	-	-	-
	05	LOW	-	72.0 / 59.0	25 – 55	82%	81%
		MED	-	115.0 / 93.0	35 – 65	81%	80%
		HIGH	-	150.0 / 120.0	50 – 80	80%	80%
	06	LOW	-	72.0 / 59.0	25 – 55	82%	81%
		MED	-	115.0 / 93.0	35 – 65	81%	80%
		HIGH	-	150.0 / 120.0	50 – 80	80%	80%
Three Phase	04	LOW	-	72.0 / 59.0	25 – 55	82%	81%
		MED	82 / 66	115.0 / 93.0	55 – 85	80%	80%
		HIGH	-	-	-	-	-
	05	LOW	-	72.0 / 59.0	25 – 55	82%	81%
		MED	-	115.0 / 93.0	35 – 65	81%	80%
		HIGH	120 / 96	150.0 / 120.0	50 – 80	80%	80%
	06	LOW	-	72.0 / 59.0	25 – 55	82%	81%
		MED	-	115.0 / 93.0	35 – 65	81%	80%
		HIGH	120 / 96	150.0 / 120.0	50 – 80	80%	80%
	07	LOW	-	72.0 / 59.0	25 – 55	82%	81%
		MED	-	115.0 / 93.0	35 – 65	81%	80%
		HIGH	120 / 96	150.0 / 120.0	50 – 80	80%	80%
	08	LOW	-	125.0 / 103.0	20 – 50	82%	N/A
		MED	120 / 98	180.0 / 148.0	35 – 65	82%	N/A
		HIGH	180 / 147	224.0 / 184.0	45 – 75	82%	N/A
09	LOW	-	125.0 / 103.0	20 – 50	82%	N/A	
	MED	120 / 98	180.0 / 148.0	35 – 65	82%	N/A	
	HIGH	180 / 147	224.0 / 184.0	45 – 75	82%	N/A	
12	LOW	120 / 98	180.0 / 148.0	35 – 65	82%	N/A	
	MED	180 / 147	224.0 / 184.0	45 – 75	82%	N/A	
	HIGH	200 / 160	250.0 / 205.0	40 – 70	82%	N/A	

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NOTE:

Heat ratings are for natural gas heat exchangers operated at or below 2000 ft. For information on LP or altitudes above 2000 ft (610m), see the Application Data section of this book. Accessory LP/High Altitude kits are also available.

Table 4 – HEATING RATING TABLE - LOW NO_x¹

UNIT		GAS HEAT	LOW NO _x HEAT EXCHANGER		TEMP RISE (DEG F)	THERMAL EFFICIENCY (%)	AFUE (%)
			INPUT / OUTPUT STAGE 1 (MBH)	INPUT / OUTPUT STAGE 2 (MBH)			
Single Phase	04	LOW	–	60.0 / 50.0	20 – 50	81%	80%
		MED	–	90.0 / 74.0	30 – 60	81%	81%
		HIGH	–	–	–	–	–
	05	LOW	–	60.0 / 50.0	20 – 50	81%	80%
		MED	–	90.0 / 74.0	30 – 60	81%	81%
		HIGH	–	120.0 / 101.0	40 – 70	81%	80%
	06	LOW	–	60.0 / 50.0	20 – 50	81%	80%
		MED	–	90.0 / 74.0	30 – 60	80%	81%
		HIGH	–	120.0 / 101.0	40 – 70	80%	81%
Three Phase	04	LOW	–	60.0 / 50.0	20 – 50	81%	80%
		MED	–	90.0 / 74.0	30 – 60	81%	81%
		HIGH	–	–	–	–	–
	05	LOW	–	60.0 / 50.0	20 – 50	81%	80%
		MED	–	90.0 / 74.0	30 – 60	81%	81%
		HIGH	–	120.0 / 101.0	40 – 70	81%	80%
	06	LOW	–	60.0 / 50.0	20 – 50	81%	80%
		MED	–	90.0 / 74.0	30 – 60	80%	81%
		HIGH	–	120.0 / 101.0	40 – 70	80%	81%

NOTE:

1. Units meet the Southern California Air Quality Management (SCAQM) Counsel Low –NO_x emissions requirement of 40 nanograms per joule or less.

Table 5 – SOUND PERFORMANCE TABLE

UNIT	OUTDOOR SOUND (dB)								
	A-Weighted	63	125	250	500	1000	2000	4000	8000
04	80	90.6	80.9	80.2	76.0	74.6	71.3	68.5	63.9
05	81	90.9	84.6	79.5	77.9	76.5	71.1	66.9	62.5
06	78	84.0	82.2	76.3	74.8	72.5	68.8	65.6	61.8
07	78	88.8	81.8	76.9	74.4	73.3	69.8	66.3	62.7
08	82	90.1	82.6	81.0	79.4	77.0	73.0	70.4	66.7
09	83	91.2	86.4	81.9	81.0	78.3	73.9	71.4	67.3
12	82	88.6	85.0	81.6	79.5	77.4	74.1	71.0	66.3

LEGEND

dB – Decibel



NOTES:

1. Outdoor sound data is measure in accordance with ARI standard 270–95.
2. Measurements are expressed in terms of sound power. Do not compare these values to sound pressure values because sound pressure depends on specific environmental factors which normally 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 “average” human ear. Carrier’s A-weighted measurements are taken in accordance with ARI standard 270–95.

Table 6 – MINIMUM - MAXIMUM AIRFLOW RATINGS - NATURAL GAS & LIQUID PROPANE

UNIT	HEAT LEVEL	COOLING		AL HX HEATING		SS HX HEATING	
		Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
04	LOW	900	1500	990	2190	990	2190
	MED			1000	1550	1000	1550
	HIGH			-	-	-	-
05	LOW	1200	2000	990	2190	990	2190
	MED			1330	2460	1330	2460
	HIGH			1390	2220	1390	2220
06	LOW	1500	2500	990	2190	990	2190
	MED			1330	2460	1330	2460
	HIGH			1390	2220	1390	2220
07	LOW	1800	3000	990	2190	990	2190
	MED			1330	2460	1330	2460
	HIGH			1390	2220	1390	2220
08	LOW	2250	3750	1900	4750	1900	4750
	MED			2100	3900	2100	3900
	HIGH			2270	3780	2270	3780
09	LOW	2550	4250	1900	4750	1900	4750
	MED			2100	3900	2100	3900
	HIGH			2270	3780	2270	3780
12	LOW	3000	5000	2100	3900	2100	3900
	MED			2270	3780	2270	3780
	HIGH			2710	4750	2710	4750

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Table 7 – PHYSICAL DATA (COOLING)

3 - 6 TONS

48TC

		48TC**04	48TC**05	48TC**06	48TC**07
Refrigeration System					
# Circuits / # Comp. / Type		1 / 1 / Scroll	1 / 1 / Scroll	1 / 1 / Scroll	1 / 1 / Scroll
Puron (R-410a) charge A/B (lbs)		5.6	8.5	10.7	14.1
Oil A/B (oz)		25	42	42	56
Metering Device		Acutrol	Acutrol	Acutrol	Acutrol
High–press. Trip / Reset (psig)		630 / 505	630 / 505	630 / 505	630 / 505
Low–press. Trip / Reset (psig)		54 / 117	54 / 117	54 / 117	54 / 117
Evap. Coil					
Material		Cu / Al	Cu / Al	Cu / Al	Cu / Al
Coil type		3/8" RTPF	3/8" RTPF	3/8" RTPF	3/8" RTPF
Rows / FPI		2 / 15	2 / 15	4 / 15	4 / 15
Total Face Area (ft ²)		5.5	5.5	5.5	7.3
Condensate Drain Conn. Size		3/4"	3/4"	3/4"	3/4"
Evap. Fan and Motor					
Standard Static 1 phase	Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt	–
	Max BHP	1.2	1.2	1.2	–
	RPM Range	560–854	560–854	770–1175	–
	Motor Frame Size	48	48	48	–
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	–
	Fan Diameter (in)	10 x 10	10 x 10	10 x 10	–
	Standard Static 3 phase	Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt
Max BHP		1.2	1.2	1.2	2.4
RPM Range		560–854	560–854	770–1175	1073–1457
Motor Frame Size		48	48	48	56
Fan Qty / Type		1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
Fan Diameter (in)		10 x 10	10 x 10	10 x 10	10 x 10
Medium Static 1 phase		Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt
	Max BHP	1.2	1.2	1.5	–
	RPM Range	770–1175	770–1175	1035–1466	–
	Motor Frame Size	48	56	56	–
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	–
	Fan Diameter (in)	10 x 10	10 x 10	10 x 10	–
	Medium Static 3 phase	Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt
Max BHP		1.2	1.2	2.4	2.9
RPM Range		770–1175	770–1175	1035–1466	1173–1788
Motor Frame Size		48	48	56	56
Fan Qty / Type		1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
Fan Diameter (in)		10 x 10	10 x 10	10 x 10	10 x 10
High Static 3 phase		Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt
	Max BHP	2.4	2.4	2.9	3.7
	RPM Range	1035–1466	1035–1466	1303–1687	1474–1788
	Motor Frame Size	56	56	56	56
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter (in)	10 x 10	10 x 10	10 x 10	10 x 10
	Cond. Coil				
Material		Cu / Al	Cu / Al	Cu / Al	Cu / Al
Coil type		3/8" RTPF	3/8" RTPF	3/8" RTPF	3/8" RTPF
Rows / FPI		1 / 17	2 / 17	2 / 17	2 / 17
Total Face Area (ft ²)		14.6	12.6	16.5	21.3
Cond. fan / motor					
Qty / Motor Drive Type		1/ Direct	1/ Direct	1/ Direct	1/ Direct
Motor HP / RPM		1/4 / 1100	1/4 / 1100	1/4 / 1100	1/4 / 1100
Fan diameter (in)		22	22	22	22
Filters					
RA Filter # / Size (in)		2 / 16 x 25 x 2	2 / 16 x 25 x 2	2 / 16 x 25 x 2	4 / 16 x 16 x 2
OA inlet screen # / Size (in)		1 / 20 x 24 x 1	1 / 20 x 24 x 1	1 / 20 x 24 x 1	1 / 20 x 24 x 1

Table 8 – PHYSICAL DATA (HEATING)

3 - 6 TONS

		48TC**04	48TC**05	48TC**06	48TC**07
Gas Connection					
	# of Gas Valves	1	1	1	1
	Nat. gas supply line press (in. w.g.)/(PSIG)	4-13 / 0.18-0.47	4-13 / 0.18-0.47	4-13 / 0.18-0.47	4-13 / 0.18-0.47
	LP supply line press (in. w.g.)/(PSIG)	11-13 / 0.40-0.47	11-13 / 0.40-0.47	11-13 / 0.40-0.47	11-13 / 0.40-0.47
Heat Anticipator Setting (Amps)					
	1st stage	0.14	0.14	0.14	0.14
	2nd stage	0.14	0.14	0.14	0.14
Natural Gas Heat					
LOW	Connection size	1/2" NPT	1/2" NPT	1/2" NPT	1/2" NPT
	# of stages / # of burners (total)	1 / 2	1 / 2	1 / 2	1 / 2
	Rollout switch opens / Closes	195 / 115	195 / 115	195 / 115	195 / 115
	Temperature rise (min/max)	25 / 55	25 - 55	25 - 55	25 - 55
MED	Connection size	1/2" NPT	1/2" NPT	1/2" NPT	1/2" NPT
	# of stages / # of burners (total)	1 or 2 / 3	1 / 3	1 / 3	1 / 3
	Rollout switch opens / Closes	195 / 115	195 / 115	195 / 115	195 / 115
	Temperature rise (min/max)	55 / 85	35 / 65	35 / 65	35 / 65
HIGH	Connection size	1/2" NPT	1/2" NPT	1/2" NPT	1/2" NPT
	# of stages / # of burners (total)	-	1 or 2 / 3	1 or 2 / 3	1 or 2 / 3
	Rollout switch opens / Closes	-	195 / 115	195 / 115	195 / 115
	Temperature rise (min/max)	-	50 / 80	50 / 80	50 / 80
Liquid Propane Heat					
LOW	Connection size	1/2" NPT	1/2" NPT	1/2" NPT	1/2" NPT
	# of stages / # of burners (total)	1 / 2	1 / 2	1 / 2	1 / 2
	Rollout switch opens / Closes	195 / 115	195 / 115	195 / 115	195 / 115
	Temperature rise (min/max)	25 / 55	25 - 55	25 - 55	25 - 55
MED	Connection size	1/2" NPT	1/2" NPT	1/2" NPT	1/2" NPT
	# of stages / # of burners (total)	1 or 2 / 3	1 or 2 / 3	1 or 2 / 3	1 or 2 / 3
	Rollout switch opens / Closes	195 / 115	195 / 115	195 / 115	195 / 115
	Temperature rise (min/max)	55 / 85	35 / 65	35 / 65	35 / 65
HIGH	Connection size	1/2" NPT	1/2" NPT	1/2" NPT	1/2" NPT
	# of stages / # of burners (total)	-	1 or 2 / 3	1 or 2 / 3	1 or 2 / 3
	Rollout switch opens / Closes	-	195 / 115	195 / 115	195 / 115
	Temperature rise (min/max)	-	50 / 80	50 / 80	50 / 80
Low NO_x Gas Heat					
LOW	Connection size	1/2" NPT	1/2" NPT	1/2" NPT	1/2" NPT
	# of stages / # of burners (total)	1 / 2	1 / 2	1 / 2	-
	Rollout switch opens / Closes	195 / 115	195 / 115	195 / 115	-
	Temperature rise (min/max)	20 / 50	20 / 50	20 / 50	-
MED	Connection size	1/2" NPT	1/2" NPT	1/2" NPT	1/2" NPT
	# of stages / # of burners (total)	1 / 3	1 / 3	1 / 3	-
	Rollout switch opens / closes	195 / 115	195 / 115	195 / 115	-
	Temperature rise (min/max)	30 / 60	30 / 60	30 / 60	-
HIGH	Connection size	1/2" NPT	1/2" NPT	1/2" NPT	1/2" NPT
	# of stages / # of burners (total)	-	1 / 3	1 / 3	-
	Rollout switch opens / Closes	-	195 / 115	195 / 115	-
	Temperature rise (min/max)	-	40 / 70	40 / 70	-

48TC

Table 9 – PHYSICAL DATA (COOLING)

7.5 - 10 TONS

		48TC**08	48TC**09	48TC**12
Refrigeration System				
# Circuits / # Comp. / Type		1 / 1 / Scroll	1 / 1 / Scroll	1 / 1 / Scroll
Puron (R-410a) charge A/B (lbs)		13.75	15.25	20.0
Oil A/B (oz)		60	85	110
Metering Device		Acutrol	Acutrol	Acutrol
High–press. Trip / Reset (psig)		630 / 505	630 / 505	630 / 505
Low–press. Trip / Reset (psig)		54 / 117	54 / 117	54 / 117
Evap. Coil				
Material		Cu / Al	Cu / Al	Cu / Al
Coil type		3/8" RTPF	3/8" RTPF	3/8" RTPF
Rows / FPI		3 / 15	3 / 15	4 / 15
Total Face Area (ft ²)		8.9	11.1	11.1
Condensate Drain Conn. Size		3/4"	3/4"	3/4"
Evap. Fan and Motor				
Standard Static 3 phase	Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt
	Max BHP	1.7	1.7	2.4
	RPM Range	489–747	518–733	591–838
	Motor Frame Size	56	56	56
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter (in)	15 x 15	15 x 15	15 x 15
	Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt
Max BHP	2.9	2.4	3.7	
RPM Range	733–949	690–936	838–1084	
Motor Frame Size	56	56	56	
Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	
Fan Diameter (in)	15 x 15	15 x 15	15 x 15	
High Static 3 phase	Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt
	Max BHP	5.25	3.7	5.25
	RPM Range	909–1102	838–1084	1022–1240
	Motor Frame Size	145TY	56	145TY
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter (in)	15 x 15	15 x 15	15 x 15
	Cond. Coil			
Material		Cu / Al	Cu / Al	Cu / Al
Coil type		3/8" RTPF	3/8" RTPF	3/8" RTPF
Rows / FPI		2 / 17	2 / 17	2 / 17
Total Face Area (ft ²)		20.5	21.4	25.1
Cond. fan / motor				
Qty / Motor Drive Type		2 / Direct	2 / Direct	2 / Direct
Motor HP / RPM		1/4 / 1100	1/4 / 1100	1/4 / 1100
Fan diameter (in)		22	22	22
Filters				
RA Filter # / Size (in)		4 / 16 x 20 x 2	4 / 20 x 20 x 2	4 / 20 x 20 x 2
OA inlet screen # / Size (in)		1 / 20 x 24 x 1	1 / 20 x 24 x 1	1 / 20 x 24 x 1

48TC

Table 10 – PHYSICAL DATA (HEATING)

7.5 - 10 TONS

		48TC**08	48TC**09	48TC**12
Gas Connection				
	# of Gas Valves	1	1	1
	Nat. gas supply line press (in. w.g.)/(PSIG)	4–13 / 0.18–0.47	4–13 / 0.18–0.47	4–13 / 0.18–0.47
	LP supply line press (in. w.g.)/(PSIG)	11–13 / 0.40–0.47	11–13 / 0.40–0.47	11–13 / 0.40–0.47
Heat Anticipator Setting (Amps)				
	1st stage	0.14	0.14	0.14
	2nd stage	0.14	0.14	0.14
Natural Gas Heat				
LOW	Connection size	1/2" NPT	1/2" NPT	3/4" NPT
	# of stages / # of burners (total)	1 / 3	1 / 3	2 / 4
	Rollout switch opens / Closes	195 / 115	195 / 115	195 / 115
	Temperature rise (min/max)	20 / 50	20 / 50	20 / 50
MED	Connection size	3/4" NPT	3/4" NPT	3/4" NPT
	# of stages / # of burners (total)	2 / 4	2 / 4	2 / 5
	Rollout switch opens / Closes	195 / 115	195 / 115	195 / 115
	Temperature rise (min/max)	35 / 68.5	35 / 65	45 / 75
HIGH	Connection size	3/4" NPT	3/4" NPT	3/4" NPT
	# of stages / # of burners (total)	2 / 5	2 / 5	2 / 5
	Rollout switch opens / Closes	195 / 115	195 / 115	195 / 115
	Temperature rise (min/max)	45 / 75	45 / 75	40 / 70
Liquid Propane Heat				
LOW	Connection size	1/2" NPT	1/2" NPT	3/4" NPT
	# of stages / # of burners (total)	2 / 3	2 / 3	2 / 3
	Rollout switch opens / Closes	195 / 115	195 / 115	195 / 115
	Temperature rise (min/max)	20 / 50	20 / 50	35 / 65
MED	Connection size	3/4" NPT	3/4" NPT	3/4" NPT
	# of stages / # of burners (total)	2 / 4	2 / 4	2 / 5
	Rollout switch opens / Closes	195 / 115	195 / 115	195 / 115
	Temperature rise (min/max)	35 / 65	35 / 65	45 / 75
HIGH	Connection size	3/4" NPT	3/4" NPT	3/4" NPT
	# of stages / # of burners (total)	2 / 5	2 / 5	2 / 5
	Rollout switch opens / Closes	195 / 115	195 / 115	195 / 115
	Temperature rise (min/max)	45 / 75	45 / 75	40 / 70

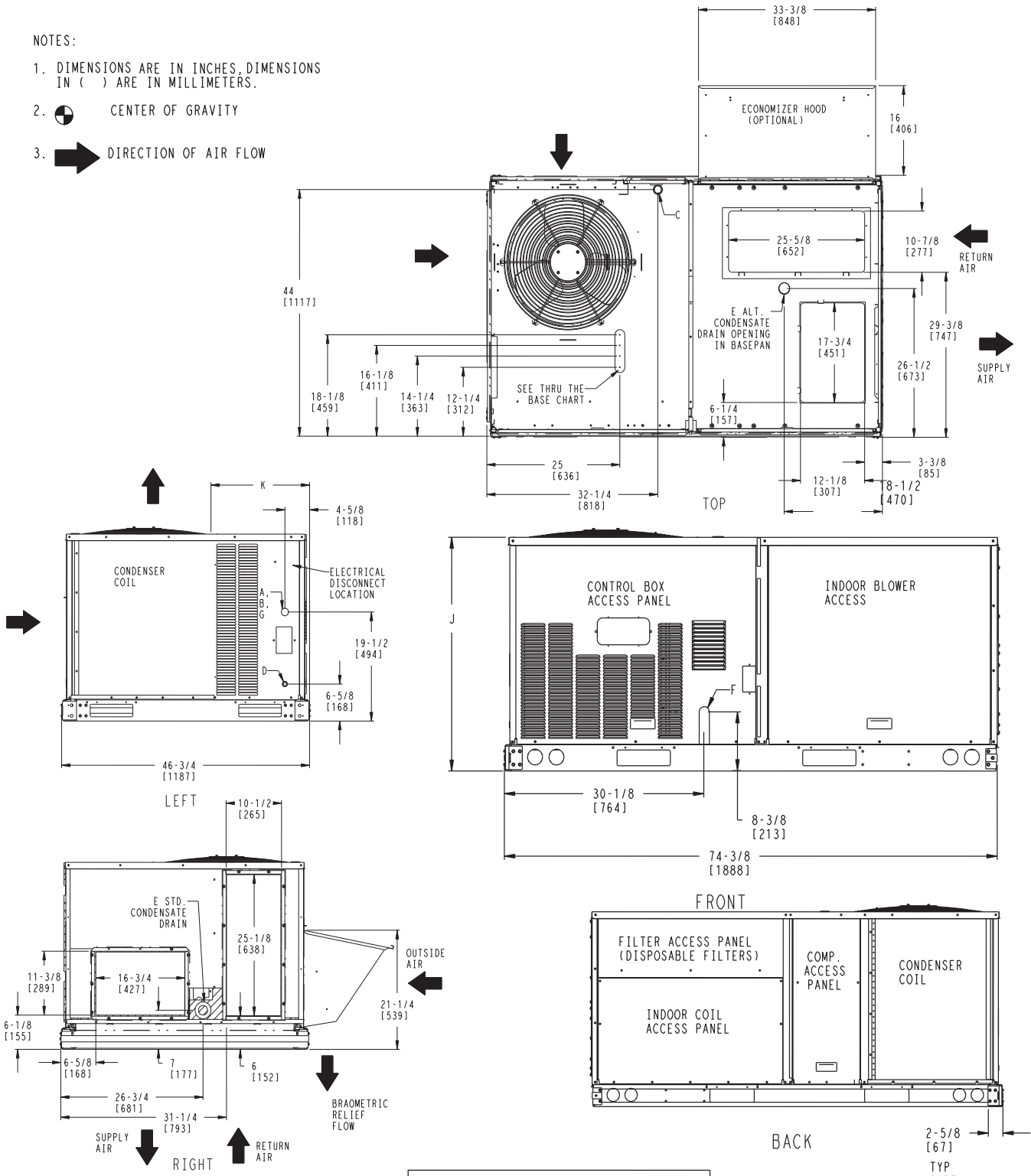
48TC

CURBS & WEIGHTS DIMENSIONS - CHASSIS 1

NOTES:

1. DIMENSIONS ARE IN INCHES, DIMENSIONS IN () ARE IN MILLIMETERS.
2. CENTER OF GRAVITY
3. DIRECTION OF AIR FLOW

48TC



CONNECTION SIZES		
A	1 3/8" DIA [35]	FIELD POWER SUPPLY HOLE
B	2" [50] DIA	POWER SUPPLY KNOCKOUT
C	1 3/4" DIA [51]	GUAGE ACCESS PLUG
D	7/8" DIA [22]	FIELD CONTROL WIRING HOLE
E	3/4"-14 NPT	CONDENSATE DRAIN
F	1/2"-14 NPT	GAS CONNECTION
G	2 1/2" DIA [64]	POWER SUPPLY KNOCK-OUT

THRU THE BASE CHART THESE HOLES REQ'D FOR USE CRBTMPWRO01A01, 2A01, 3A01, 4A01			
1/2"	ACC.	7/8"	(22.2)
1/2"	24V	7/8"	(22.2)
3/4" (001,003)	POWER*	1 1/8"	(28.4)
1 1/4" (002,004)	POWER*	1 3/4"	(44.4)
(003) 1/2" FTP	GAS	1 1/4"	(31.8)
(004) 3/4" FTP	GAS	1 5/8"	(41.3)
* SELECT EITHER 3/4" OR 1 1/4" FOR POWER, DEPENDING ON WIRE SIZE			

UNIT	J	K
48TC--04	33 3/8 [847]	18 5/8 [472]
48TC--05	33 3/8 [847]	14 7/8 [377]
48TC--06	33 3/8 [847]	14 7/8 [377]
48TC--07	41 3/8 [1051]	14 7/8 [377]

2-5/8 [67]
TYP
CURB
WIDTH

Fig. 1 - Dimensions 48TC 04-07

CURBS & WEIGHTS DIMENSIONS - CHASSIS 1 (cont.)

