

### ELECTRIC COOLING, R-410A SINGLE PACKAGE ROOFTOP 3 – 15 TONS (1 & 3-Phase)

#### BUILT TO LAST, EASY TO INSTALL AND SERVICE

- One-piece, high efficiency electric cooling with a low profile, prewired, tested, and charged at the factory
- Field Convertible from vertical to horizontal airflow on all models. No special kit required on 036-150 models. Field accessory supply duct kit required for 180 size model only.
- Full perimeter base rail with built-in rigging adapters and fork truck slots
- Pre-painted exterior panels and primer-coated interior panels tested to 500 hours salt spray protection
- Fully insulated cabinet
- Single-stage or two stage cooling capacity control
- Single or dual scroll compressor with internal line-break overload protection
- All units have high and low pressure switches
- Two inch disposable fiberglass type return air filters in dedicated rack with tool-less filter access door
- Refrigerant circuits contain a liquid line filter drier to trap dirt and moisture
- Indoor and outdoor coils constructed of aluminum fins mechanically bonded to seamless copper tubes
- Newly-designed indoor refrigerant header for easier maintenance and replacement
- Exclusive non-corrosive composite condensate pan in accordance with ASHRAE 62 Standard, sloping design; side or center drain
- Belt drive evaporator-fan motor and pulley combinations available to meet any application
- Access panels with easy grip handles provide quick and easy access to the blower and blower motor, control box, and compressor.
- "No-strip" screw system has superior holding power and guides screws into position while preventing the screw from stripping the unit's metal.
- Newly designed terminal board facilitates simple safety circuit troubleshooting and simplified control box arrangement
- Outdoor temperature cooling operation range up to 115°F (46°C) and down to 25°F (-4°C) using winter start kit
- Fixed orifice metering devices on all models to precisely control refrigerant flow
- Large, laminated control wiring and power wiring drawings are affixed to unit to make troubleshooting easy
- Standard, medium and high static fan motor options available
- Capable of thru-the-base or thru-the-curb electrical routing
- Single point electrical connections



RAS036-072



RAS090-121



Use of the AHRI Certified TM Mark indicates a manufacturer's participation in the program. For verification of certification for individual products, go to [www.ahridirectory.org](http://www.ahridirectory.org).



#### WARRANTY

- 5 Year limited warranty on compressor
- 1 Year limited warranty on parts

UNIT PERFORMANCE DATA - Single Stage Cooling							
UNIT	COOLING					Unit Dimensions H x W x L	Unit Weight lb. [kg]
	Nom. Tons	Net Cap. (Btuh)	SEER	EER	Total Power (kW)		
RAS036*0AA0AAA	3	34,600	13.0	11.0	3.1	33-3/8" x 46-3/4" x 74-3/8" (847 x 1187 x 1888)	438 [199]
RAS048*0AA0AAA	4	45,000	13.0	11.0	4.0	33-3/8" x 46-3/4" x 74-3/8" (847 x 1187 x 1888)	494 [224]
RAS060*0AA0AAA	5	59,000	13.0	10.8	5.5	33-3/8" x 46-3/4" x 74-3/8" (847 x 1187 x 1888)	524 [238]
RAS072*0AA0AAA	6	70,000	N/A	11.2	6.4	41-3/8" x 46-3/4" x 74-3/8" (1051 x 1187 x 1888)	607 [275]
RAS091*0AA0AAA	7-1/2	88,000	N/A	11.2	8.0	41-3/8" x 59-1/2" x 88-1/8" (1051 x 1510 x 2238)	705 [320]
RAS101*0AA0AAA	8-1/2	97,000	N/A	11.2	8.8	49-3/8" x 59-1/2" x 88-1/8" (1253 x 1510 x 2238)	845 [384]
RAS121*0AA0AAA	10	117,000	N/A	11.2	10.6	49-3/8" x 59-1/2" x 88-1/8" (1253 x 1510 x 2238)	855 [388]

UNIT PERFORMANCE DATA - Dual Stage Cooling							
UNIT	COOLING					Unit Dimensions H x W x L	Unit Weight lb. [kg]
	Nom. Tons	Net Cap. (Btuh)	SEER	EER	Total Power (kW)		
RAS090*0AA0AAA	7-1/2	83,000	N/A	11.2	7.4	41-3/8" x 59-1/2" x 88-1/8" (1051 x 1510 x 2238)	760 [345]
RAS102*0AA0AAA	8-1/2	99,000	N/A	11.2	9.0	49-3/8" x 59-1/2" x 88-1/8" (1253 x 1510 x 2238)	855 [388]
RAS120*0AA0AAA	10	114,000	N/A	11.3	10.1	49-3/8" x 59-1/2" x 88-1/8" (1253 x 1510 x 2238)	865 [393]
RAS150*0AA0AAA	12-1/2	140,000	N/A	11.0	12.7	49-3/8" x 59-1/2" x 88-1/8" (1253 x 1510 x 2238)	1075 [489]
RAS180*0AA0AAA	15	174,000	N/A	11.0	15.8	57-3/8" x 63-3/8" x 115-7/8" (1456 x 1609 x 2942)	1305 [593]

\* Indicates Unit voltage: K = 208/230-1-60, H = 208/230-3-60, L = 460-3-60, S = 575-3-60

NOTE: BASE MODEL NUMBERS LISTED. SEE MODEL NOMENCLATURE LISTING FOR ADDITIONAL OPTIONS

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# MODEL NOMENCLATURE

MODEL SERIES	R	A	S	0	9	1	H	0	A	A	0	A	A	A
Position Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14
R = Rooftop														
A = Air Conditioning (Cooling Only) H = Heat Pump G = Gas/Electric														
<b>Type</b>														
S = Standard ASHRAE 90.1-2010 Efficiency														
<b>Efficiency</b>														
036 = 3 Tons 048 = 4 Tons 060 = 5 Tons 072 = 6 Tons 091 = 7.5 Tons (Single Compressor) 090 = 7.5 Tons (Dual Compressor) 101 = 8.5 Tons (Single Compressor) 102 = 8.5 Tons (Dual Compressor) 121 = 10 Tons (Single Compressor) 120 = 10 Tons (Dual Compressor) 150 = 12.5 Tons (Dual Compressor) 180 = 15 Tons (Dual Compressor)														
<b>Nominal Cooling Capacity</b>														
K = 208/230-1-60 H = 208/230-3-60 L = 460-3-60 S = 575-3-60														
<b>Voltage</b>														
0 = No Heat														
<b>Heating Capacity (See spec sheet for actual capacity)</b>														
A = Standard Motor C = Medium Static Motor B = High Static Motor (6 - 12.5 ton, 3 phase models only) E = High Static, High Efficiency Motor (15 ton only)														
<b>Motor Option</b>														
A = None B = Economizer w/Bara-relief, OA Temp sensor E = Economizer w/Bara-relief + CO2 Sensor, OA Temp sensor H = Economizer w/Bara-relief, enthalpy sensor L = Economizer w/Bara-relief + CO2 Sensor, enthalpy sensor P = 2-Position damper														
<b>Outdoor Air Options / Control (See spec sheet for details)</b>														
0A = No Options 4B = Non-Fused Disconnect AT = Non-powered 115v C.O. BR = Supply Air Smoke Detector BA = Non-powered 115v C