UNIT	STD. UNIT WEIGHT		CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)		C.G.		
	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	X	Y	Z
48TC--04	483	219	111	50	125	57	131	59	116	53	39 [991]	23 [584]	16 3/8 [416]
48TC--05	537	244	124	56	139	63	145	66	129	59	39 [991]	23 [584]	17 [432]
48TC--06	569	258	131	59	147	67	154	70	137	62	39 [991]	23 [584]	17 1/4 [438]
48TC--07	652	296	150	68	169	76	176	80	157	71	39 [991]	23 [584]	20 1/8 [511]

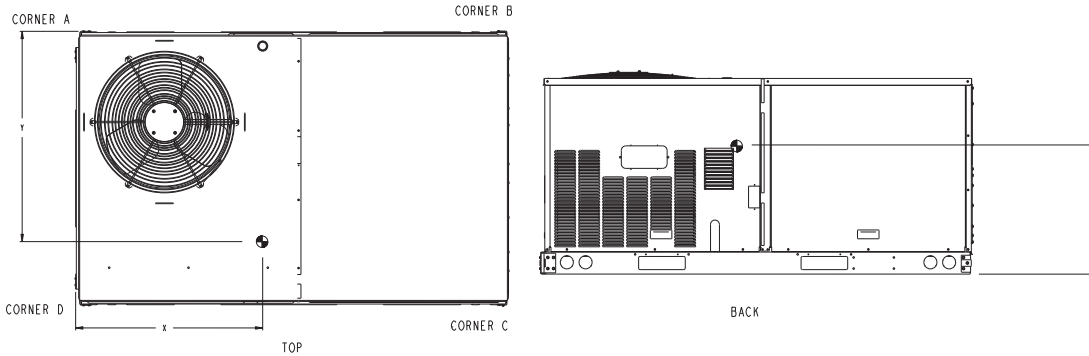


Fig. 2 - Dimensions 48TC 04-07

C08188

48TC

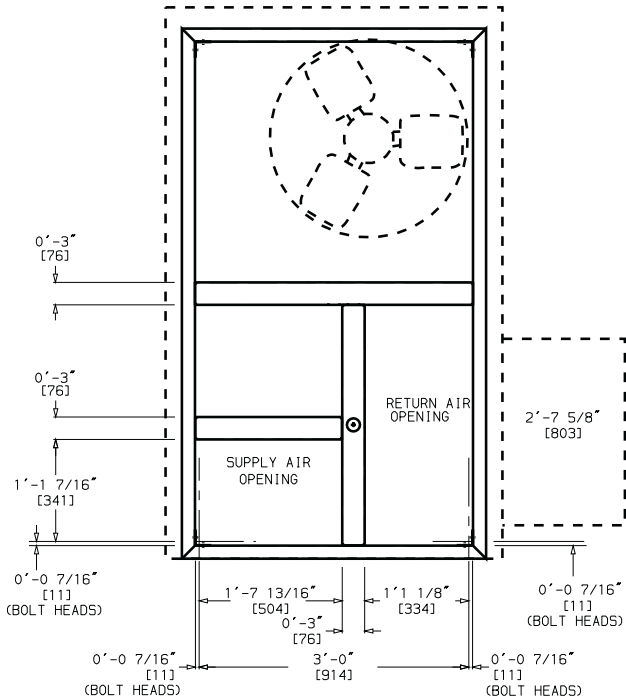


Fig. 3 - Curb Dimensions

C07458

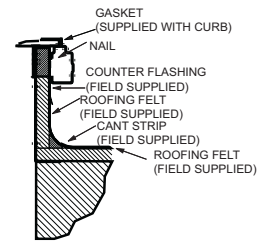


Fig. 4 - Curb Installation Detail (Typical)

C07457

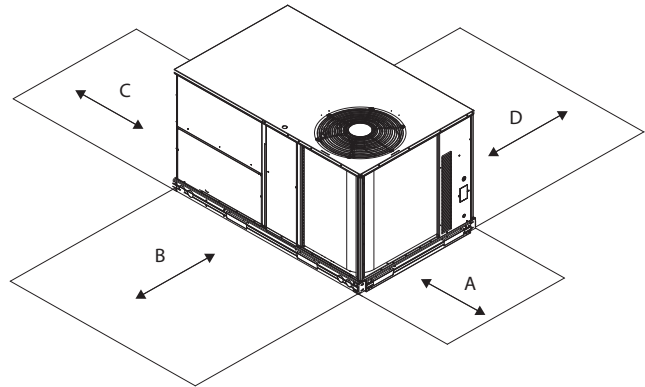


Fig. 5 - Service Clearance

C08337

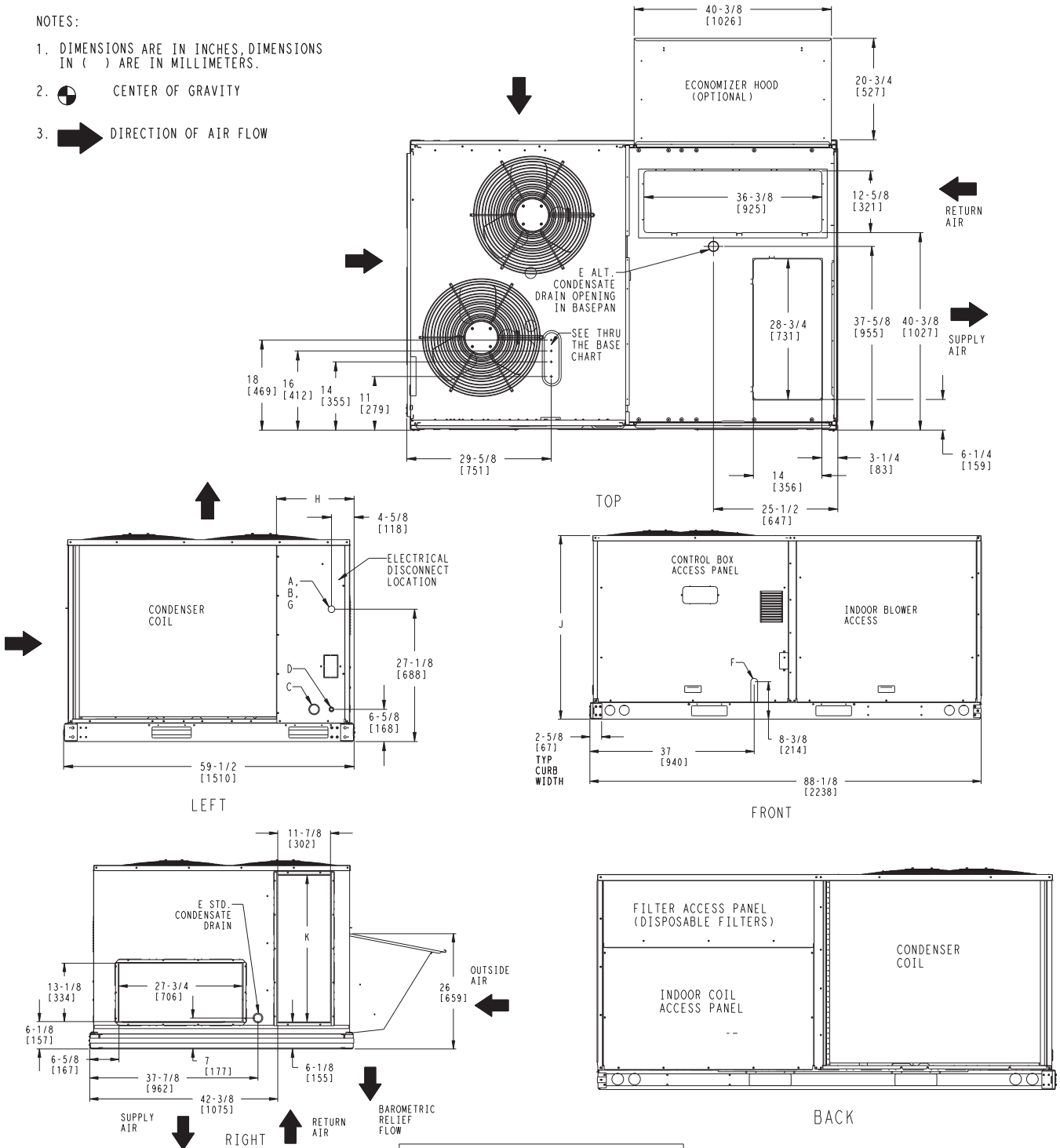
LOC	DIMENSION	CONDITION
A	48" (1219 mm)	Unit disconnect is mounted on panel
	18" (457 mm)	No disconnect, convenience outlet option
	18" (457 mm)	Recommended service clearance
	12" (305 mm)	Minimum clearance
B	42" (1067 mm)	Surface behind servicer is grounded (e.g., metal, masonry wall)
	36" (914 mm)	Surface behind servicer is electrically non-conductive (e.g., wood, fiberglass) Check for sources of flue products within 10-ft of unit fresh air intake hood
C	36" (914 mm)	Side condensate drain is used
	18" (457 mm)	Minimum clearance
D	48" (1219 mm)	No flue discharge accessory installed, surface is combustible material
	42" (1067 mm)	Surface behind servicer is grounded (e.g., metal, masonry wall, another unit)
	36" (914 mm)	Surface behind servicer is electrically non-conductive (e.g., wood, fiberglass)
	Special	Check for adjacent units or building fresh air intakes within 10-ft of this unit's flue outlet

CURBS & WEIGHTS DIMENSIONS - CHASSIS 2

NOTES:

1. DIMENSIONS ARE IN INCHES, DIMENSIONS IN () ARE IN MILLIMETERS.
2. CENTER OF GRAVITY
3. DIRECTION OF AIR FLOW

48TC



CONNECTION SIZES	
A	1 3/8" DIA [35] FIELD POWER SUPPLY HOLE
B	2 1/2" [64] DIA POWER SUPPLY KNOCKOUT
C	1 3/4" DIA [51] GAUGE ACCESS PLUG
D	7/8" DIA [22] FIELD CONTROL WIRING HOLE
E	3/4"-14 NPT CONDENSATE DRAIN
F	1/2"-14 NPT GAS CONNECTION 3/4"-14 NPT GAS CONNECTION
G	2" DIA [51] POWER SUPPLY KNOCK-OUT

THRU THE BASE CHART
THESE HOLES REQ'D FOR USE
CRBTMPWR001A01, 002A01, 003A01, 004A01

THREADED CONDUIT SIZE	WIRE USE	REQ'D HOLE SIZES (MAX.)
1/2"	ACC.	7/8" (22.2)
1/2"	24V	7/8" (22.2)
3/4" (001,003)	POWER*	1 1/8" (28.4)
1 1/4" (002,004)	POWER*	1 3/4" (44.4)
(003) 1/2" FTP	GAS	1 1/4" (31.8)
(004) 3/4" FTP	GAS	1 5/8" (41.3)

* SELECT EITHER 3/4" OR 1 1/4" FOR POWER, DEPENDING ON WIRE SIZE

	UN I	J	K	H
48TC--08	41 1/4 [1048]	33 [658]	15 7/8 [403]	
48TC--09	49 3/8 [1253]	37 1/4 [946]	23 7/8 [609]	
48TC--12	49 3/8 [1253]	37 1/4 [946]	15 7/8 [403]	

Fig. 6 - Dimensions 48TC 08-12

C08174

CURBS & WEIGHTS DIMENSIONS - CHASSIS 2 (cont.)

UNIT	STD. UNIT WEIGHT		CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)		C.G.		
	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	X	Y	Z
48TC--08	810	367	171	78	164	74	233	106	242	110	41 7/8 (1064)	33 7/8 (860)	20 1/4 (514)
48TC--09	910	413	193	88	181	82	260	118	276	125	41 3/8 (1051)	22 7/8 (581)	22 7/8 (581)
48TC--12	965	438	207	94	204	93	275	125	279	127	42 3/8 (1076)	24 1/8 (613)	24 1/8 (613)

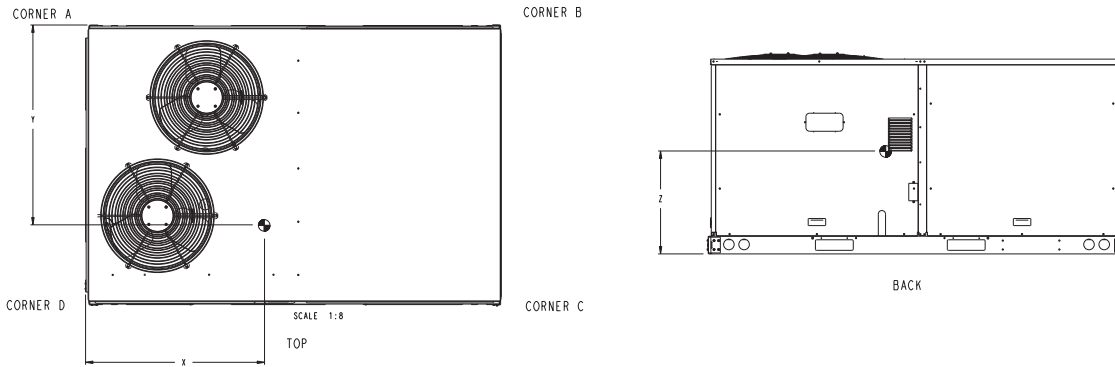


Fig. 7 - 48TC 08-12

C08175

48TC

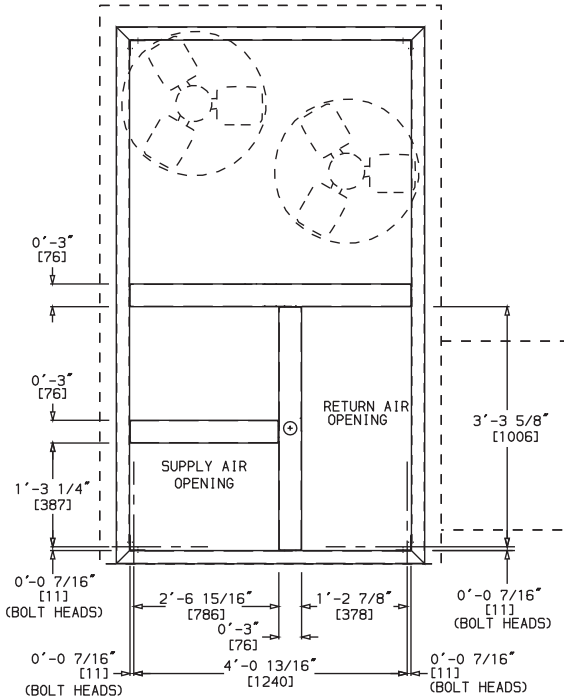


Fig. 8 - Curb Dimensions

C08309

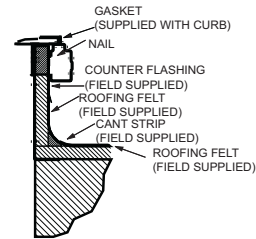


Fig. 9 - Curb Installation Detail (Typical)

C07457

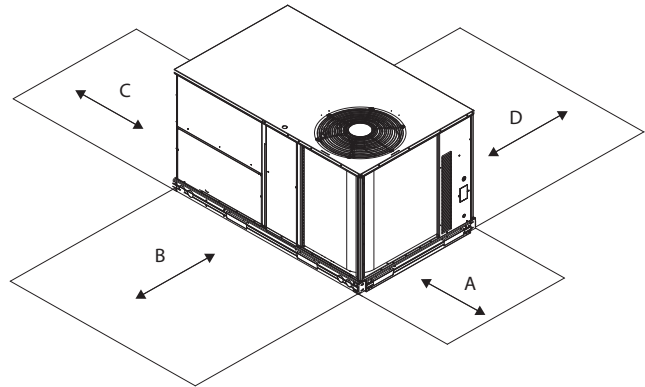


Fig. 10 - Service Clearance

C08337

LOC	DIMENSION	CONDITION
A	48" (1219 mm)	Unit disconnect is mounted on panel
	36" (914 mm)	If dimension-B is 12"
	18" (457 mm)	No disconnect, convenience outlet option
	18" (457 mm)	Recommended service clearance (use electric screwdriver)
	12" (305 mm)	Minimum clearance (use manual ratchet screwdriver)
B	36" (914 mm)	Unit has economizer
	12" (305 mm) Special	If dimension-A is 36" Check for sources of flue products within 10-ft of unit fresh air intake hood
C	36" (914 mm)	Side condensate drain is used
	18" (457 mm)	Minimum clearance
D	48" (1219 mm)	No flue discharge accessory installed, surface is combustible material
	42" (1067 mm)	Surface behind servicer is grounded (e.g., metal, masonry wall, another unit)
	36" (914 mm) Special	Surface behind servicer is electrically non-conductive (e.g., wood, fiberglass) Check for adjacent units or building fresh air intakes within 10-ft of this unit's flue outlet

APPLICATION DATA

Min operating ambient temp (cooling):

In mechanical cooling mode, your Carrier rooftop can safely operate down to an outdoor ambient temperature of 25°F (-4°C), with an accessory winter start kit. 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 mixed air temp (heating):

Using the factory settings, the minimum temperatures for the mixed air (the combined temperature of the warm return air and the cold outdoor air) entering the dimpled, gas heat exchangers are:

<u>Aluminized</u>	<u>Stainless Steel</u>
50°F (10°C) continuous	40°F (4°C) continuous
45°F (7°C) intermittent	35°F (2°C) intermittent

Operating at lower mixed-air temperatures may be possible, if a field-supplied, outdoor air thermostat initiates both heat stages when the temperature is less than the minimum temperatures listed above. Please contact your local Carrier representative for assistance.

Min and max airflow (heating and cooling):

To maintain safe and reliable operation of your rooftop, operate within the heating airflow limits during heating mode and cooling airflow limits during cooling mode. 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 and unsafe heating operation. Heating and cooling limitations differ when evaluating operating CFM, the minimum value is the HIGHER of the cooling and heating minimum CFM values published in Table 6 and the maximum value is the LOWER of the cooling and heating minimum values published in Table 6.

Heating-to-cooling changeover:

Your unit will automatically change from heating to cooling mode when using a thermostat with an auto-change-over feature.

Airflow:

All units are draw-through in cooling mode and blow-through in heating 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 Table 7 and 9, 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.

Liquid propane heating:

Liquid propane (LP) has different physical qualities than natural gas. As a result, LP requires different fuel to air mixture. To optimize the fuel/air mixture for LP, Carrier sells different burner orifices in an easy to install accessory kit. To select the correct burner orifices or determine the heat capacity for an LP application, use either the selection software, or the unit's service manual.

High altitude heating:

High altitudes have less oxygen, which affects the fuel/air mixture in heat exchangers. In order to maintain a proper fuel/air mixture, heat exchangers operating in altitudes above 2000 ft (610m) require different orifices. To select the correct burner orifices or determine the heat capacity for a high altitude application, use either the selection software, or the unit's service manual.

High altitudes have less oxygen, which means heat exchangers need less fuel. The new gas orifices in this field-installed kit make the necessary adjustment for high altitude applications. They restore the optimal fuel to air mixture and maintain healthy combustion on altitudes above 2000 ft (610m).

NOTE: Typical natural gas heating value ranges from 975 to 1050 Btu/ft³ at sea level nationally. The heating value goes down approximately 1.7% per every thousand feet elevation. Standard factory orifices can typically be used up to 2000 ft (610m) elevation without any operational issues.

Sizing a rooftop

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

Using higher design temperatures than ASHRAE recommends for your location, adding "safety factors" to the calculated load, are all signs of oversizing air conditioners. Oversizing the air conditioner leads to poor humidity control, reduced efficiency, higher utility bills, larger indoor temperature swings, excessive noise, and increased wear and tear on the air conditioner.

Rather than oversizing an air conditioner, engineers should "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. Please contact your local Carrier representative for assistance.

Low ambient applications

The optional Carrier economizer can adequately 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.

SELECTION PROCEDURE (WITH 48TC**07 EXAMPLE)¹

48TC

I. Determine cooling and heating loads.

Given:

Mixed air drybulb	80°F (27°C)
Mixed air wetbulb	67°F (19°C)
Ambient drybulb	95°F (35°C)
THC _{Load}	72.0 MBH
SHC _{Load}	54.0 MBH
Vertical supply air	2100 CFM
Heating load	85.0 MBH
External static pressure	0.67 in.wg
Electrical characteristics	230-3-60

II. Make an initial guess at cooling tons.

$$\text{Refrig. tons} = \text{THC}_{\text{Load}} / 12 \text{ MBH per ton}$$

$$\text{Refrig. tons} = 72.0 / 12 = 6.0 \text{ tons}$$

In this case, start by looking at the 48TC**07.

III. Look up the rooftop's THC and SHC.

Table 14 shows that, at the application's supply air CFM, mixed air and ambient temperatures, the 48TC**07 supplies:

$$\text{THC} = 73.7 \text{ MBH}$$

$$\text{SHC} = 54.3 \text{ MBH.}$$

IV. Calculate the building latent heat load.

$$\text{LHC}_{\text{Load}} = \text{THC}_{\text{Load}} - \text{SHC}_{\text{Load}}$$

$$\text{LHC}_{\text{Load}} = 72.0 \text{ MBH} - 54.0 \text{ MBH} = 18.0 \text{ MBH}$$

V. Calculate RTU latent heat capacity.

$$\text{LHC} = \text{THC} - \text{SHC}$$

$$\text{LHC} = 73.7 \text{ MBH} - 54.3 \text{ MBH} = 19.4 \text{ MBH}$$

VI. Compare RTU capacities to loads.^{2,3}

Compare the rooftop's SHC and LHC to the building's sensible and latent heat loads.

LEGEND

THC	— Total heat capacity
SHC	— Sensible heat capacity
LHC	— Latent heat capacity
RPM	— Revolutions per minute
RTU	— Rooftop unit
BHP	— Break horsepower
MCA	— Min. circuit ampacity
MOCP	— Max. Over-current protection
FLA	— Full load amps
RLA	— Rated load amps

VII. Select factory options (FIOP)

Local code requires an economizer for any unit with THC less than 65.0 MBH.

VIII. Calculate the total static pressure.

External static pressure	0.67 in. wg
Sum of FIOP / Accessory static	+0.13 in. wg
Total Static Pressure	0.80 in. wg

IX. Look up the indoor fan RPM & BHP.

Table 32 shows, at 2100 CFM & ESP= 0.8, RPM = 1358 & BHP = 1.52

X. Convert BHP (Step VIII) into fan motor heat.

$$\text{Fan motor heat} = 2.546 * \text{BHP} / \text{Motor Eff.}^4$$

$$\text{Fan motor heat} = 4.9 \text{ MBH}$$

XI. Calculate RTU heating capacity.

Building heating load	85.0 MBH
Fan motor heat	-4.9 MBH
Required heating capacity	80.1 MBH

XII. Select a gas heater.

Table 3 shows the heating capacities of the 48TCE*07 = 93.0 MBH. Select the 48TCE*07

XIII. Determine electrical requirements.

Table 47 shows the MCA and MOCP of a 48TC**07 (without convenience outlet) as:

$$\text{MCA} = 30.9 \text{ amps} \ \& \ \text{MOCP} = 45.0 \text{ amps}$$

$$\text{Min. disconnect size: FLA} = 30 \ \& \ \text{LRA} = 48.$$

NOTES:

- Carrier's selection software saves time by performing many of the steps above. Contact your Carrier sales representative for assistance.
- Selecting a unit with a SHC slightly lower than the SHC_{Load} is often better than oversizing. Slightly lower SHC's will help control indoor humidity, and prevent temperature swings.
- Indoor fan motor efficiency is available in Table 43. Use the decimal form in the equation, eg. 80% = .8.

Table 11 – COOLING CAPACITIES

3 TONS

48TC**04			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	
900 Cfm	EAT (wb)	58	THC	28.1	28.1	31.7	26.3	26.3	29.8	24.5	24.5	27.7	22.6	22.6	25.5
		SHC	24.4	28.1	31.7	22.9	26.3	29.8	21.3	24.5	27.7	19.6	22.6	25.5	
		62	THC	30.3	30.3	31.0	27.8	27.8	29.8	25.1	25.1	28.4	22.6	22.6	26.5
		SHC	22.6	26.8	31.0	21.5	25.7	29.8	20.2	24.3	28.4	18.7	22.6	26.5	
		67	THC	35.5	35.5	35.5	33.1	33.1	33.1	30.5	30.5	30.5	27.5	27.5	27.5
	SHC	19.5	23.7	27.9	18.5	22.7	26.9	17.4	21.6	25.8	16.2	20.4	24.6		
	72	THC	39.0	39.0	39.0	37.1	37.1	37.1	35.1	35.1	35.1	32.7	32.7	32.7	
	SHC	15.3	19.5	23.7	14.5	18.8	23.0	13.7	17.9	22.2	12.9	17.1	21.3		
	76	THC	N/A	41.4	41.4	N/A	39.6	39.6	N/A	37.6	37.6	N/A	35.4	35.4	
	SHC		16.0	21.0		15.4	20.2		14.6	19.3		13.8	18.3		
1050 Cfm	EAT (wb)	58	THC	30.2	30.2	34.2	28.4	28.4	32.2	26.5	26.5	30.0	24.5	24.5	27.7
		SHC	26.3	30.2	34.2	24.7	28.4	32.2	23.1	26.5	30.0	21.3	24.5	27.7	
		62	THC	31.9	31.9	34.2	29.4	29.4	32.8	26.7	26.7	31.2	24.5	24.5	28.8
		SHC	24.6	29.4	34.2	23.4	28.1	32.8	22.0	26.6	31.2	20.3	24.5	28.8	
		67	THC	36.7	36.7	36.7	34.8	34.8	34.8	32.2	32.2	32.2	29.1	29.1	29.1
	SHC	20.6	25.4	30.2	19.8	24.6	29.4	18.8	23.6	28.4	17.6	22.4	27.2		
	72	THC	40.1	40.1	40.1	38.2	38.2	38.2	36.1	36.1	36.1	33.7	33.7	33.7	
	SHC	15.7	20.5	25.3	15.0	19.8	24.6	14.2	19.0	23.8	13.4	18.2	23.0		
	76	THC	N/A	42.4	42.4	N/A	40.6	40.6	N/A	38.5	38.5	N/A	36.2	36.2	
	SHC		16.6	22.2		15.9	21.3		15.2	20.4		14.4	19.5		
1200 Cfm	EAT (wb)	58	THC	32.2	32.2	36.4	30.4	30.4	34.3	28.4	28.4	32.1	26.3	26.3	29.7
		SHC	28.0	32.2	36.4	26.4	30.4	34.3	24.7	28.4	32.1	22.8	26.3	29.7	
		62	THC	33.3	33.3	37.0	30.8	30.8	35.5	28.4	28.4	33.4	26.3	26.3	30.9
		SHC	26.4	31.7	37.0	25.1	30.3	35.5	23.4	28.4	33.4	21.7	26.3	30.9	
		67	THC	37.7	37.7	37.7	35.6	35.6	35.6	33.4	33.4	33.4	30.4	30.4	30.4
	SHC	21.7	27.0	32.4	20.9	26.3	31.6	20.0	25.4	30.8	18.8	24.2	29.6		
	72	THC	40.9	40.9	40.9	39.0	39.0	39.0	36.9	36.9	36.9	34.4	34.4	34.4	
	SHC	16.1	21.5	26.8	15.4	20.8	26.1	14.7	20.0	25.4	13.8	19.2	24.5		
	76	THC	N/A	43.1	43.1	N/A	41.3	41.3	N/A	39.1	39.1	N/A	36.8	36.8	
	SHC		17.1	23.1		16.4	22.3		15.7	21.4		14.9	20.5		
1350 Cfm	EAT (wb)	58	THC	-	-	-	32.1	32.1	36.3	30.0	30.0	34.0	27.9	27.9	31.5
		SHC	-	-	-	27.9	32.1	36.3	26.1	30.0	34.0	24.2	27.9	31.5	
		62	THC	28.4	28.4	30.5	32.2	32.2	37.8	30.1	30.1	35.3	27.9	27.9	32.8
		SHC	17.6	24.1	30.5	26.6	32.2	37.8	24.8	30.1	35.3	23.0	27.9	32.8	
		67	THC	33.2	33.2	33.2	36.4	36.4	36.4	34.1	34.1	34.1	31.5	31.5	32.0
	SHC	15.0	21.4	27.9	21.9	27.8	33.7	21.0	26.9	32.9	20.0	26.0	32.0		
	72	THC	37.5	37.5	37.5	39.7	39.7	39.7	37.5	37.5	37.5	35.0	35.0	35.0	
	SHC	11.8	18.3	24.8	15.8	21.7	27.5	15.0	20.9	26.8	14.2	20.1	26.0		
	76	THC	N/A	40.1	40.1	N/A	41.8	41.8	N/A	39.6	39.6	N/A	37.3	37.3	
	SHC		15.3	22.7		16.8	23.2		16.1	22.3		15.3	21.5		
1500 Cfm	EAT (wb)	58	THC	28.1	28.1	34.2	33.7	33.7	38.1	31.6	31.6	35.7	29.3	29.3	33.2
		SHC	21.9	28.1	34.2	29.3	33.7	38.1	27.4	31.6	35.7	25.5	29.3	33.2	
		62	THC	30.3	30.3	33.8	33.7	33.7	39.6	31.6	31.6	37.1	29.4	29.4	34.5
		SHC	19.8	26.8	33.8	27.8	33.7	39.6	26.1	31.6	37.1	24.2	29.4	34.5	
		67	THC	35.5	35.5	35.5	36.9	36.9	36.9	34.6	34.6	34.9	32.0	32.0	34.0
	SHC	16.7	23.7	30.7	22.8	29.2	35.7	21.9	28.4	34.9	21.0	27.5	34.0		
	72	THC	39.0	39.0	39.0	40.2	40.2	40.2	38.0	38.0	38.0	35.5	35.5	35.5	
	SHC	12.4	19.5	26.6	16.1	22.5	28.8	15.4	21.7	28.1	14.6	21.0	27.4		
	76	THC	N/A	41.4	41.4	N/A	42.2	42.2	N/A	40.0	40.0	N/A	-	-	
	SHC		16.0	24.3		17.2	24.0		16.5	23.2		-	-		

48TC

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)
- N/A - Not applicable, dry bulb temperature (db) is higher than wet bulb temperature (wb).
- SHC - Sensible heat capacity
- THC - Total heat capacity

Table 12 – COOLING CAPACITIES

4 TONS

48TC**05			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			
48TC	1200 Cfm	EAT (wb)	58	THC	-	-	-	-	-	-	36.1	36.1	40.7	34.3	34.3	38.6	
			SHC	-	-	-	-	-	-	31.5	36.1	40.7	29.9	34.3	38.6		
		62	THC	43.1	43.1	43.1	40.8	40.8	40.8	38.4	38.4	39.4	35.9	35.9	38.2		
			SHC	31.2	36.4	41.7	30.1	35.3	40.6	28.9	34.1	39.4	27.8	33.0	38.2		
		67	THC	47.4	47.4	47.4	45.2	45.2	45.2	42.9	42.9	42.9	40.3	40.3	40.3		
			SHC	25.9	31.2	36.4	25.0	30.2	35.5	23.9	29.2	34.4	22.9	28.2	33.4		
		72	THC	51.1	51.1	51.1	49.1	49.1	49.1	46.8	46.8	46.8	43.9	43.9	43.9		
			SHC	20.1	25.5	30.9	19.4	24.7	30.1	18.4	23.7	29.0	17.4	22.7	28.0		
		76	THC	N/A	53.3	53.3	N/A	51.5	51.5	N/A	49.2	49.2	N/A	45.9	45.9		
			SHC		20.8	27.4		20.2	26.8		19.3	25.7		18.3	24.6		
		1400 cfm	EAT (wb)	58	THC	41.9	41.9	47.3	40.1	40.1	45.3	38.2	38.2	43.2	36.3	36.3	41.0
					SHC	36.6	41.9	47.3	35.0	40.1	45.3	33.3	38.2	43.2	31.7	36.3	41.0
				62	THC	44.6	44.6	45.4	42.3	42.3	44.2	39.8	39.8	42.9	37.3	37.3	41.6
					SHC	33.4	39.4	45.4	32.3	38.3	44.2	31.0	37.0	42.9	29.8	35.7	41.6
				67	THC	48.7	48.7	48.7	46.6	46.6	46.6	44.2	44.2	44.2	41.4	41.4	41.4
SHC	27.3				33.2	39.2	26.4	32.3	38.3	25.3	31.3	37.3	24.2	30.2	36.2		
72	THC			52.2	52.2	52.2	50.3	50.3	50.3	47.8	47.8	47.8	44.8	44.8	44.8		
	SHC			20.6	26.7	32.7	19.9	25.9	32.0	18.9	24.9	30.9	17.9	23.8	29.7		
76	THC			N/A	54.1	54.1	N/A	52.3	52.3	N/A	49.9	49.9	N/A	46.4	46.4		
	SHC				21.5	29.0		20.8	28.0		19.9	26.9		18.8	25.7		
1600 Cfm	EAT (wb)	58	THC	44.0	44.0	49.6	42.1	42.1	47.4	40.1	40.1	45.2	38.1	38.1	43.0		
			SHC	38.3	44.0	49.6	36.7	42.1	47.4	34.9	40.1	45.2	33.2	38.1	43.0		
		62	THC	45.7	45.7	48.6	43.5	43.5	47.5	41.0	41.0	46.0	38.5	38.5	44.4		
			SHC	35.3	42.0	48.6	34.2	40.8	47.5	32.9	39.4	46.0	31.6	38.0	44.4		
		67	THC	49.8	49.8	49.8	47.6	47.6	47.6	45.1	45.1	45.1	42.3	42.3	42.3		
			SHC	28.4	35.0	41.6	27.6	34.2	40.9	26.5	33.2	39.9	25.4	32.1	38.7		
		72	THC	53.0	53.0	53.0	51.1	51.1	51.1	48.6	48.6	48.6	45.4	45.4	45.4		
			SHC	21.0	27.6	34.3	20.3	27.0	33.6	19.4	26.0	32.6	18.3	24.8	31.3		
		76	THC	N/A	54.6	54.6	N/A	52.8	52.8	N/A	50.4	50.4	N/A	46.8	46.8		
			SHC		22.0	29.9		21.3	29.0		20.3	27.9		19.2	26.6		
1800 Cfm	EAT (wb)	58	THC	44.0	44.0	50.3	42.1	42.1	48.1	40.1	40.1	45.9	38.0	38.0	43.5		
			SHC	37.6	44.0	50.3	36.0	42.1	48.1	34.3	40.1	45.9	32.6	38.0	43.5		
		62	THC	45.7	45.7	49.5	43.5	43.5	48.3	41.0	41.0	46.8	38.4	38.4	45.2		
			SHC	34.5	42.0	49.5	33.4	40.8	48.3	32.1	39.4	46.8	30.8	38.0	45.2		
		67	THC	49.8	49.8	49.8	47.6	47.6	47.6	45.1	45.1	45.1	42.3	42.3	42.3		
			SHC	27.6	35.0	42.5	26.8	34.2	41.7	25.7	33.2	40.7	24.6	32.1	39.5		
		72	THC	53.0	53.0	53.0	51.1	51.1	51.1	48.6	48.6	48.6	45.4	45.4	45.4		
			SHC	20.2	27.6	35.1	19.5	27.0	34.4	18.5	26.0	33.4	17.5	24.8	32.1		
		76	THC	N/A	54.6	54.6	N/A	52.8	52.8	N/A	50.4	50.4	N/A	46.8	46.8		
			SHC		22.0	30.9		21.3	30.0		20.3	28.9		19.2	27.5		
2000 Cfm	EAT (wb)	58	THC	46.9	46.9	52.9	45.0	45.0	50.8	42.9	42.9	48.4	40.7	40.7	45.9		
			SHC	40.9	46.9	52.9	39.3	45.0	50.8	37.4	42.9	48.4	35.5	40.7	45.9		
		62	THC	47.5	47.5	54.0	45.3	45.3	52.5	43.0	43.0	50.3	40.7	40.7	47.7		
			SHC	38.5	46.3	54.0	37.3	44.9	52.5	35.6	43.0	50.3	33.8	40.7	47.7		
		67	THC	51.2	51.2	51.2	49.1	49.1	49.1	46.5	46.5	46.5	43.5	43.5	43.5		
			SHC	30.5	38.3	46.0	29.8	37.6	45.5	28.7	36.6	44.5	27.5	35.4	43.2		
		72	THC	54.0	54.0	54.0	52.1	52.1	52.1	49.7	49.7	49.7	46.2	46.2	46.2		
			SHC	21.7	29.2	36.8	21.1	28.7	36.4	20.1	27.8	35.4	18.9	26.4	33.9		
		76	THC	N/A	55.2	55.2	N/A	53.5	53.5	N/A	51.0	51.0	N/A	47.3	47.3		
			SHC		22.7	31.4		22.0	30.6		21.1	29.6		19.9	28.1		

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)
- N/A - Not applicable, dry bulb temperature (db) is higher than wet bulb temperature (wb).
- SHC - Sensible heat capacity
- THC - Total heat capacity

Table 13 – COOLING CAPACITIES

5 TONS

48TC**06			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	
1500 Cfm	EAT (wb)	58	THC	52.9	52.9	60.0	49.9	49.9	56.6	46.6	46.6	52.9	43.1	43.1	48.9
			SHC	45.8	52.9	60.0	43.2	49.9	56.6	40.4	46.6	52.9	37.3	43.1	48.9
		62	THC	56.2	56.2	57.6	52.2	52.2	55.7	47.8	47.8	53.5	43.2	43.2	51.0
			SHC	41.8	49.7	57.6	39.9	47.8	55.7	37.8	45.6	53.5	35.5	43.2	51.0
		67	THC	62.4	62.4	62.4	58.8	58.8	58.8	54.4	54.4	54.4	49.5	49.5	49.5
			SHC	34.8	42.8	50.7	33.2	41.2	49.1	31.4	39.3	47.3	29.4	37.3	45.3
		72	THC	68.2	68.2	68.2	64.8	64.8	64.8	60.8	60.8	60.8	56.2	56.2	56.2
			SHC	27.2	35.2	43.2	25.9	33.9	41.9	24.4	32.4	40.4	22.6	30.6	38.6
		76	THC	N/A	71.1	71.1	N/A	69.0	69.0	N/A	65.4	65.4	N/A	60.9	60.9
			SHC		28.4	36.6		27.6	35.9		26.3	34.6		24.8	33.0
1750 Cfm	EAT (wb)	58	THC	56.5	56.5	64.0	53.3	53.3	60.4	49.8	49.8	56.5	46.1	46.1	52.3
			SHC	48.9	56.5	64.0	46.1	53.3	60.4	43.1	49.8	56.5	39.9	46.1	52.3
		62	THC	58.5	58.5	63.4	54.4	54.4	61.3	49.9	49.9	58.9	46.1	46.1	54.4
			SHC	45.2	54.3	63.4	43.2	52.2	61.3	41.0	49.9	58.9	37.9	46.1	54.4
		67	THC	64.3	64.3	64.3	60.5	60.5	60.5	56.2	56.2	56.2	51.3	51.3	51.3
			SHC	36.9	46.1	55.2	35.3	44.5	53.7	33.6	42.8	51.9	31.6	40.8	49.9
		72	THC	69.5	69.5	69.5	66.5	66.5	66.5	62.4	62.4	62.4	57.7	57.7	57.7
			SHC	27.8	36.9	45.9	26.7	35.9	45.1	25.2	34.5	43.7	23.5	32.8	42.0
		76	THC	N/A	72.2	72.2	N/A	70.1	70.1	N/A	66.6	66.6	N/A	-	-
			SHC		29.3	38.9		28.6	38.2		27.4	36.8		-	-
2000 Cfm	EAT (wb)	58	THC	59.3	59.3	67.3	56.1	56.1	63.6	52.5	52.5	59.5	48.6	48.6	55.1
			SHC	51.4	59.3	67.3	48.6	56.1	63.6	45.4	52.5	59.5	42.1	48.6	55.1
		62	THC	60.1	60.1	68.5	56.2	56.2	66.3	52.5	52.5	62.0	48.7	48.7	57.4
			SHC	48.1	58.3	68.5	46.2	56.2	66.3	43.1	52.5	62.0	39.9	48.7	57.4
		67	THC	65.7	65.7	65.7	61.9	61.9	61.9	57.5	57.5	57.5	52.6	52.6	54.4
			SHC	38.8	49.1	59.5	37.3	47.7	58.1	35.6	46.0	56.4	33.6	44.0	54.4
		72	THC	70.1	70.1	70.1	67.6	67.6	67.6	63.6	63.6	63.6	58.9	58.9	58.9
			SHC	28.3	38.1	48.0	27.4	37.7	48.0	26.0	36.4	46.7	24.3	34.7	45.2
		76	THC	N/A	72.9	72.9	N/A	70.8	70.8	N/A	67.4	67.4	N/A	-	-
			SHC		30.1	40.7		29.3	39.9		28.2	38.7		-	-
2250 Cfm	EAT (wb)	58	THC	61.5	61.5	69.8	58.4	58.4	66.2	54.8	54.8	62.1	50.8	50.8	57.6
			SHC	53.2	61.5	69.8	50.5	58.4	66.2	47.4	54.8	62.1	43.9	50.8	57.6
		62	THC	61.6	61.6	72.6	58.4	58.4	68.9	54.8	54.8	64.6	50.8	50.8	59.9
			SHC	50.6	61.6	72.6	47.9	58.4	68.9	45.0	54.8	64.6	41.7	50.8	59.9
		67	THC	66.8	66.8	66.8	63.0	63.0	63.0	58.5	58.5	60.6	53.6	53.6	58.6
			SHC	40.5	52.0	63.4	39.1	50.7	62.3	37.4	49.0	60.6	35.5	47.0	58.6
		72	THC	70.8	70.8	70.8	68.5	68.5	68.5	64.5	64.5	64.5	59.8	59.8	59.8
			SHC	28.7	39.5	50.2	28.0	39.3	50.5	26.7	38.1	49.6	25.0	36.6	48.1
		76	THC	N/A	73.4	73.4	N/A	71.2	71.2	N/A	67.9	67.9	N/A	-	-
			SHC		30.7	42.1		30.0	41.4		28.9	40.4		-	-
2500 Cfm	EAT (wb)	58	THC	63.3	63.3	71.8	60.1	60.1	68.2	56.5	56.5	64.1	52.6	52.6	59.6
			SHC	54.8	63.3	71.8	52.1	60.1	68.2	49.0	56.5	64.1	45.5	52.6	59.6
		62	THC	63.4	63.4	74.7	60.2	60.2	71.0	56.6	56.6	66.7	52.6	52.6	62.1
			SHC	52.0	63.4	74.7	49.4	60.2	71.0	46.5	56.6	66.7	43.2	52.6	62.1
		67	THC	67.6	67.6	67.6	63.8	63.8	66.2	59.3	59.3	64.6	54.4	54.4	62.5
			SHC	42.1	54.6	67.1	40.9	53.5	66.2	39.2	51.9	64.6	37.2	49.8	62.5
		72	THC	71.3	71.3	71.3	69.0	69.0	69.0	65.1	65.1	65.1	60.4	60.4	60.4
			SHC	29.1	40.7	52.2	28.5	40.7	52.9	27.3	39.7	52.2	25.7	38.3	50.9
		76	THC	N/A	73.8	73.8	N/A	71.4	71.4	N/A	68.3	68.3	N/A	-	-
			SHC		31.2	43.3		30.5	42.6		29.6	41.9		-	-

48TC

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)
- N/A - Not applicable, dry bulb temperature (db) is higher than wet bulb temperature (wb).
- SHC - Sensible heat capacity
- THC - Total heat capacity

Table 14 – COOLING CAPACITIES

6 TONS

48TC**07			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			
48TC	1800 Cfm	EAT (wb)	58	THC	64.9	64.9	73.3	62.1	62.1	70.0	58.9	58.9	66.4	55.6	55.6	62.7	
			SHC	56.6	64.9	73.3	54.1	62.1	70.0	51.4	58.9	66.4	48.5	55.6	62.7		
		62	THC	68.7	68.7	70.3	64.9	64.9	68.5	60.8	60.8	66.4	56.4	56.4	64.0		
			SHC	51.7	61.0	70.3	49.9	59.2	68.5	47.9	57.2	66.4	45.7	54.9	64.0		
		67	THC	75.6	75.6	75.6	71.7	71.7	71.7	67.4	67.4	67.4	62.5	62.5	62.5		
			SHC	42.8	52.2	61.5	41.2	50.5	59.8	39.3	48.6	58.0	37.2	46.5	55.8		
		72	THC	82.6	82.6	82.6	78.5	78.5	78.5	73.7	73.7	73.7	67.8	67.8	67.8		
			SHC	33.5	42.8	52.2	31.9	41.3	50.6	30.0	39.3	48.6	27.8	36.9	45.9		
		76	THC	N/A	87.5	87.5	N/A	83.3	83.3	N/A	77.7	77.7	N/A	70.9	70.9		
			SHC		35.0	44.9		33.5	43.4		31.6	41.5		29.3	39.1		
		2100 Cfm	EAT (wb)	58	THC	68.9	68.9	77.7	65.9	65.9	74.3	62.5	62.5	70.5	58.7	58.7	66.2
					SHC	60.1	68.9	77.7	57.4	65.9	74.3	54.5	62.5	70.5	51.2	58.7	66.2
				62	THC	70.9	70.9	76.9	67.1	67.1	75.0	63.0	63.0	72.5	58.7	58.7	68.7
					SHC	55.6	66.3	76.9	53.8	64.4	75.0	51.6	62.1	72.5	48.7	58.7	68.7
				67	THC	77.8	77.8	77.8	73.7	73.7	73.7	69.2	69.2	69.2	64.0	64.0	64.0
SHC	45.4				56.1	66.8	43.7	54.4	65.2	41.8	52.5	63.2	39.6	50.2	60.7		
72	THC			84.5	84.5	84.5	80.3	80.3	80.3	75.1	75.1	75.1	68.8	68.8	68.8		
	SHC			34.5	45.2	55.9	32.9	43.5	54.2	30.9	41.4	52.0	28.5	38.7	48.9		
76	THC			N/A	89.2	89.2	N/A	84.7	84.7	N/A	78.8	78.8	N/A	71.6	71.6		
	SHC				36.3	47.8		34.7	46.0		32.6	43.7		30.1	40.9		
2400 Cfm	EAT (wb)	58	THC	72.0	72.0	81.2	68.7	68.7	77.5	65.2	65.2	73.5	61.1	61.1	68.9		
			SHC	62.8	72.0	81.2	60.0	68.7	77.5	56.9	65.2	73.5	53.3	61.1	68.9		
		62	THC	72.8	72.8	82.8	68.9	68.9	80.7	65.2	65.2	76.4	61.2	61.2	71.6		
			SHC	59.1	71.0	82.8	57.2	68.9	80.7	54.1	65.2	76.4	50.7	61.2	71.6		
		67	THC	79.4	79.4	79.4	75.2	75.2	75.2	70.5	70.5	70.5	65.1	65.1	65.3		
			SHC	47.7	59.8	71.8	46.0	58.1	70.2	44.0	56.0	68.1	41.6	53.5	65.3		
		72	THC	86.0	86.0	86.0	81.6	81.6	81.6	76.1	76.1	76.1	69.6	69.6	69.6		
			SHC	35.3	47.2	59.2	33.7	45.6	57.5	31.7	43.3	55.0	29.1	40.3	51.4		
		76	THC	N/A	90.3	90.3	N/A	85.7	85.7	N/A	79.6	79.6	N/A	72.1	72.1		
			SHC		37.3	49.8		35.6	48.0		33.5	45.6		30.8	42.5		
2700 Cfm	EAT (wb)	58	THC	60.3	60.3	74.1	71.1	71.1	80.2	67.4	67.4	76.0	63.0	63.0	71.1		
			SHC	46.4	60.3	74.1	62.0	71.1	80.2	58.8	67.4	76.0	55.0	63.0	71.1		
		62	THC	65.4	65.4	69.3	71.2	71.2	83.3	67.5	67.5	79.0	63.1	63.1	73.8		
			SHC	41.0	55.1	69.3	59.0	71.2	83.3	55.9	67.5	79.0	52.3	63.1	73.8		
		67	THC	72.7	72.7	72.7	76.3	76.3	76.3	71.5	71.5	72.6	65.8	65.8	69.4		
			SHC	33.8	48.0	62.2	48.2	61.6	74.9	46.1	59.3	72.6	43.5	56.5	69.4		
		72	THC	79.7	79.7	79.7	82.5	82.5	82.5	76.9	76.9	76.9	70.1	70.1	70.1		
			SHC	25.8	40.2	54.6	34.5	47.5	60.5	32.3	45.0	57.7	29.7	41.7	53.8		
		76	THC	N/A	85.1	85.1	N/A	86.4	86.4	N/A	80.2	80.2	N/A	72.5	72.5		
			SHC		33.5	48.4		36.5	49.9		34.3	47.3		31.5	44.0		
3000 Cfm	EAT (wb)	58	THC	64.9	64.9	78.8	73.1	73.1	82.5	69.2	69.2	78.0	64.5	64.5	72.7		
			SHC	51.1	64.9	78.8	63.8	73.1	82.5	60.3	69.2	78.0	56.2	64.5	72.7		
		62	THC	68.7	68.7	76.5	73.2	73.2	85.7	69.2	69.2	81.0	64.5	64.5	75.5		
			SHC	45.5	61.0	76.5	60.7	73.2	85.7	57.4	69.2	81.0	53.5	64.5	75.5		
		67	THC	75.6	75.6	75.6	77.2	77.2	79.4	72.2	72.2	76.8	66.3	66.3	73.0		
			SHC	36.6	52.2	67.7	50.2	64.8	79.4	48.0	62.4	76.8	45.1	59.1	73.0		
		72	THC	82.6	82.6	82.6	83.3	83.3	83.3	77.5	77.5	77.5	70.5	70.5	70.5		
			SHC	27.2	42.8	58.5	35.1	49.2	63.3	32.9	46.6	60.3	30.2	43.0	55.9		
		76	THC	N/A	87.5	87.5	N/A	86.9	86.9	N/A	80.6	80.6	N/A	72.8	72.8		
			SHC		35.0	51.5		37.3	51.6		35.0	48.9		32.1	45.3		

LEGEND:

- Do not operate in this region
- Cfm - Cubic feet per minute (supply air)
- EAT(db) - Entering air temperature (dry bulb)
- EAT(wb) - Entering air temperature (wet bulb)
- N/A - Not applicable, dry bulb temperature (db) is higher than wet bulb temperature (wb).
- SHC - Sensible heat capacity
- THC - Total heat capacity

Table 15 – COOLING CAPACITIES

7.5 TONS

48TC**08			AMBIENT TEMPERATURE												
			85			95			105			115			
			EAT (db)			EAT (db)			EAT (db)			EA (db)			
			75	80	85	75	80	85	75	80	85	75	80	85	
2250 Cfm	EAT (wb)	58	THC	81.2	81.2	91.8	77.5	77.5	87.7	73.6	73.6	83.3	69.5	69.5	78.7
			SHC	70.5	81.2	91.8	67.3	77.5	87.7	63.9	73.6	83.3	60.4	69.5	78.7
		62	THC	86.9	86.9	86.9	82.3	82.3	84.0	77.2	77.2	81.5	71.9	71.9	78.8
			SHC	63.6	74.9	86.2	61.4	72.7	84.0	58.9	70.2	81.5	56.3	67.6	78.8
		67	THC	95.2	95.2	95.2	90.7	90.7	90.7	85.7	85.7	85.7	79.9	79.9	79.9
			SHC	52.8	64.2	75.6	50.9	62.2	73.6	48.8	60.1	71.5	46.3	57.6	68.9
		72	THC	103.5	103.5	103.5	98.9	98.9	98.9	93.8	93.8	93.8	87.3	87.3	87.3
			SHC	41.5	53.1	64.6	39.7	51.2	62.7	37.7	49.2	60.6	35.3	46.6	57.8
		76	THC	N/A	109.6	109.6	N/A	104.8	104.8	N/A	99.1	99.1	N/A	91.6	91.6
			SHC		43.7	56.0		42.0	54.3		40.0	52.4		37.4	49.8
2625 Cfm	EAT (wb)	58	THC	85.9	85.9	97.2	82.2	82.2	93.1	78.1	78.1	88.4	73.9	73.9	83.6
			SHC	74.6	85.9	97.2	71.4	82.2	93.1	67.9	78.1	88.4	64.1	73.9	83.6
		62	THC	89.6	89.6	94.1	85.1	85.1	91.7	80.1	80.1	89.1	74.6	74.6	86.0
			SHC	68.1	81.1	94.1	65.9	78.8	91.7	63.4	76.3	89.1	60.6	73.3	86.0
		67	THC	97.9	97.9	97.9	93.2	93.2	93.2	88.1	88.1	88.1	82.0	82.0	82.0
			SHC	55.7	68.7	81.7	53.7	66.7	79.8	51.6	64.6	77.6	49.0	62.0	74.9
		72	THC	106.0	106.0	106.0	101.3	101.3	101.3	95.9	95.9	95.9	89.0	89.0	89.0
			SHC	42.7	55.8	68.9	40.9	53.9	67.0	38.8	51.8	64.7	36.2	48.9	61.7
		76	THC	N/A	111.8	111.8	N/A	106.9	106.9	N/A	100.7	100.7	N/A	92.7	92.7
			SHC		45.3	59.8		43.6	58.0		41.4	55.6		38.7	52.6
3000 Cfm	EAT (wb)	58	THC	89.6	89.6	101.4	85.9	85.9	97.2	81.7	81.7	92.5	77.0	77.0	87.1
			SHC	77.9	89.6	101.4	74.6	85.9	97.2	71.0	81.7	92.5	66.9	77.0	87.1
		62	THC	91.8	91.8	101.1	87.2	87.2	98.6	82.3	82.3	95.5	77.1	77.1	90.6
			SHC	72.2	86.7	101.1	69.9	84.3	98.6	67.2	81.3	95.5	63.5	77.1	90.6
		67	THC	99.9	99.9	99.9	95.2	95.2	95.2	89.9	89.9	89.9	83.6	83.6	83.6
			SHC	58.3	72.9	87.5	56.4	71.0	85.5	54.2	68.8	83.4	51.6	66.1	80.5
		72	THC	107.9	107.9	107.9	103.0	103.0	103.0	97.3	97.3	97.3	90.1	90.1	90.1
			SHC	43.7	58.3	72.8	41.9	56.4	70.9	39.7	54.1	68.4	37.0	51.0	65.0
		76	THC	N/A	113.8	113.8	N/A	108.4	108.4	N/A	102.0	102.0	N/A	93.4	93.4
			SHC		46.7	62.5		44.8	60.4		42.6	57.9		39.6	54.7
3375 Cfm	EAT (wb)	58	THC	92.7	92.7	104.9	88.8	88.8	100.5	84.6	84.6	95.7	79.6	79.6	90.0
			SHC	80.5	92.7	104.9	77.1	88.8	100.5	73.4	84.6	95.7	69.1	79.6	90.0
		62	THC	93.7	93.7	107.3	89.1	89.1	104.7	84.6	84.6	99.5	79.6	79.6	93.6
			SHC	75.8	91.6	107.3	73.5	89.1	104.7	69.8	84.6	99.5	65.6	79.6	93.6
		67	THC	101.5	101.5	101.5	96.7	96.7	96.7	91.3	91.3	91.3	84.8	84.8	85.7
			SHC	60.8	76.9	93.0	58.8	74.9	91.0	56.7	72.8	88.9	53.9	69.8	85.7
		72	THC	109.4	109.4	109.4	104.3	104.3	104.3	98.4	98.4	98.4	90.9	90.9	90.9
			SHC	44.6	60.5	76.4	42.8	58.6	74.4	40.5	56.2	71.8	37.7	52.8	68.0
		76	THC	N/A	115.1	115.1	N/A	109.5	109.5	N/A	102.8	102.8	N/A	94.0	94.0
			SHC		47.8	64.9		45.9	62.7		43.5	60.1		40.4	56.5
3750 Cfm	EAT (wb)	58	THC	95.3	95.3	107.8	91.3	91.3	103.3	86.9	86.9	98.3	81.7	81.7	92.4
			SHC	82.7	95.3	107.8	79.3	91.3	103.3	75.5	86.9	98.3	70.9	81.7	92.4
		62	THC	95.5	95.5	112.2	91.3	91.3	107.4	87.0	87.0	102.2	81.7	81.7	96.0
			SHC	78.7	95.5	112.2	75.3	91.3	107.4	71.7	87.0	102.2	67.4	81.7	96.0
		67	THC	102.8	102.8	102.8	97.9	97.9	97.9	92.3	92.3	94.0	85.7	85.7	90.5
			SHC	63.1	80.6	98.2	61.2	78.7	96.3	59.0	76.5	94.0	56.0	73.2	90.5
		72	THC	110.6	110.6	110.6	105.4	105.4	105.4	99.2	99.2	99.2	91.5	91.5	91.5
			SHC	45.5	62.7	79.9	43.5	60.7	77.8	41.3	58.1	75.0	38.3	54.5	70.7
		76	THC	N/A	116.1	116.1	N/A	110.3	110.3	N/A	103.5	103.5	N/A	94.5	94.5
			SHC		48.9	67.0		46.8	64.8		44.4	62.0		41.1	58.1

48TC

LEGEND:

- Do not operate in this region
- Cfm - Cubic feet per minute (supply air)
- EAT(db) - Entering air temperature (dry bulb)
- EAT(wb) - Entering air temperature (wet bulb)
- N/A - Not applicable, dry bulb temperature (db) is higher than wet bulb temperature (wb).
- SHC - Sensible heat capacity
- THC - Total heat capacity

Table 16 – COOLING CAPACITIES

8.5 TONS

48TC**09			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	
2550 Cfm	EAT (wb)	58	THC	88.1	88.1	99.9	84.1	84.1	95.3	79.6	79.6	90.3	74.9	74.9	84.9
			SHC	76.4	88.1	99.9	72.8	84.1	95.3	69.0	79.6	90.3	64.9	74.9	84.9
		62	THC	93.9	93.9	95.2	88.6	88.6	92.6	82.8	82.8	89.7	76.6	76.6	86.5
			SHC	69.4	82.3	95.2	66.8	79.7	92.6	64.1	76.9	89.7	61.0	73.8	86.5
		67	THC	103.8	103.8	103.8	98.7	98.7	98.7	93.0	93.0	93.0	86.7	86.7	86.7
			SHC	57.8	70.7	83.6	55.6	68.5	81.4	53.1	66.1	79.0	50.5	63.4	76.4
		72	THC	113.1	113.1	113.1	108.0	108.0	108.0	102.4	102.4	102.4	96.1	96.1	96.1
			SHC	45.2	58.3	71.3	43.2	56.3	69.3	41.1	54.1	67.1	38.7	51.7	64.7
		76	THC	N/A	119.9	119.9	N/A	114.7	114.7	N/A	109.0	109.0	N/A	102.7	102.7
			SHC		47.9	61.9		46.0	60.1		44.1	58.1		41.9	55.8
2975 Cfm	EAT (wb)	58	THC	93.6	93.6	106.1	89.3	89.3	101.2	84.6	84.6	96.0	79.6	79.6	90.3
			SHC	81.1	93.6	106.1	77.4	89.3	101.2	73.3	84.6	96.0	69.0	79.6	90.3
		62	THC	97.5	97.5	104.3	92.0	92.0	101.4	86.1	86.1	98.3	79.8	79.8	94.1
			SHC	74.7	89.5	104.3	72.0	86.7	101.4	69.1	83.7	98.3	65.6	79.8	94.1
		67	THC	106.7	106.7	106.7	101.5	101.5	101.5	95.7	95.7	95.7	89.2	89.2	89.2
			SHC	61.0	75.8	90.6	58.8	73.6	88.5	56.4	71.3	86.1	53.8	68.7	83.6
		72	THC	115.8	115.8	115.8	110.6	110.6	110.6	104.9	104.9	104.9	98.4	98.4	98.4
			SHC	46.5	61.3	76.2	44.5	59.4	74.2	42.3	57.2	72.1	40.0	54.8	69.7
		76	THC	N/A	122.4	122.4	N/A	117.0	117.0	N/A	111.1	111.1	N/A	104.5	104.5
			SHC		49.8	66.1		47.8	63.9		45.7	61.6		43.4	59.0
3400 Cfm	EAT (wb)	58	THC	98.1	98.1	111.3	93.7	93.7	106.2	88.9	88.9	100.8	83.7	83.7	94.9
			SHC	85.0	98.1	111.3	81.2	93.7	106.2	77.0	88.9	100.8	72.5	83.7	94.9
		62	THC	100.0	100.0	112.3	94.9	94.9	108.6	89.1	89.1	104.9	83.8	83.8	98.7
			SHC	79.3	95.8	112.3	76.3	92.5	108.6	73.2	89.1	104.9	68.8	83.8	98.7
		67	THC	109.0	109.0	109.0	103.6	103.6	103.6	97.6	97.6	97.6	91.0	91.0	91.0
			SHC	63.9	80.5	97.2	61.8	78.5	95.2	59.4	76.1	92.9	56.8	73.5	90.3
		72	THC	117.9	117.9	117.9	112.5	112.5	112.5	106.6	106.6	106.6	100.0	100.0	100.0
			SHC	47.6	64.1	80.6	45.6	62.1	78.7	43.4	60.0	76.6	41.1	57.6	74.2
		76	THC	N/A	124.2	124.2	N/A	118.6	118.6	N/A	112.5	112.5	N/A	105.7	105.7
			SHC		51.2	69.0		49.2	66.7		47.0	64.4		44.7	61.9
3825 Cfm	EAT (wb)	58	THC	101.6	101.6	115.1	97.2	97.2	110.1	92.3	92.3	104.6	87.0	87.0	98.6
			SHC	88.0	101.6	115.1	84.2	97.2	110.1	80.0	92.3	104.6	75.4	87.0	98.6
		62	THC	101.9	101.9	120.0	97.3	97.3	114.6	92.4	92.4	108.9	87.1	87.1	102.6
			SHC	83.7	101.8	120.0	79.9	97.3	114.6	75.9	92.4	108.9	71.6	87.1	102.6
		67	THC	110.7	110.7	110.7	105.3	105.3	105.3	99.2	99.2	99.3	92.5	92.5	96.7
			SHC	66.7	85.0	103.4	64.6	83.0	101.5	62.2	80.8	99.3	59.6	78.2	96.7
		72	THC	119.4	119.4	119.4	114.0	114.0	114.0	108.0	108.0	108.0	101.3	101.3	101.3
			SHC	48.5	66.6	84.6	46.6	64.7	82.7	44.4	62.6	80.7	42.1	60.2	78.4
		76	THC	N/A	125.5	125.5	N/A	119.8	119.8	N/A	113.6	113.6	N/A	106.7	106.7
			SHC		52.4	71.5		50.4	69.3		48.2	67.0		45.9	64.4
4250 Cfm	EAT (wb)	58	THC	104.4	104.4	118.3	99.9	99.9	113.2	95.0	95.0	107.6	89.5	89.5	101.5
			SHC	90.4	104.4	118.3	86.6	99.9	113.2	82.3	95.0	107.6	77.6	89.5	101.5
		62	THC	104.4	104.4	123.0	99.9	99.9	117.8	95.0	95.0	112.0	89.6	89.6	105.6
			SHC	85.8	104.4	123.0	82.1	99.9	117.8	78.1	95.0	112.0	73.6	89.6	105.6
		67	THC	112.1	112.1	112.1	106.6	106.6	107.5	100.4	100.4	105.3	93.6	93.6	102.7
			SHC	69.2	89.2	109.2	67.2	87.3	107.5	64.9	85.1	105.3	62.3	82.5	102.7
		72	THC	120.7	120.7	120.7	115.1	115.1	115.1	109.0	109.0	109.0	102.2	102.2	102.2
			SHC	49.4	68.9	88.4	47.4	67.0	86.5	45.3	64.9	84.6	42.9	62.6	82.3
		76	THC	N/A	126.6	126.6	N/A	120.8	120.8	N/A	114.5	114.5	N/A	107.4	107.4
			SHC		53.5	73.9		51.5	71.7		49.3	69.4		46.9	66.8

LEGEND:

- Do not operate in this region
- Cfm - Cubic feet per minute (supply air)
- EAT(db) - Entering air temperature (dry bulb)
- EAT(wb) - Entering air temperature (wet bulb)
- N/A - Not applicable, dry bulb temperature (db) is higher than wet bulb temperature (wb).
- SHC - Sensible heat capacity
- THC - Total heat capacity

Table 17 – COOLING CAPACITIES

10 TONS

48TC**12			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	
			3000 Cfm	EAT (wb)	58	THC	106.3	106.3	120.5	101.7	101.7	115.2	96.6	96.6	109.4
SHC	92.2	106.3				120.5	88.2	101.7	115.2	83.8	96.6	109.4	78.9	91.0	103.1
62	THC	112.5			112.5	115.2	106.5	106.5	112.3	99.9	99.9	109.0	92.7	92.7	105.2
	SHC	83.8			99.5	115.2	81.0	96.6	112.3	77.8	93.4	109.0	74.2	89.7	105.2
67	THC	123.5			123.5	123.5	117.8	117.8	117.8	111.3	111.3	111.3	104.0	104.0	104.0
	SHC	69.2			85.0	100.7	66.8	82.5	98.3	64.1	79.8	95.5	61.0	76.8	92.5
72	THC	134.3			134.3	134.3	128.5	128.5	128.5	122.0	122.0	122.0	114.7	114.7	114.7
	SHC	53.8			69.6	85.5	51.6	67.4	83.2	49.1	64.9	80.7	46.3	62.1	77.9
76	THC	N/A			142.4	142.4	N/A	136.3	136.3	N/A	129.5	129.5	N/A	121.8	121.8
	SHC				56.8	73.3		54.7	71.2		52.3	68.8		49.7	66.2
3500 Cfm	EAT (wb)	58	THC	112.9	112.9	127.8	108.0	108.0	122.3	102.7	102.7	116.3	96.8	96.8	109.7
			SHC	97.9	112.9	127.8	93.6	108.0	122.3	89.0	102.7	116.3	83.9	96.8	109.7
		62	THC	116.3	116.3	126.2	110.5	110.5	123.3	103.8	103.8	119.5	97.1	97.1	114.3
			SHC	90.2	108.2	126.2	87.4	105.3	123.3	84.0	101.8	119.5	79.8	97.1	114.3
		67	THC	126.9	126.9	126.9	120.9	120.9	120.9	114.3	114.3	114.3	106.8	106.8	106.8
			SHC	73.2	91.3	109.4	70.8	88.9	107.1	68.1	86.2	104.4	65.0	83.2	101.3
		72	THC	137.5	137.5	137.5	131.4	131.4	131.4	124.7	124.7	124.7	117.2	117.2	117.2
			SHC	55.3	73.4	91.5	53.1	71.1	89.2	50.6	68.7	86.7	47.8	65.9	83.9
		76	THC	N/A	145.1	145.1	N/A	138.8	138.8	N/A	131.7	131.7	N/A	123.6	123.6
			SHC		59.0	78.2		56.7	75.8		54.3	73.1		51.5	70.0
4000 Cfm	EAT (wb)	58	THC	117.8	117.8	133.5	113.0	113.0	128.0	107.5	107.5	121.8	101.5	101.5	115.0
			SHC	102.2	117.8	133.5	98.0	113.0	128.0	93.3	107.5	121.8	88.0	101.5	115.0
		62	THC	119.1	119.1	136.0	113.5	113.5	132.5	107.7	107.7	126.7	101.6	101.6	119.6
			SHC	95.8	115.9	136.0	92.8	112.6	132.5	88.6	107.7	126.7	83.6	101.6	119.6
		67	THC	129.4	129.4	129.4	123.3	123.3	123.3	116.5	116.5	116.5	108.9	108.9	109.8
			SHC	76.9	97.3	117.7	74.5	95.0	115.4	71.8	92.3	112.8	68.8	89.3	109.8
		72	THC	139.7	139.7	139.7	133.5	133.5	133.5	126.6	126.6	126.6	118.8	118.8	118.8
			SHC	56.7	76.8	97.0	54.4	74.6	94.7	51.9	72.1	92.3	49.1	69.3	89.5
		76	THC	N/A	147.0	147.0	N/A	140.5	140.5	N/A	133.2	133.2	N/A	124.9	124.9
			SHC		60.6	81.7		58.4	79.3		55.8	76.5		53.0	73.5
4500 Cfm	EAT (wb)	58	THC	121.7	121.7	137.9	116.8	116.8	132.3	111.2	111.2	126.0	105.0	105.0	118.9
			SHC	105.6	121.7	137.9	101.3	116.8	132.3	96.4	111.2	126.0	91.0	105.0	118.9
		62	THC	121.8	121.8	143.4	116.9	116.9	137.6	111.3	111.3	131.0	105.1	105.1	123.7
			SHC	100.2	121.8	143.4	96.1	116.9	137.6	91.6	111.3	131.0	86.5	105.1	123.7
		67	THC	131.3	131.3	131.3	125.1	125.1	125.1	118.2	118.2	120.8	110.5	110.5	117.7
			SHC	80.3	102.9	125.5	78.0	100.7	123.3	75.3	98.0	120.8	72.3	95.0	117.7
		72	THC	141.5	141.5	141.5	135.1	135.1	135.1	128.0	128.0	128.0	120.1	120.1	120.1
			SHC	57.9	80.0	102.1	55.6	77.7	99.9	53.1	75.2	97.4	50.3	72.4	94.6
		76	THC	N/A	148.3	148.3	N/A	141.8	141.8	N/A	134.3	134.3	N/A	125.8	125.8
			SHC		62.1	84.9		59.8	82.5		57.3	79.7		54.4	76.6
5000 Cfm	EAT (wb)	58	THC	125.0	125.0	141.6	120.0	120.0	135.9	114.3	114.3	129.5	107.9	107.9	122.3
			SHC	108.4	125.0	141.6	104.0	120.0	135.9	99.1	114.3	129.5	93.6	107.9	122.3
		62	THC	125.1	125.1	147.2	120.1	120.1	141.4	114.4	114.4	134.7	108.0	108.0	127.2
			SHC	102.9	125.1	147.2	98.8	120.1	141.4	94.1	114.4	134.7	88.9	108.0	127.2
		67	THC	132.8	132.8	133.0	126.5	126.5	130.8	119.6	119.6	128.2	111.8	111.8	125.1
			SHC	83.6	108.3	133.0	81.2	106.0	130.8	78.6	103.4	128.2	75.6	100.3	125.1
		72	THC	142.8	142.8	142.8	136.3	136.3	136.3	129.1	129.1	129.1	121.1	121.1	121.1
			SHC	59.0	82.9	106.9	56.7	80.7	104.7	54.1	78.2	102.2	51.3	75.4	99.4
		76	THC	N/A	149.4	149.4	N/A	142.8	142.8	N/A	135.1	135.1	N/A	126.5	126.5
			SHC		63.4	87.9		61.2	85.5		58.6	82.7		55.6	79.4

48TC

LEGEND:

- Do not operate in this region
- Cfm - Cubic feet per minute (supply air)
- EAT(db) - Entering air temperature (dry bulb)
- EAT(wb) - Entering air temperature (wet bulb)
- N/A - Not applicable, dry bulb temperature (db) is higher than wet bulb temperature (wb).
- SHC - Sensible heat capacity
- THC - Total heat capacity

Table 18 – STATIC PRESSURE ADDERS (Factory Options and/or Accessories)

3 – 6 TONS											
CFM	600	800	1000	1250	1500	1750	2000	2250	2500	2750	3000
Vertical Economizer	0.01	0.02	0.04	0.05	0.07	0.09	0.12	0.15	0.18	0.22	0.26
Horizontal Economizer	0.02	0.03	0.04	0.06	0.08	0.10	0.13	0.15	0.18	0.23	0.28

7.5 – 10 TONS																
CFM	2250	2500	2750	3000	3250	3500	3750	4000	4250	4500	4750	5000	5250	5500	5750	6000
Vertical Economizer	0.06	0.08	0.09	0.12	0.13	0.15	0.17	0.20	0.22	0.25	0.29	0.33	0.36	0.40	0.44	0.48
Horizontal Economizer	0.08	0.10	0.13	0.15	0.18	0.21	0.25	0.28	0.30	0.34	0.39	0.43	0.47	0.51	0.56	0.60

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 Table 18. 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's motors, please see the Electrical information section of this book.
6. For more information on the performance limits of Carrier's motors, see the application data section of this book.

FAN PERFORMANCE

Table 19 – 48TC04**

1 PHASE

3 TON HORIZONTAL SUPPLY

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
	Field–Supplied Drive ¹		Standard Static Option				Medium Static Option			
900	553	0.14	681	0.22	782	0.32	870	0.42	948	0.53
975	575	0.16	700	0.25	801	0.35	888	0.46	965	0.57
1050	597	0.18	720	0.28	820	0.38	906	0.49	983	0.61
1125	620	0.21	741	0.31	839	0.42	925	0.54	1001	0.66
1200	643	0.23	762	0.34	859	0.46	944	0.58	1020	0.71
1275	667	0.27	783	0.38	879	0.50	963	0.63	1038	0.76
1350	691	0.30	805	0.42	900	0.55	983	0.68	1057	0.82
1425	715	0.34	827	0.47	920	0.60	1002	0.74	1076	0.88
1500	740	0.38	849	0.52	941	0.66	1023	0.80	1096	0.95

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
	Medium Static Option				Field–Supplied Drive ²					
900	1019	0.64	1084	0.76	1146	0.89	1203	1.02	1258	1.16
975	1036	0.69	1101	0.81	1162	0.94	1219	1.08	–	–
1050	1053	0.74	1118	0.86	1179	1.00	1236	1.14	–	–
1125	1071	0.79	1135	0.92	1196	1.06	1253	1.20	–	–
1200	1089	0.84	1153	0.98	1213	1.12	–	–	–	–
1275	1107	0.90	1171	1.04	1231	1.19	–	–	–	–
1350	1126	0.96	1189	1.11	–	–	–	–	–	–
1425	1144	1.03	1208	1.18	–	–	–	–	–	–
1500	1163	1.10	–	–	–	–	–	–	–	–

NOTE: For more information, see General Fan Performance Notes on page 30.

Boldface indicates field–supplied drive is required.

1. Recommend using field–supplied fan pulley (part number KR11AG006) and belt (part number KR30AE039).
2. Recommend using field–supplied motor pulley (part number KR11HY161) and belt (part number KR30AE035).

Table 20 – 48TC04**

1 PHASE

3 TON VERTICAL SUPPLY

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
	Field–Supplied Drive ¹		Standard Static Option				Medium Static Option			
900	567	0.15	688	0.22	786	0.30	871	0.37	947	0.44
975	591	0.17	710	0.26	807	0.34	891	0.42	966	0.49
1050	615	0.20	732	0.29	828	0.38	911	0.47	985	0.55
1125	641	0.23	755	0.33	849	0.42	931	0.52	1005	0.61
1200	666	0.26	778	0.37	871	0.47	952	0.57	1025	0.67
1275	693	0.29	802	0.41	893	0.53	974	0.63	1046	0.74
1350	719	0.33	826	0.46	916	0.58	995	0.70	1067	0.81
1425	746	0.38	850	0.51	939	0.64	1017	0.76	1088	0.89
1500	773	0.42	875	0.57	963	0.70	1040	0.84	1110	0.96

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
	Medium Static Option				Field–Supplied Drive ²					
900	1016	0.51	1080	0.57	1139	0.64	1195	0.71	1249	0.77
975	1034	0.57	1098	0.64	1157	0.72	1213	0.79	1266	0.86
1050	1053	0.63	1116	0.71	1176	0.79	1231	0.87	1284	0.95
1125	1073	0.70	1135	0.79	1194	0.87	1250	0.96	1302	1.04
1200	1093	0.77	1155	0.87	1213	0.96	1268	1.05	1321	1.14
1275	1113	0.85	1174	0.95	1232	1.05	1287	1.15	–	–
1350	1133	0.92	1194	1.03	1252	1.14	–	–	–	–
1425	1154	1.01	1215	1.12	–	–	–	–	–	–
1500	1175	1.09	–	–	–	–	–	–	–	–

NOTE: For more information, see General Fan Performance Notes on page 30.

Boldface indicates field–supplied drive is required.

1. Recommend using field–supplied fan pulley (part number KR11AG006) and belt (part number KR30AE039).
2. Recommend using field–supplied motor pulley (part number KR11HY161) and belt (part number KR30AE035).

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FAN PERFORMANCE (cont.)

Table 21 – 48TC04**

3 PHASE

3 TON HORIZONTAL SUPPLY

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
	Field-Supplied Drive ¹		Standard Static Option				Medium Static Option			
900	553	0.14	681	0.22	782	0.32	870	0.42	948	0.53
975	575	0.16	700	0.25	801	0.35	888	0.46	965	0.57
1050	597	0.18	720	0.28	820	0.38	906	0.49	983	0.61
1125	620	0.21	741	0.31	839	0.42	925	0.54	1001	0.66
1200	643	0.23	762	0.34	859	0.46	944	0.58	1020	0.71
1275	667	0.27	783	0.38	879	0.50	963	0.63	1038	0.76
1350	691	0.30	805	0.42	900	0.55	983	0.68	1057	0.82
1425	715	0.34	827	0.47	920	0.60	1002	0.74	1076	0.88
1500	740	0.38	849	0.52	941	0.66	1023	0.80	1096	0.95

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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
	Medium Static Option					High Static Option				
900	1019	0.64	1084	0.76	1146	0.89	1203	1.02	1258	1.16
975	1036	0.69	1101	0.81	1162	0.94	1219	1.08	1274	1.22
1050	1053	0.74	1118	0.86	1179	1.00	1236	1.14	1290	1.28
1125	1071	0.79	1135	0.92	1196	1.06	1253	1.20	1307	1.35
1200	1089	0.84	1153	0.98	1213	1.12	1270	1.27	1324	1.42
1275	1107	0.90	1171	1.04	1231	1.19	1287	1.34	1341	1.50
1350	1126	0.96	1189	1.11	1249	1.26	1305	1.42	1358	1.58
1425	1144	1.03	1208	1.18	1267	1.34	1323	1.50	1376	1.66
1500	1163	1.10	1226	1.25	1285	1.41	1341	1.58	1394	1.75

NOTE: For more information, see General Fan Performance Notes on page 33.

1. Recommend using field-supplied drive (part number KR11AG006) and belt (part number KR30AE039)

Table 22 – 48TC04**

3 PHASE

3 TON VERTICAL SUPPLY

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
	Field-Supplied Drive ¹		Standard Static Option				Medium Static Option			
900	567	0.15	688	0.22	786	0.30	871	0.37	947	0.44
975	591	0.17	710	0.26	807	0.34	891	0.42	966	0.49
1050	615	0.20	732	0.29	828	0.38	911	0.47	985	0.55
1125	641	0.23	755	0.33	849	0.42	931	0.52	1005	0.61
1200	666	0.26	778	0.37	871	0.47	952	0.57	1025	0.67
1275	693	0.29	802	0.41	893	0.53	974	0.63	1046	0.74
1350	719	0.33	826	0.46	916	0.58	995	0.70	1067	0.81
1425	746	0.38	850	0.51	939	0.64	1017	0.76	1088	0.89
1500	773	0.42	875	0.57	963	0.70	1040	0.84	1110	0.96

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
	Medium Static Option					High Static Option				
900	1016	0.51	1080	0.57	1139	0.64	1195	0.71	1249	0.77
975	1034	0.57	1098	0.64	1157	0.72	1213	0.79	1266	0.86
1050	1053	0.63	1116	0.71	1176	0.79	1231	0.87	1284	0.95
1125	1073	0.70	1135	0.79	1194	0.87	1250	0.96	1302	1.04
1200	1093	0.77	1155	0.87	1213	0.96	1268	1.05	1321	1.14
1275	1113	0.85	1174	0.95	1232	1.05	1287	1.15	1339	1.25
1350	1133	0.92	1194	1.03	1252	1.14	1307	1.25	1358	1.35
1425	1154	1.01	1215	1.12	1272	1.24	1326	1.35	1378	1.46
1500	1175	1.09	1235	1.22	1292	1.34	1346	1.46	1397	1.58

NOTE: For more information, see General Fan Performance Notes on page 30.

Boldface indicates field-supplied drive is required.

1. Recommend using field-supplied fan pulley (part number KR11AG006) and belt (part number KR30AE039).

FAN PERFORMANCE (cont.)

Table 23 – 48TC05**

1 PHASE

4 TON HORIZONTAL SUPPLY

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
	Standard Static Option					Medium Static Option				
1200	643	0.23	762	0.34	859	0.46	944	0.58	1020	0.71
1300	675	0.28	790	0.40	886	0.52	969	0.65	1044	0.78
1400	707	0.33	819	0.45	913	0.58	996	0.72	1070	0.86
1500	740	0.38	849	0.52	941	0.66	1023	0.80	1096	0.95
1600	773	0.45	879	0.59	970	0.73	1050	0.88	1123	1.04
1700	807	0.52	910	0.67	999	0.82	1078	0.98	1150	1.14
1800	841	0.59	942	0.75	1029	0.91	1106	1.08	1177	1.25
1900	875	0.68	974	0.85	1059	1.02	1135	1.19	1205	1.37
2000	910	0.77	1006	0.95	1090	1.13	1165	1.31	1234	1.49

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
	Medium Static Option					Field-Supplied Drive ¹				
1200	1089	0.84	1153	0.98	1213	1.12	-	-	-	-
1300	1113	0.92	1177	1.06	-	-	-	-	-	-
1400	1138	1.01	1201	1.15	-	-	-	-	-	-
1500	1163	1.10	-	-	-	-	-	-	-	-
1600	1189	1.20	-	-	-	-	-	-	-	-
1700	-	-	-	-	-	-	-	-	-	-
1800	-	-	-	-	-	-	-	-	-	-
1900	-	-	-	-	-	-	-	-	-	-
2000	-	-	-	-	-	-	-	-	-	-

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NOTE: For more information, see General Fan Performance Notes on page 30.

Boldface indicates field-supplied drive is required.

1. Recommend using field-supplied motor pulley (part number KR11HY161) and belt (part number KR30AE035).

Table 24 – 48TC05**

1 PHASE

4 TON VERTICAL SUPPLY

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
	Standard Static Option					Medium Static Option				
1200	666	0.26	778	0.37	871	0.47	952	0.57	1025	0.67
1300	701	0.31	810	0.43	901	0.54	981	0.65	1053	0.76
1400	737	0.36	842	0.49	931	0.62	1010	0.74	1081	0.86
1500	773	0.42	875	0.57	963	0.70	1040	0.84	1110	0.96
1600	810	0.49	909	0.65	994	0.79	1070	0.94	1140	1.08
1700	847	0.57	943	0.73	1027	0.89	1101	1.05	1170	1.20
1800	885	0.66	978	0.83	1060	1.00	1133	1.16	1200	1.32
1900	923	0.75	1014	0.94	1093	1.11	1165	1.29	1231	1.46
2000	962	0.85	1049	1.05	1127	1.24	1198	1.42	1263	1.61

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
	Medium Static Option					Field-Supplied Drive ¹				
1200	1093	0.77	1155	0.87	1213	0.96	1268	1.05	1321	1.14
1300	1119	0.87	1181	0.98	1239	1.08	1294	1.18	-	-
1400	1147	0.98	1208	1.09	-	-	-	-	-	-
1500	1175	1.09	-	-	-	-	-	-	-	-
1600	-	-	-	-	-	-	-	-	-	-
1700	-	-	-	-	-	-	-	-	-	-
1800	-	-	-	-	-	-	-	-	-	-
1900	-	-	-	-	-	-	-	-	-	-
2000	-	-	-	-	-	-	-	-	-	-

NOTE: For more information, see General Fan Performance Notes on page 30.

Boldface indicates field-supplied drive is required.

1. Recommend using field-supplied motor pulley (part number KR11HY161) and belt (part number KR30AE035).

FAN PERFORMANCE (cont.)

Table 25 – 48TC05**

3 PHASE

4 TON HORIZONTAL SUPPLY

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
	Standard Static Option					Medium Static Option				
1200	643	0.23	762	0.34	859	0.46	944	0.58	1020	0.71
1300	675	0.28	790	0.40	886	0.52	969	0.65	1044	0.78
1400	707	0.33	819	0.45	913	0.58	996	0.72	1070	0.86
1500	740	0.38	849	0.52	941	0.66	1023	0.80	1096	0.95
1600	773	0.45	879	0.59	970	0.73	1050	0.88	1123	1.04
1700	807	0.52	910	0.67	999	0.82	1078	0.98	1150	1.14
1800	841	0.59	942	0.75	1029	0.91	1106	1.08	1177	1.25
1900	875	0.68	974	0.85	1059	1.02	1135	1.19	1205	1.37
2000	910	0.77	1006	0.95	1090	1.13	1165	1.31	1234	1.49

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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
	Medium Static Option					High Static Option				
1200	1089	0.84	1153	0.98	1213	1.12	1270	1.27	1324	1.42
1300	1113	0.92	1177	1.06	1237	1.21	1293	1.36	1347	1.52
1400	1138	1.01	1201	1.15	1261	1.31	1317	1.47	1370	1.63
1500	1163	1.10	1226	1.25	1285	1.41	1341	1.58	1394	1.75
1600	1189	1.20	1252	1.36	1310	1.53	1365	1.70	1418	1.87
1700	1216	1.31	1277	1.48	1335	1.65	1390	1.83	1442	2.01
1800	1242	1.42	1303	1.60	1361	1.78	1415	1.96	1467	2.15
1900	1270	1.55	1330	1.73	1387	1.92	1441	2.11	1493	2.30
2000	1297	1.68	1357	1.87	1414	2.07	1467	2.26	-	-

NOTE: For more information, see General Fan Performance Notes on page 30.

Boldface indicates field-supplied drive is required.

1. Recommend using field-supplied fan pulley (part no. KR11AZ506), motor pulley (part no. KR11HY181) and belt (part no. KR30AE041).

Table 26 – 48TC05**

3 PHASE

4 TON VERTICAL SUPPLY

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
	Standard Static Option					Medium Static Option				
1200	666	0.26	778	0.37	871	0.47	952	0.57	1025	0.67
1300	701	0.31	810	0.43	901	0.54	981	0.65	1053	0.76
1400	737	0.36	842	0.49	931	0.62	1010	0.74	1081	0.86
1500	773	0.42	875	0.57	963	0.70	1040	0.84	1110	0.96
1600	810	0.49	909	0.65	994	0.79	1070	0.94	1140	1.08
1700	847	0.57	943	0.73	1027	0.89	1101	1.05	1170	1.20
1800	885	0.66	978	0.83	1060	1.00	1133	1.16	1200	1.32
1900	923	0.75	1014	0.94	1093	1.11	1165	1.29	1231	1.46
2000	962	0.85	1049	1.05	1127	1.24	1198	1.42	1263	1.61

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
	Medium Static Option					High Static Option				
1200	1093	0.77	1155	0.87	1213	0.96	1268	1.05	1321	1.14
1300	1119	0.87	1181	0.98	1239	1.08	1294	1.18	1346	1.28
1400	1147	0.98	1208	1.09	1265	1.21	1320	1.32	1371	1.43
1500	1175	1.09	1235	1.22	1292	1.34	1346	1.46	1397	1.58
1600	1204	1.21	1263	1.35	1320	1.48	1373	1.61	1424	1.74
1700	1233	1.34	1292	1.49	1348	1.63	1401	1.77	1451	1.91
1800	1262	1.48	1321	1.64	1376	1.79	1428	1.94	1479	2.09
1900	1293	1.63	1350	1.79	1405	1.96	1457	2.12	1506	2.28
2000	1323	1.79	1380	1.96	1434	2.13	1486	2.31	-	-

NOTE: For more information, see General Fan Performance Notes on page 30.

Boldface indicates field-supplied drive is required.

1. Recommend using field-supplied fan pulley (part no. KR11AZ506), motor pulley (part no. KR11HY181) and belt (part no. KR30AE041).

FAN PERFORMANCE (cont.)

Table 27 – 48TC06**

1 PHASE

5 TON HORIZONTAL SUPPLY

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
	Standard Static Option								Medium Static Option	
1500	800	0.39	904	0.49	999	0.60	1087	0.72	1169	0.85
1625	849	0.48	947	0.59	1038	0.70	1122	0.83	1201	0.96
1750	899	0.59	992	0.70	1078	0.82	1159	0.95	1235	1.08
1875	950	0.70	1038	0.82	1120	0.95	1198	1.08	1271	1.22
2000	1001	0.84	1085	0.96	1163	1.09	1238	1.23	1309	1.38
2125	1053	0.99	1133	1.12	1208	1.26	1280	1.40	-	-
2250	1106	1.16	1182	1.29	1254	1.44	-	-	-	-
2375	1159	1.34	1231	1.49	-	-	-	-	-	-
2500	-	-	-	-	-	-	-	-	-	-

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
	Medium Static Option									
1500	1247	0.98	1320	1.13	1390	1.28	1457	1.44	-	-
1625	1276	1.10	1348	1.24	1416	1.40	-	-	-	-
1750	1308	1.22	1377	1.38	-	-	-	-	-	-
1875	1342	1.37	-	-	-	-	-	-	-	-
2000	-	-	-	-	-	-	-	-	-	-
2125	-	-	-	-	-	-	-	-	-	-
2250	-	-	-	-	-	-	-	-	-	-
2375	-	-	-	-	-	-	-	-	-	-
2500	-	-	-	-	-	-	-	-	-	-

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NOTE: For more information, see General Fan Performance Notes on page 30.
Boldface indicates field-supplied drive is required.

Table 28 – 48TC06**

1 PHASE

5 TON VERTICAL SUPPLY

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
	Standard Static Option						Medium Static Option			
1500	848	0.42	968	0.55	1069	0.68	1158	0.80	1238	0.94
1625	897	0.51	1013	0.65	1111	0.79	1198	0.93	1277	1.07
1750	947	0.61	1059	0.76	1155	0.91	1240	1.06	1318	1.21
1875	997	0.72	1105	0.89	1199	1.05	1283	1.21	1359	1.37
2000	1048	0.85	1153	1.03	1244	1.20	1326	1.37	-	-
2125	1100	1.00	1201	1.19	1290	1.37	-	-	-	-
2250	1152	1.16	1250	1.36	-	-	-	-	-	-
2375	1205	1.34	-	-	-	-	-	-	-	-
2500	-	-	-	-	-	-	-	-	-	-

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
	Medium Static Option						Field-Supplied Drive¹			
1500	1312	1.07	1380	1.20	1445	1.34	1506	1.48	-	-
1625	1350	1.21	1418	1.35	1482	1.50	-	-	-	-
1750	1390	1.36	-	-	-	-	-	-	-	-
1875	-	-	-	-	-	-	-	-	-	-
2000	-	-	-	-	-	-	-	-	-	-
2125	-	-	-	-	-	-	-	-	-	-
2250	-	-	-	-	-	-	-	-	-	-
2375	-	-	-	-	-	-	-	-	-	-
2500	-	-	-	-	-	-	-	-	-	-

NOTE: For more information, see General Fan Performance Notes on page 30.
Boldface indicates field-supplied drive is required.

1. Recommend using field-supplied motor pulley (part number KR11HY171) and belt (part number KR30AE039).

FAN PERFORMANCE (cont.)

Table 29 – 48TC06**

3 PHASE

5 TON HORIZONTAL SUPPLY

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
	Standard Static Option								Medium Static Option	
1500	800	0.39	904	0.49	999	0.60	1087	0.72	1169	0.85
1625	849	0.48	947	0.59	1038	0.70	1122	0.83	1201	0.96
1750	899	0.59	992	0.70	1078	0.82	1159	0.95	1235	1.08
1875	950	0.70	1038	0.82	1120	0.95	1198	1.08	1271	1.22
2000	1001	0.84	1085	0.96	1163	1.09	1238	1.23	1309	1.38
2125	1053	0.99	1133	1.12	1208	1.26	1280	1.40	1348	1.55
2250	1106	1.16	1182	1.29	1254	1.44	1323	1.59	1389	1.74
2375	1159	1.34	1231	1.49	1300	1.64	1367	1.80	1430	1.96
2500	1212	1.55	1281	1.70	1348	1.86	1412	2.02	1473	2.19

48TC

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
	Medium Static Option								High Static Option	
1500	1247	0.98	1320	1.13	1390	1.28	1457	1.44	1522	1.61
1625	1276	1.10	1348	1.24	1416	1.40	1481	1.56	1544	1.73
1750	1308	1.22	1377	1.38	1444	1.53	1507	1.70	1569	1.87
1875	1342	1.37	1409	1.52	1473	1.69	1536	1.86	1596	2.03
2000	1377	1.53	1442	1.69	1505	1.86	1565	2.03	1624	2.21
2125	1414	1.71	1477	1.87	1538	2.04	1597	2.22	1654	2.40
2250	1452	1.91	1514	2.08	1573	2.25	1630	2.43	1686	2.62
2375	1492	2.12	1551	2.30	1609	2.48	1665	2.66	1719	2.85
2500	1533	2.36	1591	2.54	1647	2.73	-	-	-	-

NOTE: For more information, see General Fan Performance Notes on page 30.

Boldface indicates field-supplied drive is required.

1. Recommend using field-supplied fan pulley (part number KR11AZ506), motor pulley (part number KR11HY191) and belt (part number KR30AE042).

Table 30 – 48TC06**

3 PHASE

5 TON VERTICAL SUPPLY

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
	Standard Static Option								Medium Static Option	
1500	848	0.42	968	0.55	1069	0.68	1158	0.80	1238	0.94
1625	897	0.51	1013	0.65	1111	0.79	1198	0.93	1277	1.07
1750	947	0.61	1059	0.76	1155	0.91	1240	1.06	1318	1.21
1875	997	0.72	1105	0.89	1199	1.05	1283	1.21	1359	1.37
2000	1048	0.85	1153	1.03	1244	1.20	1326	1.37	1401	1.54
2125	1100	1.00	1201	1.19	1290	1.37	1370	1.55	1444	1.73
2250	1152	1.16	1250	1.36	1336	1.55	1415	1.75	1487	1.94
2375	1205	1.34	1299	1.55	1384	1.76	1460	1.96	1532	2.17
2500	1258	1.54	1349	1.76	1431	1.98	1506	2.20	1576	2.41

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
	Medium Static Option								High Static Option	
1500	1312	1.07	1380	1.20	1445	1.34	1506	1.48	1564	1.62
1625	1350	1.21	1418	1.35	1482	1.50	1542	1.64	1600	1.79
1750	1390	1.36	1457	1.51	1520	1.67	1580	1.83	1637	1.98
1875	1430	1.53	1496	1.69	1559	1.86	1618	2.02	1675	2.19
2000	1471	1.72	1536	1.89	1598	2.06	1657	2.24	1713	2.41
2125	1513	1.92	1577	2.10	1638	2.28	1696	2.47	1752	2.65
2250	1555	2.13	1619	2.33	1679	2.52	1736	2.72	-	-
2375	1598	2.37	1661	2.57	1720	2.78	-	-	-	-
2500	1642	2.63	1704	2.84	-	-	-	-	-	-

NOTE: For more information, see General Fan Performance Notes on page 30.

Boldface indicates field-supplied drive is required.

1. Recommend using field-supplied fan pulley (part number KR11AZ506), motor pulley (part number KR11HY191) and belt (part number KR30AE042).

FAN PERFORMANCE (cont.)

Table 31 – 48TC07**

3 PHASE

6 TON HORIZONTAL SUPPLY

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
	Field – Supplied Drive¹					Standard Static Option				Medium Static Option
1800	913	0.64	1010	0.80	1098	0.98	1178	1.16	1252	1.35
1950	972	0.78	1065	0.96	1148	1.14	1226	1.34	1298	1.54
2100	1032	0.95	1120	1.14	1200	1.33	1275	1.54	1345	1.75
2250	1093	1.14	1177	1.34	1254	1.55	1325	1.76	1393	1.98
2400	1155	1.36	1234	1.57	1308	1.78	1377	2.01	1443	2.24
2550	1217	1.60	1293	1.82	1363	2.05	1430	2.28	1494	2.53
2700	1280	1.87	1352	2.10	1420	2.34	1484	2.59	1546	2.84
2850	1343	2.17	1412	2.42	1477	2.67	1539	2.93	1599	3.19
3000	1406	2.50	1472	2.76	1535	3.03	1595	3.29	1653	3.57

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
	Medium Static Option					High Static Option				
1800	1322	1.56	1388	1.77	1451	1.98	1510	2.21	1568	2.44
1950	1366	1.75	1430	1.97	1491	2.20	1550	2.43	1606	2.67
2100	1411	1.97	1473	2.20	1533	2.43	1590	2.67	1645	2.92
2250	1457	2.21	1518	2.45	1576	2.69	1632	2.94	1686	3.20
2400	1505	2.48	1564	2.73	1621	2.98	1676	3.24	1729	3.51
2550	1554	2.78	1612	3.03	1667	3.30	1721	3.57	–	–
2700	1604	3.10	1660	3.37	1715	3.64	–	–	–	–
2850	1656	3.46	–	–	–	–	–	–	–	–
3000	–	–	–	–	–	–	–	–	–	–

48TC

NOTE: For more information, see General Fan Performance Notes on page 30.

Boldface indicates field – supplied drive is required.

1. Recommend using field – supplied fan pulley (part number KR11AZ406), motor pulley (part number KR11HY151) and belt (part number KR29AF035).

Table 32 – 48TC07**

3 PHASE

6 TON VERTICAL SUPPLY

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
	Standard Static Option					Medium Static Option				
1800	967	0.63	1075	0.80	1170	0.97	1255	1.13	1333	1.28
1950	1029	0.77	1132	0.96	1223	1.14	1306	1.32	1382	1.49
2100	1091	0.93	1189	1.14	1278	1.33	1358	1.52	1433	1.71
2250	1154	1.11	1248	1.33	1333	1.55	1411	1.75	1484	1.96
2400	1218	1.32	1308	1.55	1390	1.78	1466	2.01	1537	2.23
2550	1283	1.55	1369	1.80	1448	2.05	1521	2.29	1590	2.52
2700	1348	1.80	1431	2.07	1507	2.33	1578	2.59	1645	2.84
2850	1414	2.09	1493	2.37	1566	2.65	1636	2.92	1701	3.19
3000	1479	2.40	1556	2.70	1627	3.00	1694	3.29	1757	3.57

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
	Medium Static Option					High Static Option				
1800	1406	1.43	1475	1.58	1540	1.72	1601	1.87	1660	2.00
1950	1454	1.65	1521	1.82	1585	1.98	1645	2.13	1703	2.29
2100	1502	1.89	1568	2.07	1631	2.25	1690	2.42	1747	2.59
2250	1552	2.15	1617	2.35	1678	2.54	1737	2.73	1793	2.92
2400	1603	2.44	1666	2.65	1727	2.86	1784	3.06	1839	3.26
2550	1655	2.75	1717	2.98	1776	3.20	1833	3.42	1887	3.64
2700	1709	3.09	1769	3.33	1827	3.57	–	–	–	–
2850	1763	3.45	–	–	–	–	–	–	–	–
3000	–	–	–	–	–	–	–	–	–	–

NOTE: For more information, see General Fan Performance Notes on page 30.

Boldface indicates field – supplied drive is required.

1. Recommend using field – supplied fan pulley (part number KR11AZ506), motor pulley (part number KR11HY191) and belt (part number KR29AF042).

FAN PERFORMANCE (cont.)

Table 33 – 48TC08**

3 PHASE

7.5 TON HORIZONTAL SUPPLY

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
	Standard Static Option								Medium Static Option	
2250	505	0.52	586	0.73	657	0.97	722	1.22	782	1.50
2438	533	0.62	610	0.85	679	1.09	742	1.36	800	1.65
2625	562	0.74	635	0.98	701	1.23	762	1.51	819	1.81
2813	591	0.88	661	1.13	725	1.39	783	1.68	839	1.98
3000	621	1.03	688	1.29	749	1.57	806	1.87	859	2.18
3188	652	1.21	715	1.48	774	1.77	829	2.07	881	2.40
3375	682	1.40	743	1.68	800	1.98	853	2.30	903	2.63
3563	713	1.61	772	1.91	826	2.22	878	2.55	927	2.89
3750	745	1.85	801	2.15	853	2.48	903	2.82	951	3.18

48TC

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
	Medium Static Option					High Static Option				
2250	838	1.81	891	2.12	941	2.46	988	2.82	1033	3.19
2438	854	1.96	906	2.28	955	2.63	1001	2.99	1046	3.37
2625	872	2.12	922	2.46	970	2.81	1016	3.17	1060	3.56
2813	890	2.31	940	2.65	986	3.01	1031	3.38	1074	3.77
3000	910	2.51	958	2.86	1004	3.23	1048	3.61	1090	4.01
3188	930	2.74	977	3.10	1022	3.47	1065	3.86	1107	4.26
3375	951	2.99	997	3.35	1041	3.74	1083	4.13	1124	4.54
3563	973	3.26	1018	3.63	1061	4.02	1103	4.43	1143	4.85
3750	996	3.55	1040	3.93	1082	4.34	1122	4.75	1162	5.18

NOTE: For more information, see General Fan Performance Notes on page 30.

Boldface indicates field-supplied drive is required.

1. Recommend using field-supplied fan pulley (part no. KR11AZ002) and belt (part no. KR29AF054).

Table 34 – 48TC08**

3 PHASE

7.5 TON VERTICAL SUPPLY

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
	Standard Static Option								Medium Static Option	
2250	513	0.54	595	0.76	665	1.01	728	1.27	786	1.56
2438	541	0.65	620	0.89	688	1.14	750	1.42	806	1.71
2625	570	0.77	645	1.02	712	1.29	772	1.58	827	1.88
2813	600	0.91	672	1.18	736	1.46	794	1.76	848	2.07
3000	629	1.07	699	1.35	761	1.64	818	1.95	871	2.28
3188	660	1.25	726	1.54	787	1.85	842	2.17	894	2.51
3375	690	1.45	754	1.75	813	2.07	867	2.41	917	2.76
3563	721	1.67	783	1.98	840	2.32	892	2.67	941	3.03
3750	752	1.91	812	2.24	867	2.59	918	2.95	966	3.32

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
	Medium Static Option					High Static Option				
2250	839	1.86	889	2.18	935	2.52	980	2.87	1022	3.23
2438	858	2.02	907	2.35	953	2.70	997	3.06	1039	3.43
2625	878	2.20	926	2.54	972	2.89	1015	3.26	1056	3.64
2813	899	2.40	946	2.75	991	3.11	1033	3.49	1074	3.88
3000	920	2.62	966	2.98	1010	3.35	1052	3.74	1093	4.14
3188	942	2.86	987	3.23	1031	3.61	1072	4.01	1112	4.42
3375	964	3.12	1009	3.50	1052	3.89	1093	4.30	1132	4.72
3563	988	3.41	1032	3.80	1074	4.20	1114	4.61	1152	5.04
3750	1011	3.71	1054	4.11	1096	4.53	1135	4.95	-	-

NOTE: For more information, see General Fan Performance Notes on page 30.

Boldface indicates field-supplied drive is required.

1. Recommend using field-supplied fan pulley (part no. KR11AZ002) and belt (part no. KR29AF054).

FAN PERFORMANCE (cont.)

Table 35 – 48TC09**

3 PHASE

8.5 TON HORIZONTAL SUPPLY

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
	Field – Supplied Drive¹				Standard Static Option				Medium Static Option	
2550	497	0.48	579	0.61	651	0.75	717	0.90	777	1.05
2763	524	0.58	602	0.72	671	0.87	735	1.03	794	1.19
2975	551	0.70	626	0.86	693	1.01	754	1.18	812	1.35
3188	580	0.84	651	1.00	716	1.17	775	1.34	831	1.52
3400	609	1.00	677	1.17	739	1.35	797	1.53	851	1.71
3613	638	1.17	703	1.35	763	1.54	819	1.73	871	1.93
3825	668	1.37	730	1.56	788	1.76	842	1.96	893	2.16
4038	698	1.59	758	1.79	813	2.00	866	2.20	915	2.42
4250	728	1.83	786	2.04	839	2.26	890	2.47	938	2.70

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
	Medium Static Option				High Static Option					
2550	833	1.21	886	1.38	936	1.56	984	1.74	1029	1.93
2763	849	1.36	900	1.53	950	1.72	996	1.90	1041	2.10
2975	865	1.52	916	1.70	964	1.89	1010	2.09	1054	2.29
3188	883	1.70	933	1.89	980	2.09	1025	2.29	1068	2.50
3400	902	1.90	950	2.10	996	2.30	1041	2.51	1083	2.73
3613	921	2.13	969	2.33	1014	2.54	1057	2.76	1099	2.98
3825	941	2.37	988	2.58	1032	2.80	1075	3.02	1116	3.25
4038	963	2.63	1008	2.86	1051	3.08	1093	3.31	1133	3.55
4250	984	2.92	1029	3.15	1071	3.39	1112	3.63	1152	3.87

48TC

NOTE: For more information, see General Fan Performance Notes on page 30.

Boldface indicates field – supplied drive is required.

1. Recommend using field – supplied fan pulley (part no. KR11AK012) and belt (part no. KR29AF055).
2. Recommend using field – supplied motor pulley (part no. KR11HY310), fan pulley (part no. KR11AZ002) and belt (part no. KR29AF054).

Table 36 – 48TC09**

3 PHASE

8.5 TON VERTICAL SUPPLY

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
	Standard Static Option						Medium Static Option			
2550	526	0.51	600	0.65	666	0.79	727	0.93	783	1.07
2763	557	0.62	627	0.77	690	0.92	749	1.08	804	1.23
2975	588	0.75	655	0.91	716	1.08	772	1.24	825	1.40
3188	621	0.90	684	1.07	743	1.25	797	1.42	848	1.60
3400	653	1.06	714	1.25	770	1.44	822	1.62	872	1.81
3613	687	1.25	744	1.45	798	1.65	849	1.84	897	2.04
3825	720	1.45	775	1.67	827	1.88	876	2.09	922	2.30
4038	754	1.69	807	1.91	856	2.13	904	2.35	949	2.57
4250	788	1.94	839	2.17	886	2.41	932	2.64	976	2.88

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
	Medium Static Option				High Static Option					
2550	836	1.20	886	1.34	934	1.48	979	1.61	1022	1.74
2763	855	1.37	904	1.52	950	1.67	995	1.82	1037	1.97
2975	875	1.56	923	1.72	968	1.88	1012	2.04	1053	2.20
3188	897	1.77	943	1.94	987	2.11	1030	2.29	1071	2.46
3400	919	1.99	964	2.18	1007	2.36	1049	2.55	1089	2.73
3613	943	2.24	986	2.44	1029	2.63	1069	2.83	1108	3.02
3825	967	2.51	1010	2.71	1051	2.92	1090	3.13	1129	3.34
4038	992	2.80	1034	3.02	1074	3.24	1112	3.46	1150	3.68
4250	1018	3.11	1058	3.34	1097	3.57	–	–	–	–

NOTE: For more information, see General Fan Performance Notes on page 30.

Boldface indicates field – supplied drive is required.

1. Recommend using field – supplied motor pulley (part no. KR11HY310), fan pulley (part no. KR11AZ002) and belt (part no. KR29AF054).

FAN PERFORMANCE (cont.)

Table 37 – 48TC12**

3 PHASE

10 TON HORIZONTAL SUPPLY

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
	Field–Supplied Drive¹		Standard Static Option						Medium Static Option	
3000	579	0.70	660	0.89	732	1.09	799	1.29	860	1.50
3250	613	0.85	690	1.06	760	1.27	823	1.49	883	1.71
3500	648	1.03	721	1.25	788	1.48	850	1.71	907	1.95
3750	683	1.23	753	1.47	817	1.71	877	1.96	933	2.21
4000	719	1.45	786	1.71	848	1.97	905	2.23	959	2.50
4250	756	1.71	819	1.98	879	2.26	934	2.53	987	2.81
4500	792	1.99	853	2.28	910	2.57	964	2.87	1015	3.16
4750	830	2.31	888	2.62	943	2.92	995	3.23	1044	3.54
5000	867	2.66	923	2.98	976	3.30	1026	3.63	1074	3.95

48TC

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
	Medium Static Option						High Static Option			
3000	917	1.70	970	1.91	1021	2.13	1070	2.34	1117	2.56
3250	938	1.93	991	2.16	1041	2.38	1089	2.61	1134	2.85
3500	961	2.18	1013	2.42	1062	2.66	1108	2.91	1153	3.15
3750	985	2.46	1035	2.71	1083	2.97	1129	3.23	1173	3.49
4000	1011	2.76	1059	3.03	1106	3.30	1151	3.58	1194	3.85
4250	1037	3.09	1084	3.38	1130	3.66	1174	3.95	1216	4.24
4500	1064	3.46	1110	3.76	1155	4.06	1198	4.36	1239	4.66
4750	1091	3.85	1137	4.16	1180	4.48	1222	4.80	1263	5.12
5000	1120	4.28	1164	4.61	1207	4.94	–	–	–	–

NOTE: For more information, see General Fan Performance Notes on page 30.

Boldface indicates field–supplied drive is required.

1. Recommend using field–supplied fan pulley (part no. KR11AD912) and belt (part no. KR29AF051).
2. Recommend using field–supplied motor pulley (part no. KR11HY410).

Table 38 – 48TC12**

3 PHASE

10 TON VERTICAL SUPPLY

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
	Standard Static Option						Medium Static Option			
3000	616	0.79	689	0.97	757	1.16	821	1.36	882	1.57
3250	655	0.96	724	1.16	788	1.37	849	1.58	907	1.80
3500	695	1.17	760	1.38	821	1.60	879	1.83	934	2.06
3750	736	1.41	797	1.63	855	1.86	910	2.10	963	2.35
4000	777	1.68	834	1.91	889	2.16	942	2.41	993	2.67
4250	818	1.98	873	2.23	925	2.49	976	2.75	1025	3.02
4500	860	2.32	912	2.58	962	2.85	1010	3.13	1057	3.41
4750	902	2.69	951	2.97	999	3.26	1046	3.55	1091	3.84
5000	944	3.11	991	3.40	1037	3.70	1082	4.00	1125	4.31

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
	Medium Static Option						High Static Option			
3000	939	1.79	994	2.01	1047	2.24	1098	2.47	1147	2.71
3250	962	2.03	1015	2.26	1066	2.50	1115	2.75	1163	3.00
3500	987	2.30	1038	2.54	1088	2.80	1135	3.05	1181	3.32
3750	1014	2.60	1063	2.86	1111	3.12	1157	3.39	1202	3.66
4000	1042	2.93	1090	3.20	1136	3.48	1180	3.76	1224	4.04
4250	1072	3.30	1118	3.58	1162	3.87	1205	4.16	1247	4.46
4500	1103	3.70	1147	4.00	1190	4.29	1232	4.60	1273	4.91
4750	1135	4.14	1177	4.45	1219	4.76	1259	5.08	–	–
5000	1167	4.63	1209	4.95	–	–	–	–	–	–

NOTE: For more information, see General Fan Performance Notes on page 30.

Boldface indicates field–supplied drive is required.

1. Recommend using field–supplied motor pulley (part no. KR11HY410).

FAN PERFORMANCE (cont.)

Table 39 – PULLEY ADJUSTMENT

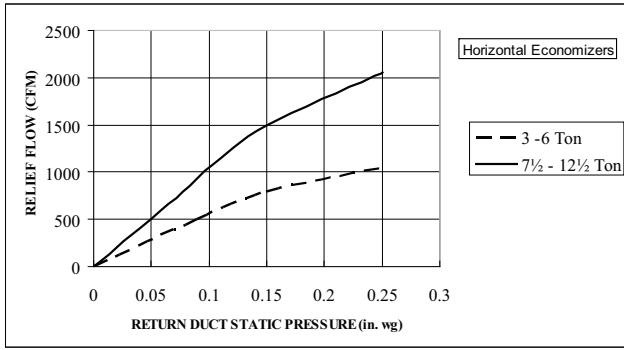
UNIT	MOTOR/DRIVE COMBO	MOTOR PULLEY TURNS OPEN											
		0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	
04	1 phase	Standard Static	854	825	795	766	736	707	678	648	619	589	560
		Medium Static	1175	1135	1094	1054	1013	973	932	892	851	811	770
		High Static	–	–	–	–	–	–	–	–	–	–	–
	3 phase	Standard Static	854	825	795	766	736	707	678	648	619	589	560
		Medium Static	1175	1135	1094	1054	1013	973	932	892	851	811	770
		High Static	1466	1423	1380	1337	1294	1251	1207	1164	1121	1078	1035
05	1 phase	Standard Static	854	825	795	766	736	707	678	648	619	589	560
		Medium Static	1175	1135	1094	1054	1013	973	932	892	851	811	770
		High Static	–	–	–	–	–	–	–	–	–	–	–
	3 phase	Standard Static	854	825	795	766	736	707	678	648	619	589	560
		Medium Static	1175	1135	1094	1054	1013	973	932	892	851	811	770
		High Static	1466	1423	1380	1337	1294	1251	1207	1164	1121	1078	1035
06	1 phase	Standard Static	1175	1135	1094	1054	1013	973	932	892	851	811	770
		Medium Static	1466	1423	1380	1337	1294	1251	1207	1164	1121	1078	1035
		High Static	–	–	–	–	–	–	–	–	–	–	–
	3 phase	Standard Static	1175	1135	1094	1054	1013	973	932	892	851	811	770
		Medium Static	1466	1423	1380	1337	1294	1251	1207	1164	1121	1078	1035
		High Static	1687	1649	1610	1572	1533	1495	1457	1418	1380	1341	1303
07	3 phase	Standard Static	1457	1419	1380	1342	1303	1265	1227	1188	1150	1111	1073
		Medium Static	1518	1484	1449	1415	1380	1346	1311	1277	1242	1208	1173
		High Static	1788	1757	1725	1694	1662	1631	1600	1568	1537	1505	1474
08	3 phase	Standard Static	747	721	695	670	644	618	592	566	541	515	489
		Medium Static	949	927	906	884	863	841	819	798	776	755	733
		High Static	1102	1083	1063	1044	1025	1006	986	967	948	928	909
09	3 phase	Standard Static	733	712	690	669	647	626	604	583	561	540	518
		Medium Static	936	911	887	862	838	813	788	764	739	715	690
		High Static	1084	1059	1035	1010	986	961	936	912	887	863	838
12	3 phase	Standard Static	838	813	789	764	739	715	690	665	640	616	591
		Medium Static	1084	1059	1035	1010	986	961	936	912	887	863	838
		High Static	1240	1218	1196	1175	1153	1131	1109	1087	1066	1044	1022

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

■ – Factory settings

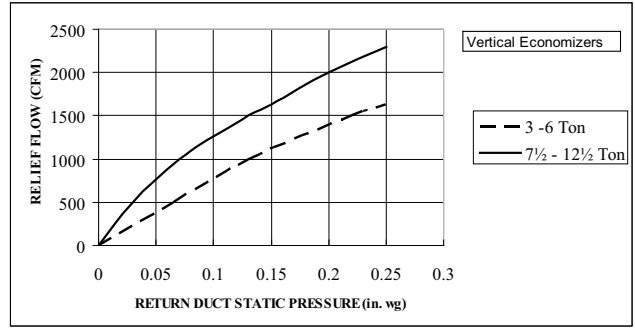
48TC

ECONOMIZER, BAROMETRIC RELIEF AND PE PERFORMANCE



C08070

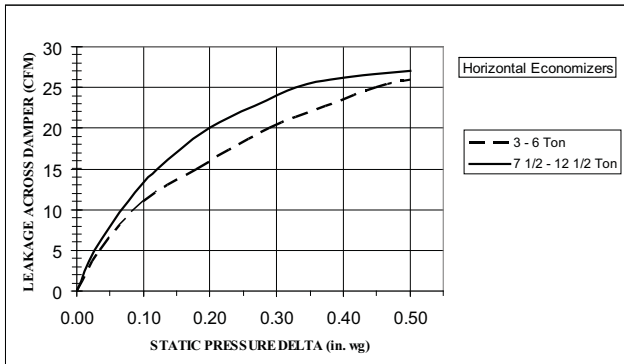
Fig. 11 - Barometric Relief Flow Capacity



C08073

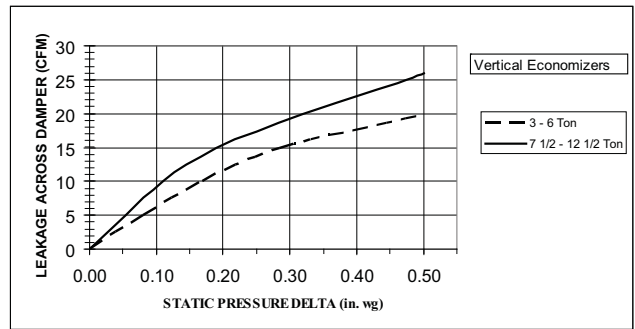
Fig. 14 - Barometric Relief Flow Capacity

48TC



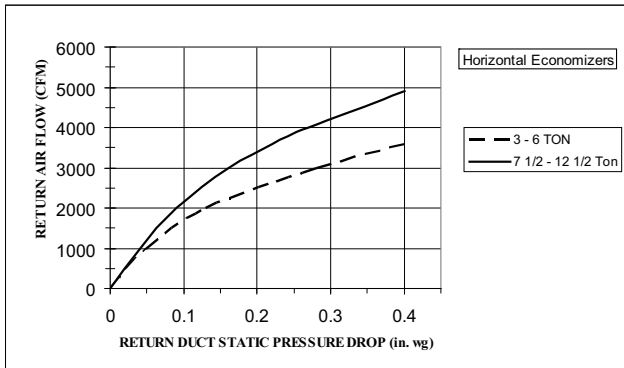
C08071

Fig. 12 - Outdoor Air Damper Leakage



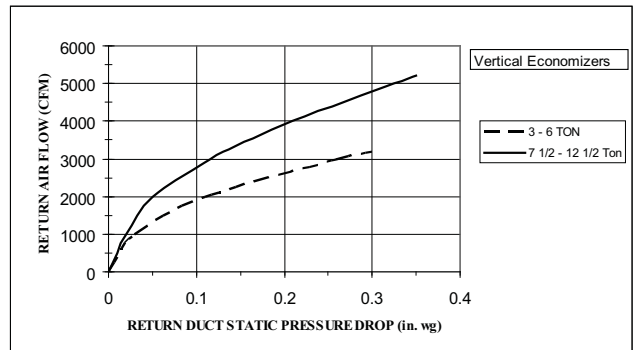
C08074

Fig. 15 - Outdoor Air Damper Leakage



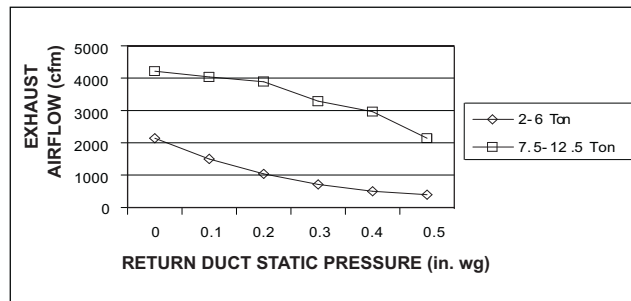
C08072

Fig. 13 - Return Air Pressure Drop



C08075

Fig. 16 - Return Air Pressure Drop



C08013

Fig. 17 - Power Exhaust Performance

ELECTRICAL INFORMATION

Table 40 – 48TC04**
3 TONS

V-Ph-Hz	VOLTAGE RANGE		COMP (ea)		OFM (ea)		IFM				
	MIN	MAX	RLA	LRA	WATTS	FLA	TYPE	Max WATTS	Max AMP Draw	EFF at Full Load	FLA
208-1-60	187	253	16.6	79	325	1.5	Std Static	1000	5.1	70%	4.9
							Med Static	1000	5.1	70%	4.9
230-1-60	187	253	16.6	79	325	1.5	Std Static	1000	5.1	70%	4.9
							Med Static	1000	5.1	70%	4.9
208-3-60	187	253	10.4	73	325	1.5	Std Static	1000	5.1	70%	4.9
							Med Static	1000	5.1	70%	4.9
							High Static	2120	5.5	80%	5.2
230-3-60	187	253	10.4	73	325	1.5	Std Static	1000	5.1	70%	4.9
							Med Static	1000	5.1	70%	4.9
							High Static	2120	5.5	80%	5.2
460-3-60	414	506	5.8	38	325	0.8	Std Static	1000	2.2	70%	2.1
							Med Static	1000	2.2	70%	2.1
							High Static	2120	2.7	80%	2.6
575-3-60	518	633	3.8	37	325	0.6	Std Static	1000	2.0	71%	1.9
							Med Static	1000	2.0	71%	1.9
							High Static	2120	2.1	80%	2.0

48TC
Table 41 – 48TC05**
4 TONS

V-Ph-Hz	VOLTAGE RANGE		COMP (ea)		OFM (ea)		IFM				
	MIN	MAX	RLA	LRA	WATTS	FLA	TYPE	Max WATTS	Max AMP Draw	EFF at Full Load	FLA
208-1-60	187	253	21.8	117	325	1.5	Std Static	1000	5.1	70%	4.9
							Med Static	1850	7.4	78%	7.0
230-1-60	187	253	21.8	117	325	1.5	Std Static	1000	5.1	70%	4.9
							Med Static	1850	7.4	78%	7.0
208-3-60	187	253	13.7	83	325	1.5	Std Static	1000	5.1	70%	4.9
							Med Static	1000	5.1	70%	4.9
							High Static	2120	5.5	80%	5.2
230-3-60	187	253	13.7	83	325	1.5	Std Static	1000	5.1	70%	4.9
							Med Static	1000	5.1	70%	4.9
							High Static	2120	5.5	80%	5.2
460-3-60	414	506	6.2	41	325	0.8	Std Static	1000	2.2	70%	2.1
							Med Static	1000	2.2	70%	2.1
							High Static	2120	2.7	80%	2.6
575-3-60	518	633	4.8	37	325	0.6	Std Static	1000	2.0	71%	1.9
							Med Static	1000	2.2	71%	2.1
							High Static	2120	2.1	80%	2.0

ELECTRICAL INFORMATION (cont.)

Table 42 – 48TC06**
5 TONS

V-Ph-Hz	VOLTAGE RANGE		COMP (ea)		OFM (ea)		IFM				
	MIN	MAX	RLA	LRA	WATTS	FLA	TYPE	Max WATTS	Max AMP Draw	EFF at Full Load	FLA
208-1-60	187	253	26.2	134	325	1.5	Std Static	1000	5.1	70%	4.9
							Med Static	1850	7.4	78%	7.0
230-1-60	187	253	26.2	134	325	1.5	Std Static	1000	5.1	70%	4.9
							Med Static	1850	7.4	78%	7.0
208-3-60	187	253	15.6	110	325	1.5	Std Static	1000	5.1	70%	4.9
							Med Static	2120	5.5	80%	5.2
							High Static	2615	7.9	81%	7.5
230-3-60	187	253	15.6	110	325	1.5	Std Static	1000	5.1	70%	4.9
							Med Static	2120	5.5	80%	5.2
							High Static	2615	7.9	81%	7.5
460-3-60	414	506	7.7	52	325	0.8	Std Static	1000	2.2	70%	2.1
							Med Static	2120	2.7	80%	2.6
							High Static	2615	3.6	81%	3.4
575-3-60	518	633	5.8	39	325	0.6	Std Static	1000	2.0	71%	1.9
							Med Static	1390	2.1	81%	2.0
							High Static	3775	2.9	81%	2.8

Table 43 – 48TC07**
6 TONS

V-Ph-Hz	VOLTAGE RANGE		COMP (ea)		OFM (ea)		IFM				
	MIN	MAX	RLA	LRA	WATTS	FLA	TYPE	Max WATTS	Max AMP Draw	EFF at Full Load	FLA
208-3-60	187	253	19.0	123	325	1.5	Std Static	2120	5.5	80%	5.2
							Med Static	2615	7.9	81%	7.5
							High Static	2615	7.9	81%	7.5
230-3-60	187	253	19.0	123	325	1.5	Std Static	2120	5.5	80%	5.2
							Med Static	2615	7.9	81%	7.5
							High Static	2615	7.9	81%	7.5
460-3-60	414	506	9.7	62	325	0.8	Std Static	2120	2.7	80%	2.6
							Med Static	2615	3.6	81%	3.4
							High Static	3775	4.6	81%	4.4
575-3-60	518	633	7.4	50	325	0.6	Std Static	2120	2.1	80%	2.0
							Med Static	3775	2.9	81%	2.8
							High Static	3775	2.9	81%	2.8

Table 44 – 48TC08**
7.5 TONS

V-Ph-Hz	VOLTAGE RANGE		COMP (ea)		OFM (ea)		IFM				
	MIN	MAX	RLA	LRA	WATTS	FLA	TYPE	Max WATTS	Max AMP Draw	EFF at Full Load	FLA
208-3-60	187	253	25.0	164	325	1.5	Std Static	1448	5.5	80%	5.2
							Med Static	2278	7.9	81%	7.5
							High Static	4559	15.8	81%	15.0
230-3-60	187	253	25.0	164	325	1.5	Std Static	1448	5.5	80%	5.2
							Med Static	2278	7.9	81%	7.5
							High Static	4559	15.8	81%	15.0
460-3-60	414	506	12.2	100	325	0.8	Std Static	1448	2.7	80%	2.6
							Med Static	2278	3.6	81%	3.4
							High Static	4559	7.8	81%	7.4
575-3-60	518	633	9.0	78	325	0.6	Std Static	1379	2.5	80%	2.4
							Med Static	3775	2.9	81%	2.8
							High Static	1870	5.9	81%	5.6

ELECTRICAL INFORMATION (cont.)

Table 45 – 48TC09**

8.5 TONS

V-Ph-Hz	VOLTAGE RANGE		COMP (ea)		OFM (ea)		IFM				
	MIN	MAX	RLA	LRA	WATTS	FLA	TYPE	Max WATTS	Max AMP Draw	EFF at Full Load	FLA
208-3-60	187	253	29.5	195	325	1.5	Std Static	1448	5.5	80%	5.2
							Med Static	2120	5.5	80%	5.2
							High Static	2694	10.5	80%	10.0
230-3-60	187	253	29.5	195	325	1.5	Std Static	1448	5.5	80%	5.2
							Med Static	2120	5.5	80%	5.2
							High Static	2694	10.5	80%	10.0
460-3-60	414	506	14.7	95	325	0.8	Std Static	1448	2.7	80%	2.6
							Med Static	2120	2.7	80%	2.6
							High Static	2694	4.6	80%	4.4
575-3-60	518	633	12.2	80	325	0.6	Std Static	1379	2.5	80%	2.4
							Med Static	1390	2.1	80%	2.0
							High Static	3775	2.9	81%	2.8

48TC

Table 46 – 48TC12**

10 TONS

V-Ph-Hz	VOLTAGE RANGE		COMP (ea)		OFM (ea)		IFM				
	MIN	MAX	RLA	LRA	WATTS	FLA	TYPE	Max WATTS	Max AMP Draw	EFF at Full Load	FLA
208-3-60	187	253	30.1	225	325	1.5	Std Static	2120	5.5	80%	5.2
							Med Static	3775	10.5	81%	10.0
							High Static	4559	15.8	81%	15.0
230-3-60	187	253	30.1	225	325	1.5	Std Static	2120	5.5	80%	5.2
							Med Static	3775	10.5	81%	10.0
							High Static	4559	15.8	81%	15.0
460-3-60	414	506	16.7	114	325	0.8	Std Static	2120	2.7	80%	2.6
							Med Static	3775	4.6	81%	4.4
							High Static	4559	7.8	81%	7.4
575-3-60	518	633	12.2	80	325	0.6	Std Static	1390	2.1	80%	2.0
							Med Static	3775	2.9	81%	2.8
							High Static	1870	5.9	81%	5.6

Table 47 – MCA/MOCP DETERMINATION NO C.O. OR UNPWRD C.O.

UNIT	NOM. V-Ph-Hz	IFM TYPE	COMBUSTION FAN MOTOR FLA	POWER EXHAUST FLA	NO C.O. or UNPWRD C.O.							
					NO P.E.				w/ P.E. (pwrd fr/ unit)			
					MCA	MOCP	DISC. SIZE		MCA	MOCP	DISC. SIZE	
							FLA	LRA			FLA	LRA
48TC**04	208/230-1-60	STD	0.48	1.9	27.2	40.0	26	95	29.1	45.0	29	97
		MED			27.2	40.0	26	95	29.1	45.0	29	97
	208/230-3-60	STD	0.48	1.9	19.4	25.0	19	89	21.3	30.0	22	91
		MED			19.4	25.0	19	89	21.3	30.0	22	91
		HIGH			19.7	30.0	20	107	21.6	30.0	22	109
	460-3-60	STD	0.25	1.0	10.2	15.0	10	46	11.2	15.0	11	47
		MED			10.2	15.0	10	46	11.2	15.0	11	47
		HIGH			10.7	15.0	11	55	11.7	15.0	12	56
	575-3-60	STD	0.24	1.9	7.3	15.0	7	44	9.2	15.0	9	46
		MED			7.3	15.0	7	44	9.2	15.0	9	46
		HIGH			7.4	15.0	7	50	9.3	15.0	10	52
	48TC**05	208/230-1-60	STD	0.48	1.9	33.7	50.0	32	133	35.6	50.0	35
MED			33.7			50.0	32	133	35.6	50.0	35	135
208/230-3-60		STD	0.48	1.9	23.5	30.0	23	99	25.4	30.0	25	101
		MED			23.5	30.0	23	99	25.4	30.0	25	101
		HIGH			23.8	30.0	23	117	25.7	30.0	25	119
460-3-60		STD	0.25	1.0	10.7	15.0	10	49	11.7	15.0	12	50
		MED			10.7	15.0	10	49	11.7	15.0	12	50
		HIGH			11.2	15.0	11	58	12.2	15.0	12	59
575-3-60		STD	0.24	1.9	8.5	15.0	8	44	10.4	15.0	11	46
		MED			8.5	15.0	8	44	10.4	15.0	11	46
		HIGH			8.6	15.0	9	50	10.5	15.0	11	52
48TC**06		208/230-1-60	STD	0.48	1.9	39.2	60.0	37	150	41.1	60.0	40
	MED		41.3			60.0	40	175	43.2	60.0	42	177
	208/230-3-60	STD	0.48	1.9	25.9	30.0	25	126	27.8	40.0	27	128
		MED			26.2	40.0	26	144	28.1	40.0	28	146
		HIGH			28.5	40.0	29	170	30.4	45.0	30	172
	460-3-60	STD	0.25	1.0	12.5	20.0	12	60	13.5	20.0	13	61
		MED			13.0	20.0	13	69	14.0	20.0	14	70
		HIGH			13.8	20.0	14	82	14.8	20.0	15	83
	575-3-60	STD	0.24	1.9	9.8	15.0	10	46	11.7	15.0	12	48
		MED			9.9	15.0	10	52	11.8	15.0	13	54
		HIGH			10.7	15.0	11	63	12.6	15.0	13	65
	48TC**07	208/230-3-60	STD	0.48	1.9	30.5	45.0	30	157	32.4	50.0	32
MED			32.8			50.0	32	183	34.7	50.0	34	185
HIGH			32.8			50.0	32	183	34.7	50.0	34	185
460-3-60		STD	0.25	1.0	15.5	25.0	15	79	16.5	25.0	16	80
		MED			16.3	25.0	16	92	17.3	25.0	17	93
		HIGH			17.3	25.0	17	101	18.3	25.0	18	102
575-3-60		STD	0.24	1.9	11.9	15.0	12	63	13.8	20.0	14	65
		MED			12.7	20.0	12	74	14.6	20.0	15	76
		HIGH			12.7	20.0	12	74	14.6	20.0	15	76

48TC

See notes on next page.

Table 47 (cont.) MCA/MOCP DETERMINATION NO C.O. OR UNPWRD C.O.

UNIT	NOM. V-Ph-Hz	IFM TYPE	COMBUSTION FAN MOTOR FLA	POWER EXHAUST FLA	NO C.O. or UNPWRD C.O.				NO C.O. or UNPWRD C.O.			
					NO P.E.				w/ P.E. (pwrd fr/ unit)			
					MCA	MOCP	DISC. SIZE		MCA	MOCP	DISC. SIZE	
							FLA	LRA			FLA	LRA
48TC**08	208/230-3-60	STD	0.48	3.8	39.5	60	38	191	43.3	60	43	195
		MED			41.8	60	41	228	45.6	60	45	232
		HIGH			49.3	60	49	254	53.1	60	54	258
	460-3-60	STD	0.25	1.8	19.5	30	19	113	21.3	30	21	115
		MED			20.3	30	20	132	22.1	30	22	134
		HIGH			24.3	30	24	145	26.1	30	26	147
	575-3-60	STD	0.24	3.8	14.9	20	14	89	18.7	25	19	93
		MED			15.3	20	15	104	19.1	25	19	108
		HIGH			18.1	25	18	118	21.9	30	23	122
48TC**09	208/230-3-60	STD	0.48	3.8	45.1	60	43	222	48.9	60	48	226
		MED			45.1	60	43	233	48.9	60	48	237
		HIGH			49.9	60	49	276	53.7	80	53	280
	460-3-60	STD	0.25	1.8	22.6	30	22	108	24.4	30	24	110
		MED			22.6	30	22	114	24.4	30	24	116
		HIGH			24.4	30	24	136	26.2	30	26	138
	575-3-60	STD	0.24	3.8	18.9	30	18	91	22.7	30	23	95
		MED			18.5	30	18	95	22.3	30	22	99
		HIGH			19.3	30	19	106	23.1	30	23	110
48TC**12	208/230-3-60	STD	0.48	3.8	45.8	60	44	263	49.6	60	48	267
		MED			50.6	60	50	306	54.4	80	54	310
		HIGH			55.6	80	55	315	59.4	80	60	319
	460-3-60	STD	0.25	1.8	25.1	30	24	133	26.9	40	26	135
		MED			26.9	40	26	155	28.7	45	28	157
		HIGH			29.9	45	30	159	31.7	45	32	161
	575-3-60	STD	0.24	3.8	18.5	30	18	95	22.3	30	22	99
		MED			19.3	30	19	106	23.1	30	23	110
		HIGH			22.1	30	22	120	25.9	30	26	124

48TC

¹Fuse or breaker

LEGEND:

- CO - Convenient outlet
- DISC - Disconnect
- FLA - Full load amps
- IFM - Indoor fan motor
- LRA - Locked rotor amps
- MCA - Minimum circuit amps
- MOCP - Maximum over current protection
- PE - Power exhaust
- UNPWRD 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 v
- (BC) 231 - 227 = 4 v
- (AC) 227 - 226 = 1 v

Maximum deviation is 4 v.

Determine percent of voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{4}{227} = 1.76\%$$

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 48 – MCA/MOCP DETERMINATION W/ PWRD C.O.

UNIT	NOM. V-Ph-Hz	IFM TYPE	COMBUSTION FAN MOTOR FLA	POWER EXHAUST FLA	w/ PWRD C.O.							
					NO P.E.				w/ P.E. (pwrd fr/ unit)			
					MCA	MOCP	DISC. SIZE		MCA	MOCP	DISC. SIZE	
							FLA	LRA			FLA	LRA
48TC**04	208/230-1-60	STD	0.48	1.9	32.0	45.0	32	100	33.9	50.0	34	102
		MED			32.0	45.0	32	100	33.9	50.0	34	102
	208/230-3-60	STD	0.48	1.9	24.2	30.0	25	94	26.1	30.0	27	96
		MED			24.2	30.0	25	94	26.1	30.0	27	96
		HIGH			24.5	30.0	25	112	26.4	30.0	27	114
	460-3-60	STD	0.25	1.0	12.4	15.0	13	48	13.4	15.0	14	49
		MED			12.4	15.0	13	48	13.4	15.0	14	49
		HIGH			12.9	15.0	13	57	13.9	20.0	14	58
	575-3-60	STD	0.24	1.9	9.0	15.0	9	46	10.9	15.0	11	48
		MED			9.0	15.0	9	46	10.9	15.0	11	48
		HIGH			9.1	15.0	9	52	11.0	15.0	12	54
	48TC**05	208/230-1-60	STD	0.48	1.9	38.5	60.0	38	138	40.4	60.0	40
MED			38.5			60.0	38	138	40.4	60.0	40	140
208/230-3-60		STD	0.48	1.9	28.3	40.0	29	104	30.2	40.0	31	106
		MED			28.3	40.0	29	104	30.2	40.0	31	106
		HIGH			28.6	40.0	29	122	30.5	40.0	31	124
460-3-60		STD	0.25	1.0	12.9	15.0	13	51	13.9	20.0	14	52
		MED			12.9	15.0	13	51	13.9	20.0	14	52
		HIGH			13.4	15.0	14	60	14.4	20.0	15	61
575-3-60		STD	0.24	1.9	10.2	15.0	10	46	12.1	15.0	13	48
		MED			10.2	15.0	10	46	12.1	15.0	13	48
		HIGH			10.3	15.0	10	52	12.2	15.0	13	54
48TC**06		208/230-1-60	STD	0.48	1.9	44.0	60.0	43	155	45.9	60.0	45
	MED		46.1			60.0	45	180	48.0	60.0	48	182
	208/230-3-60	STD	0.48	1.9	30.7	45.0	31	131	32.6	45.0	33	133
		MED			31.0	45.0	31	149	32.9	45.0	33	151
		HIGH			33.3	45.0	34	175	35.2	50.0	36	177
	460-3-60	STD	0.25	1.0	14.7	20.0	15	62	15.7	20.0	16	63
		MED			15.2	20.0	15	71	16.2	20.0	16	72
		HIGH			16.0	20.0	16	84	17.0	20.0	17	85
	575-3-60	STD	0.24	1.9	11.5	15.0	12	48	13.4	15.0	14	50
		MED			11.6	15.0	12	54	13.5	15.0	14	56
		HIGH			12.4	15.0	13	65	14.3	20.0	15	67
	48TC**07	208/230-3-60	STD	0.48	1.9	35.3	50.0	35	162	37.2	50.0	37
MED			37.6			50.0	38	188	39.5	50.0	40	190
HIGH			37.6			50.0	38	188	39.5	50.0	40	190
460-3-60		STD	0.25	1.0	17.7	25.0	18	81	18.7	25.0	19	82
		MED			18.5	25.0	19	94	19.5	25.0	20	95
		HIGH			19.5	25.0	20	103	20.5	30.0	21	104
575-3-60		STD	0.24	1.9	13.6	20.0	13	65	15.5	20.0	16	67
		MED			14.4	20.0	14	76	16.3	20.0	17	78
		HIGH			14.4	20.0	14	76	16.3	20.0	17	78

48TC

See notes on next page.

Table 48 (cont.) MCA/MOCP DETERMINATION W/ PWRD C.O.

UNIT	NOM. V-Ph-Hz	IFM TYPE	COMBUSTION FAN MOTOR FLA	POWER EXHAUST FLA	w/ PWRD C.O.							
					NO P.E.				w/ P.E. (pwrd fr/ unit)			
					MCA	MOCP	DISC. SIZE		MCA	MOCP	DISC. SIZE	
							FLA	LRA			FLA	LRA
48TC**08	208/230-3-60	STD	0.48	3.8	44.3	60	44	196	48.1	60	48	200
		MED			46.6	60	46	233	50.4	60	51	237
		HIGH			54.1	70	55	259	57.9	80	59	263
	460-3-60	STD	0.25	1.8	21.7	30	21	115	23.5	30	23	117
		MED			22.5	30	22	134	24.3	30	24	136
		HIGH			26.5	30	27	147	28.3	40	29	149
	575-3-60	STD	0.24	3.8	16.6	25	16	91	20.4	25	21	95
		MED			17.0	25	17	106	20.8	25	21	110
		HIGH			19.8	25	20	120	23.6	30	24	124
48TC**09	208/230-3-60	STD	0.48	3.8	49.9	60	49	227	53.7	80	53	231
		MED			49.9	60	49	238	53.7	80	53	242
		HIGH			54.7	80	54	281	58.5	80	59	285
	460-3-60	STD	0.25	1.8	24.8	30	24	110	26.6	40	26	112
		MED			24.8	30	24	116	26.6	40	26	118
		HIGH			26.6	40	26	138	28.4	40	28	140
	575-3-60	STD	0.24	3.8	20.6	30	20	93	24.4	30	24	97
		MED			20.2	30	20	97	24.0	30	24	101
		HIGH			21.0	30	21	108	24.8	30	25	112
48TC**12	208/230-3-60	STD	0.48	3.8	50.6	60	50	268	54.4	80	54	272
		MED			55.4	80	55	311	59.2	80	59	315
		HIGH			60.4	90	61	320	64.2	90	65	324
	460-3-60	STD	0.25	1.8	27.3	40	27	135	29.1	45	29	137
		MED			29.1	45	29	157	30.9	45	31	159
		HIGH			32.1	45	32	161	33.9	50	34	163
	575-3-60	STD	0.24	3.8	20.2	30	20	97	24.0	30	24	101
		MED			21.0	30	21	108	24.8	30	25	112
		HIGH			23.8	30	24	122	27.6	35	28	126

48TC

¹Fuse or breaker

LEGEND:

- CO - Convenient outlet
- DISC - Disconnect
- FLA - Full load amps
- IFM - Indoor fan motor
- LRA - Locked rotor amps
- MCA - Minimum circuit amps
- MOCP - Maximum over current protection
- PE - Power exhaust
- UNPWRD 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 v
- (BC) 231 - 227 = 4 v
- (AC) 227 - 226 = 1 v

Maximum deviation is 4 v.

Determine percent of voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{4}{227} = 1.76\%$$

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.

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

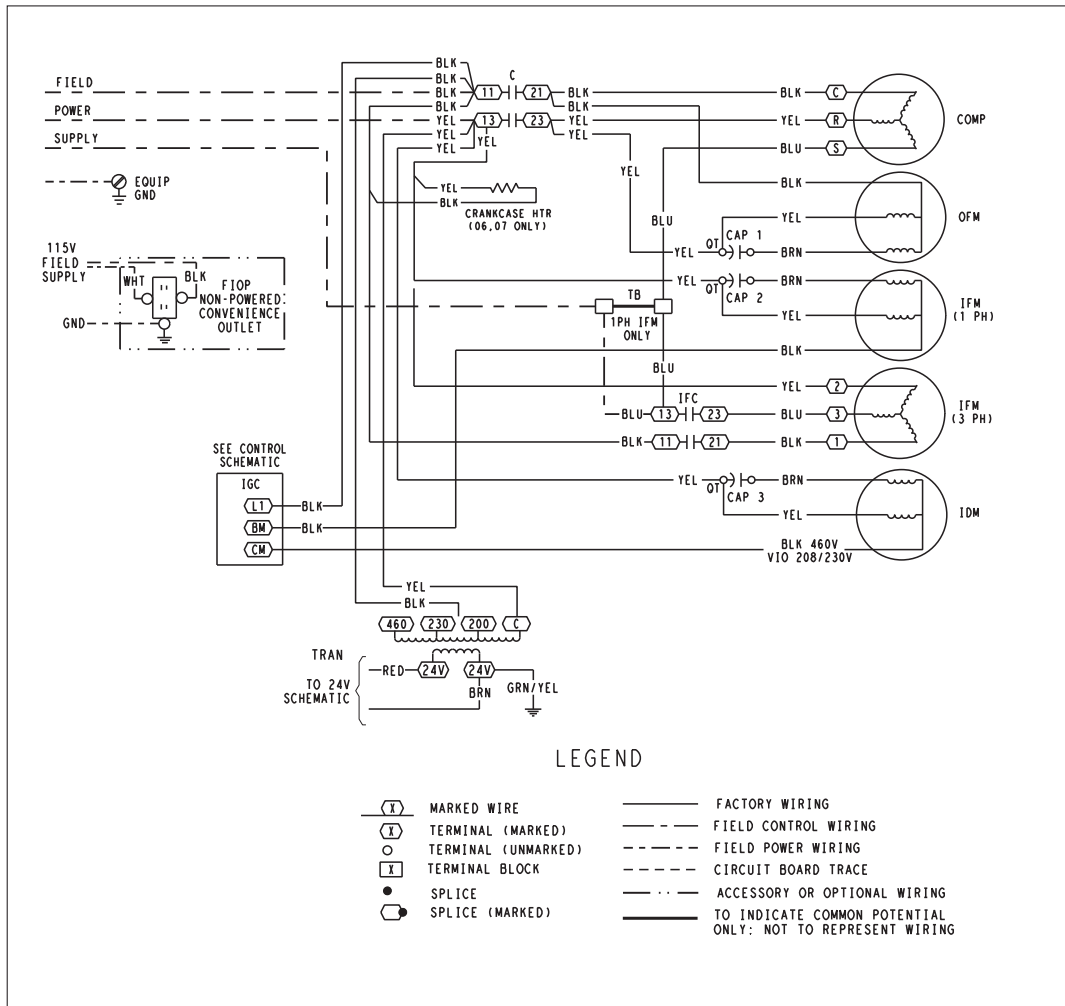


Fig. 18 - Typical Power Diagram

C08014

LEGEND

- | | | | |
|----------|------------------------------|------|----------------------------|
| C | - Contactor, compressor | IRH | - Indoor relative humidity |
| CAP | - Capacitor | LA | - Low ambient lockout |
| CB | - Circuit breaker | LPS | - Low pressure switch |
| CCH | - Crankcase heater | LS | - Limit switch |
| CCN | - Carrier Comfort Network | MGV | - Main gas valve |
| CMP SAFE | - Compressor safety | OAT | - Outdoor air temp sensor |
| COMP | - Compressor motor | OFM | - Outdoor fan motor |
| DDC | - Direct digital control | OLR | - Overload relay |
| FSD | - Fire shut down | PL | - Plug assembly |
| FU | - Fuse | POT | - Potentiometer |
| GND | - Ground | PRM | - Phase relay monitor |
| GVR | - Gas valve relay | QT | - Quadruple terminal |
| HPS | - High pressure switch | R | - Relay |
| HS | - Hall effect sensor | RAT | - Return air temp sensor |
| I | - Ignitor | RS | - Rollout switch |
| IAQ | - Indoor air quality sensors | SAT | - Supply air temp sensor |
| IDM | - Inducer draft motor | SET | - Setpoint offset |
| IFC | - Indoor fan motor contactor | SFS | - Supply fan status |
| IFM | - Indoor fan motor | TB | - Terminal block |
| IGC | - Integrated gas control | TRAN | - Transformer |

NOTES:

1. If any of the original wire furnished must be replaced, it must be replaced with type 90 C wire or its equivalent.
2. Compressor and fan motors are thermally protected against primary single phasing conditions.
3. 208/230V unit transformer is wired for 230V unit. If unit is to be run with 208V power supply, disconnect black wire from 230V tap and connect to 200V tap.
4. Use copper, copper clad, aluminum or aluminum connectors.
5. Use copper conductor only.

SEQUENCE OF OPERATION

General

The sequence below describes the sequence of operation for an electro-mechanical unit with and without a factory installed EconoMi\$er IV (called “economizer” in this sequence). For information regarding a direct digital controller, see the start-up, operations, and troubleshooting manual for the applicable controller.

Electro-mechanical units with no economizer

Cooling —

When the thermostat calls for cooling, terminals G and Y1 are energized. As a result, the indoor-fan contactor (IFC) and the compressor contactor (C1) are energized, causing the indoor-an motor (IFM), compressor #1, and outdoor fan to start. If the unit has 2 stages of cooling, the thermostat will additionally energize Y2. The Y2 signal will energize compressor contactor #2 (C2), causing compressor #2 to start. Regardless of the number of stages, the outdoor-an motor runs continuously while unit is cooling.

Heating

NOTE: WeatherMaker (48TC) units have either 1 or 2 stages of gas heat.

When the thermostat calls for heating, power is sent to W on the Integrated Gas Controller (IGC) board. An LED (light-emitting diode) on the IGC board turns on and remains on during normal operation. A check is made to ensure that the rollout switch and limit switch are closed and the induced-draft motor is running. If the check was successful, the induced-draft motor is energized, and when its speed is satisfactory, as proven by the “hall effect” sensor, the ignition activation period begins. The burners will ignite within 5 seconds. If the burners do not light, there is a 22-second delay before another 5-second attempt. This sequence is repeated for 15 minutes or until the burners light. If, after the 15 minutes, the burners still have not lit, heating is locked out. To reset the control, break 24-v power to the thermostat.

When ignition occurs, the IGC board will continue to monitor the condition of the rollout switch, the limit switches, the “hall effect” sensor, as well as the flame sensor. 45 seconds after ignition occurs, assuming the unit is controlled through a room thermostat set for fan auto, the indoor-fan motor will energize (and the outdoor-air dampers will open to their minimum position). If, for some reason, the over-temperature limit opens prior to the start of the indoor fan blower, the unit will shorten the 45-second delay to 5 seconds less than the time from initiation of heat to when the limit tripped. Gas will not be interrupted to the burners and heating will continue. Once the fan-on delay has been modified, it will not change back to 45 seconds until power is reset to the control.

On units with 2 stages of heat, when additional heat is required, W2 closes and initiates power to the second stage of the main gas valve. When the thermostat is satisfied, W1 and W2 open and the gas valve closes, interrupting the flow of gas to the main burners.

If the call for W1 lasted less than 1 minute, the heating cycle will not terminate until 1 minute after W1 became active. If the unit is controlled through a room thermostat set for fan auto, the indoor-fan motor will continue to operate for an additional 45 seconds then stop. If the over-temperature limit opens after the indoor motor is stopped, but within 10 minutes of W1 becoming inactive, on the next cycle the time will be extended by 15 seconds. The maximum delay is 3 minutes. Once modified, the fan off delay will not change back to 45 seconds unless power is reset to the control. A LED indicator is provided on the IGC to monitor operation.

Electro-mechanical units with an economizer

Cooling —

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 control to provide a 50°F (10°C) to 55°F (13°C) mixed-air temperature into the zone. As the mixed air temperature fluctuates above 55°F (13°C) or below 50°F (10°C) 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). The power exhaust fans will be energized and de-energized, if installed, as the outdoor-air damper opens and closes.

If field-installed accessory CO2 sensors are connected to the EconoMi\$er IV control, a demand controlled ventilation strategy will begin to operate. As the CO2 level in the zone increases above the CO2 set point, the minimum position of the damper will be increased proportionally. As the CO2 level decreases because of the increase in fresh air, the outdoor-air damper will be proportionally closed. For EconoMi\$er IV 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 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 damper to the minimum position.

On the initial power to the EconoMi\$er IV control, it will take the damper up to 2 1/2 minutes before it begins to position itself. After the initial power-up, further changes in damper position can take up to 30 seconds to initiate. Damper movement from full closed to full open (or vice versa) will take between 1 1/2 and 2 1/2 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 set point at 50°F (10°C) to 55°F (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 set point. The EconoMiSer IV damper will be open at maximum position. EconoMiSer IV operation is limited to a single compressor.

Heating

The sequence of operation for the heating is the same as an electromechanical unit with no economizer. The only difference is how the economizer acts. The economizer will stay at the Economizer Minimum Position while the evaporator fan is operating. The outdoor-air damper is closed when the indoor fan is not operating.

GUIDE SPECIFICATIONS - 48TC**04-12

Note about this specification:

Carrier wrote this specification in the 2004 version of the “Masterformat” as published by the Construction Specification Institute. Please feel free to copy this specification directly into your building spec.

GAS HEAT PACKAGED ROOFTOP

HVAC Guide Specifications

Size Range: 3 to 10 Nominal Tons



This product has been designed and manufactured to meet Energy Star® criteria for energy efficiency. However, proper refrigerant charge and proper air flow are critical to achieve rated capacity and efficiency. Installation of this product should follow all manufacturer's refrigerant charging and air flow instructions. Failure to confirm proper charge and air flow may reduce energy efficiency and shorten equipment life.

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

23 07 16	HVAC Equipment Insulation
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23 07 16.13	Decentralized, Rooftop Units:
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23 07 16.13.A.	Evaporator fan compartment:
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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.	Gas heat compartment:
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1. Aluminum foil-faced fiberglass insulation shall be used.
2. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.

23 09 13	Instrumentation and Control Devices for HVAC
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23 09 13.23	Sensors and Transmitters
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23 09 13.23.A.	Thermostats
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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. must include capability for occupancy scheduling.

23 09 23	Direct-digital Control system for HVAC
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23 09 23.13	Decentralized, Rooftop Units:
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23 09 23.13.A.	PremierLink controller
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1. Shall be ASHRAE 62-2001 compliant.
2. Shall accept 18-32 VAC 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, Set point 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 CO2 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 ready, 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 service 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 ComfortLink and ComfortVIEW controllers.
 13. Shall have built-in support for Carrier service 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 (1219m) max, 60 devices per 1000 ft (305m) section, and 1 RS-485 repeater per 1000 ft (305m) sections.
- 23 09 23.13.B. Open 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, Set point 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 service tool.
 13. Shall include an EIA-485 protocol communication port, an access port for connection of either a computer or a Carrier service 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 fuse on the 24-v transformer side (04-12 units have a resettable circuit breaker).
2. Shall utilize color-coded wiring.
3. Unit shall be include self-contained low-voltage control circuit protected by a fuse on the 24-v transformer side with a resettable circuit breaker.

4. The heat exchanger shall be controlled by an integrated gas controller (IGC) microprocessor. See heat exchanger section of this specification.
 5. Unit shall include a minimum of one 8-pin screw terminal connection board for connection of control wiring.
- 23 09 33.23.B. Safeties:
1. Compressor over-temperature, over current.
 2. Low-pressure switch.
 - a. Units with 2 compressors shall have different sized connectors for the circuit 1 and circuit 2 Low and High Pressure switches. They shall physically prevent the cross-wiring of the safety switches between circuits 1 and 2.
 - b. Low pressure switch shall use different color wire than the high pressure switch. The purpose is to assist the installer and service person 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 Low and 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 person to correctly wire and or troubleshoot the rooftop unit.
 4. Automatic reset, motor thermal overload protector.
 5. Heating section shall be provided with the following minimum protections:
 - a. High-temperature limit switches.
 - b. Induced draft motor speed sensor.
 - c. Flame rollout switch.
 - d. Flame proving controls.

23 09 93 Sequence of Operations for HVAC Controls

23 09 93.13 Decentralized, Rooftop Units:

23 09 93.13 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 shall

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. Filter face velocity shall not exceed 365 fpm at nominal airflows.
4. Filters shall be accessible through an access panel with "no-tool" removal as described in the unit cabinet section of this specification (23 81 19.13.H).

23 81 19 Self-Contained Air Conditioners

23 81 19.13 Small-Capacity Self-Contained Air Conditioners (48TC**04-12)

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 90.1-2004 minimum efficiency requirements.
2. 3 phase units are Energy Star qualified.
3. Unit shall be rated in accordance with ARI Standards 210 and 360.
4. Unit shall be designed to conform to ASHRAE 15, 2001.
5. Unit shall be UL-tested and certified in accordance with ANSI Z21.47 Standards and UL-listed and certified under Canadian standards as a total package for safety requirements.
6. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.

7. Unit casing shall be capable of withstanding 500-hour salt spray exposure per ASTM B117 (scribed specimen).
 8. Unit casing shall be capable of withstanding Federal Test Method Standard No. 141 (Method 6061) 5000-hour salt spray.
 9. Unit shall be designed in accordance with ISO 9001:2000, and shall be manufactured in a facility registered by ISO 9001:2000.
 10. Roof curb shall be designed to conform to NRCA Standards.
 11. 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.
 12. Unit shall be designed in accordance with UL Standard 1995, including tested to withstand rain.
 13. Unit shall be constructed to prevent intrusion of snow and tested to prevent snow intrusion into the control box up to 40 mph.
 14. Unit shake tested to assurance level 1, ASTM D4169 to ensure shipping reliability.
- 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.E. Project Conditions
1. As specified in the contract.
- 23 81 19.13.F. Operating Characteristics
1. Unit shall be capable of starting and running at 115°F (46°C) ambient outdoor temperature, meeting maximum load criteria of ARI Standard 210/240 or 360 at ± 10% voltage.
 2. Compressor with standard controls shall be capable of operation down to 40°F (4°C), ambient outdoor temperatures. Accessory winter start kit is necessary if mechanically cooling at ambient temperatures below 40°F (4°C).
 3. Unit shall discharge supply air vertically or horizontally as shown on contract drawings.
 4. Unit shall be factory configured for vertical supply & return configurations.
 5. Unit shall be field convertible from vertical to horizontal configuration
 6. Unit shall be capable of mixed operation: vertical supply with horizontal return or horizontal supply with vertical return.
- 23 81 19.13.G. Electrical Requirements
1. Main power supply voltage, phase, and frequency must match those required by the manufacturer.
- 23 81 19.13.H. 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 / 16°C): 60, Hardness: H-2H Pencil hardness.
 3. Evaporator fan compartment interior cabinet insulation shall conform to ARI Standards 210 or 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 gas heat compartment.
 4. Base of unit shall have a minimum of four locations for thru-the-base gas and electrical connections (factory installed or field installed), standard.
 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" -14 NPT drain connection, possible either through the bottom or side of the drain pan. Connection shall be made per manufacturer's recommendations.
 7. Top panel:

- a. Shall be a single piece top panel.
- 8. Gas Connections:
 - a. All gas piping connecting to unit gas valve shall enter the unit cabinet at a single location on side of unit (horizontal plane).
 - b. Thru-the-base capability
 - i. Standard unit shall have a thru-the-base gas-line location using a raised, embossed portion of the unit basepan.
 - ii. Optional, factory-approved, water-tight connection method must be used for thru-the-base gas connections.
 - iii. No basepan penetration, other than those authorized by the manufacturer, is permitted.
- 9. Electrical Connections
 - a. All unit power wiring shall enter unit cabinet at a single, factory-prepared, knockout location.
 - b. Thru-the-base capability
 - i. Standard unit shall have a thru-the-base electrical location(s) using a raised, embossed portion of the unit basepan.
 - ii. Optional, factory-approved, water-tight connection method must be used for thru-the-base electrical connections.
 - iii. No basepan penetration, other than those authorized by the manufacturer, is permitted.
- 10. 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, indoor fan, indoor fan motor, gas components (where applicable), and compressors shall have a molded composite handles.
 - d. Handles shall be UV modified, composite. They shall be 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.I. Gas Heat
 - 1. General
 - a. Heat exchanger shall be an induced draft design. Positive pressure heat exchanger designs shall not be allowed.
 - b. Shall incorporate a direct-spark ignition system and redundant main gas valve.
 - c. Heat exchanger design shall allow combustion process condensate to gravity drain; maintenance to drain the gas heat exchanger shall not be required.
 - d. Gas supply pressure at the inlet to the rooftop unit gas valve must match that required by the manufacturer.
 - 2. The heat exchanger shall be controlled by an integrated gas controller (IGC) microprocessor.
 - a. IGC board shall notify users of fault using an LED (light-emitting diode).
 - b. The Light Emitting Diode (LED) shall be visible without removing the control box access panel.
 - c. IGC board shall contain algorithms that modify evaporator-fan operation to prevent future cycling on high temperature limit switch.
 - d. Unit shall be equipped with anti-cycle protection with one short cycle on unit flame rollout switch or 4 continuous short cycles on the high temperature limit switch. Fault indication shall be made using an LED.
 - 3. Standard Heat Exchanger construction
 - a. Heat exchanger shall be of the tubular-section type constructed of a minimum of 20-gauge steel coated with a nominal 1.2 mil aluminum-silicone alloy for corrosion resistance.
 - b. Burners shall be of the in-shot type constructed of aluminum-coated steel.
 - c. Burners shall incorporate orifices for rated heat output up to 2000 ft (610m) elevation. Additional accessory kits may be required for applications above 2000 ft (610m) elevation, depending on local gas supply conditions.
 - d. Each heat exchanger tube shall contain multiple dimples for increased heating effectiveness.
 - 4. Optional Stainless Steel Heat Exchanger construction
 - a. Use energy saving, direct-spark ignition system
 - b. Use a redundant main gas valve.
 - c. Burners shall be of the in-shot type constructed of aluminum-coated steel.

- d. All gas piping shall enter the unit cabinet at a single location on side of unit (horizontal plane).
 - e. The optional stainless steel heat exchanger shall be of the tubular-section type, constructed of a minimum of 20-gauge type 409 stainless steel.
 - f. Type 409 stainless steel shall be used in heat exchanger tubes and vestibule plate.
 - g. Complete stainless steel heat exchanger allows for greater application flexibility.
5. Optional Low NOx Heat Exchanger construction
- a. Low NOx reduction shall be provided to reduce nitrous oxide emissions to meet the California Air Quality Management NOx requirement of 40 nanograms/joule or less.
 - b. Primary tubes and vestibule plates on low NOx units shall be 409 stainless steel. Other components shall be aluminized steel.
6. Induced draft combustion motor and blower
- a. Shall be a direct-drive, single inlet, forward-curved centrifugal type.
 - b. Shall be made from steel with a corrosion-resistant finish.
 - c. Shall have permanently lubricated sealed bearings.
 - d. Shall have inherent thermal overload protection.
 - e. Shall have an automatic reset feature.

23 81 19.13.J. Coils

1. Standard Aluminum/Copper Coils:
- 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 and condenser coils shall be leak tested to 150 psig, pressure tested to 400 psig, and qualified to UL 1995 burst test at 2,200 psi.
2. Optional Pre-coated aluminum-fin coils:
- 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 coils:
- 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 coils shall have a flexible epoxy polymer coating uniformly applied to all coil surface areas without material bridging between fins.
- a. Coating process shall ensure complete coil encapsulation of tubes, fins and headers.
 - b. Color shall be high gloss black with gloss per ASTM D523-89.
 - c. Uniform dry film thickness from 0.8 to 1.2 mil on all surface areas including fin edges
 - d. Superior hardness characteristics of 2H per ASTM D3363-92A and cross-hatch adhesion of 4B-5B per ASTM D3359-93.
 - e. Impact resistance shall be up to 160 in.-lb (ASTM D2794-93).
 - f. Humidity and water immersion resistance shall be up to minimum 1000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92).
 - g. Corrosion durability shall be confirmed through testing to be no less than 1000 hours salt spray per ASTM B117-90.
5. Optional E-coated copper-fin coils
- a. Shall have a flexible epoxy polymer coating uniformly applied to all coil surface areas without material bridging between fins.
 - b. Galvanized steel tube sheets shall not be acceptable.
 - c. A polymer strip shall prevent coil assembly from contacting sheet metal coil pan to maintain coating integrity and minimize corrosion potential between coil and pan.
 - d. Coating process shall ensure complete coil encapsulation of tubes, fins and headers.
 - e. Color shall be high gloss black with gloss per ASTM D523-89.
 - f. Uniform dry film thickness from 0.8 to 1.2 mil on all surface areas including fin edges

- g. Superior hardness characteristics of 2H per ASTM D3363-92A and cross-hatch adhesion of 4B-5B per ASTM D3359-93.
 - h. Impact resistance shall be up to 160 in.-lb (ASTM D2794-93).
 - i. Humidity and water immersion resistance shall be up to minimum 1000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92).
 - j. Corrosion durability shall be confirmed through testing to be no less than 1000 hours salt spray per ASTM B117-90.
- 23 81 19.13.K. Refrigerant Components
- 1. Refrigerant circuit shall include the following control, safety, and maintenance features:
 - a. Fixed orifice metering system shall prevent mal-distribution of two-phase refrigerant by including multiple fixed orifice devices in each refrigeration circuit. Each orifice is to be optimized to the coil circuit it serves.
 - b. Refrigerant filter drier.
 - c. Service gauge connections on suction and discharge lines.
 - d. Pressure gauge access through a specially designed access port in the top panel of the unit.
 - 2. There shall be gauge line access port in the skin of the rooftop, covered by a black, removable plug.
 - a. The plug shall be easy to remove and replace.
 - b. When the plug is removed, the gauge access port shall enable maintenance personnel to route their pressure gauge lines.
 - c. This gauge access port shall facilitate correct and accurate condenser pressure readings by enabling the reading with the compressor access panel on.
 - d. The plug shall be made of a leak proof, UV-resistant, composite material.
 - 3. Compressors
 - a. Unit shall use one fully hermetic, scroll compressor for each independent refrigeration circuit.
 - b. Compressor motors shall be cooled by refrigerant gas passing through motor windings.
 - c. Compressors shall be internally protected from high discharge temperature conditions using a Thermal Overload Disk (TOD) installed at the muffler plate on 04-06 sizes; a TOD installed at the fixed scroll discharge has outlet on 07-08 sizes; and Advanced Scroll Temperature Protection on 09-12 sizes.
 - d. Compressors shall be protected from an over-temperature and over-ampereage conditions by an internal, motor overload device.
 - e. Compressor shall be factory mounted on rubber grommets.
 - f. Compressor motors shall have internal line break thermal and current overload protection.
 - g. Crankcase heaters shall not be required for normal operating range.
- 23 81 19.13.L. Filter Section
- 1. Filters access is specified in the unit cabinet section of this specification.
 - 2. Filters shall be held in place by a pivoting filter tray, facilitating easy removal and installation.
 - 3. Shall consist of factory-installed, low velocity, throw-away 2-in. thick fiberglass filters.
 - 4. Filter face velocity shall not exceed 320 fpm at nominal airflows.
 - 5. Filters shall be standard, commercially available sizes.
 - 6. Only one size filter per unit is allowed.
- 23 81 19.13.M. Evaporator Fan and Motor
- 1. Evaporator fan motor:
 - a. Shall have permanently lubricated bearings
 - b. Shall have inherent automatic-reset thermal overload protection.
 - c. 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.
 - b. Shall use sealed, permanently lubricated ball-bearing type.
 - 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.N. 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. Shaft-up designs including those with “rain-slinger devices” shall not be allowed.
2. Condenser Fans shall:
- 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.O. Special Features
1. 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 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. Shall be equipped with low-leakage dampers, not to exceed 2% leakage at 1 in. wg pressure differential.
 - g. Shall be capable of introducing up to 100% outdoor air.
 - h. Shall be equipped with a barometric relief damper capable of relieving up to 100% return air.
 - i. Shall be designed to close damper(s) during loss-of-power situations with spring return built into motor.
 - j. Dry bulb outdoor-air temperature sensor shall be provided as standard. Outdoor air sensor set point shall be adjustable and shall range from 40 to 100°F / 4 to 38°C. Additional sensor options shall be available as accessories.
 - k. 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%.
 - l. 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 set point.
 - m. Dampers shall be completely closed when the unit is in the unoccupied mode.
 - n. Economizer controller shall accept a 2-10Vdc CO2 sensor input for IAQ/DCV control. In this mode, dampers shall modulate the outdoor-air damper to provide ventilation based on the sensor input.
 - o. Compressor lockout sensor shall open at 35°F (2°C) and close closes at 50°F (10°C).
 - p. Actuator shall be direct coupled to economizer gear. No linkage arms or control rods shall be acceptable.
 - q. Economizer controller shall provide indications when in free cooling mode, in the DCV mode, or the exhaust fan contact is closed.
2. 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 economizer 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. Design shall incorporate inherent barometric relief capabilities for barometric relief of rooftop unit return air.
 - h. The damper actuator shall plug into the rooftop unit’s wiring harness plug. No hard wiring shall be required.
 - i. Outside air hood shall include aluminum water entrainment filter
3. Manual damper
- a. Manual damper package shall consist of damper, air inlet screen, and rain hood which can be preset to admit up to 50% outdoor air for year round ventilation.
4. 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).
5. Liquid Propane (LP) Conversion Kit
 - a. Package shall contain all the necessary hardware and instructions to convert a standard natural gas unit for use with liquefied propane, up to 2000 ft (610m) elevation.
 - b. Additional accessory kits may be required for applications above 2000 ft (610m) elevation.
6. Flue Shield
 - a. Flue shield shall provide protection from the hot sides of the gas flue hood.
7. Condenser Coil Hail Guard Assembly
 - a. Shall protect against damage from hail.
 - b. Shall be either hood style or louvered.
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.
 - b. Outlet shall be powered from main line power to the rooftop unit.
 - c. Outlet shall be powered from line side or load side of disconnect by installing contractor, as required by code. If outlet is powered from load side of disconnect, unit electrical ratings shall be UL certified and rated for additional outlet amperage.
 - d. Outlet shall be factory-installed and internally mounted with easily accessible 115-v female receptacle.
 - e. Outlet shall include 15 amp GFI receptacles with independent fuse protection.
 - f. Voltage required to operate convenience outlet shall be provided by a factory-installed step-down transformer.
 - g. Outlet shall be accessible from outside the unit.
 - h. Non-Powered convenience outlet.
 - i. Outlet shall be powered from a separate 115-120v power source.
 - j. A transformer shall not be included.
 - k. Outlet shall be factory-installed and internally mounted with easily accessible 115-v female receptacle.
 - l. Outlet shall include 15 amp GFI receptacles with independent fuse protection.
 - m. Outlet shall be accessible from outside the unit.
10. Flue Discharge Deflector:
 - a. Flue discharge deflector shall direct unit exhaust vertically instead of horizontally.
 - b. Deflector shall be defined as a “natural draft” device by the National Fuel and Gas (NFG) code.
11. Thru-the-Base Connectors:
 - a. Kits shall provide connectors to permit gas and electrical connections to be brought to the unit through the unit basepan.
 - b. Minimum of four connection locations per unit.
12. 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.
13. Propeller 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.
14. Ultraviolet Germicidal Lamps:
 - a. Ultraviolet germicidal lamps are designed to eliminate odor causing mold and fungus that may develop in the wet area of the evaporator section of the unit.
 - b. Shall be installed in the indoor blower section of the unit and shine on the evaporator and condensate pan.

- c. Shall be specifically designed and optimized for 40°F (4°C) to 45°F (7°C), high-humidity operation in a moving air stream inside an HVAC unit.
 - d. The germicidal lamps shall have an output rating at 45°F (7°C) in 400 fpm airflow of 120 microwatts/cm² at 1 meter.
15. Roof Curbs (Vertical):
- a. Full perimeter roof curb with exhaust capability providing separate airstreams 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.
16. Universal Gas Conversion Kit:
- a. Package shall contain all the necessary hardware and instructions to convert a standard natural gas unit to operate from 2000-7000 ft (610 to 2134m) elevation with natural gas or from 0-7000 ft 90-2134m) elevation with liquefied propane.
17. Condenser Coil Grille:
- a. The grille protects the condenser coil from damage by large objects without increasing unit clearances.
18. 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.
19. 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.
20. Indoor Air Quality (CO₂) 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.
21. 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:
 - i. One set of normally open alarm initiation contacts for connection to an initiating device circuit on a fire alarm control panel
 - ii. Two Form-C auxiliary alarm relays for interface with rooftop unit or other equipment
 - iii. One Form-C supervision (trouble) relay to control the operation of the Trouble LED on a remote test/reset station
 - iv. Capable of direct connection to two individual detector modules
 - v. Can be wired to up to 14 other duct smoke detectors for multiple fan shutdown applications
22. Winter start kit
- a. Shall contain a bypass device around the low pressure switch.
 - b. Shall be required when mechanical cooling below an outdoor ambient of 40°F (4°C).
 - c. Shall not be required to operate an equipped economizer when below an outdoor ambient of 40°F (4°C).
23. Barometric relief
- a. Shall include damper, seals, hard-ware, and hoods to relieve excess building pressure.
 - b. Damper shall gravity-close upon unit shutdown.
24. Time Guard
- a. Shall prevent compressor short cycling by providing a 5-minute delay (±2 minutes) before restarting a compressor after shutdown for any reason.
 - b. One device shall be required per compressor.

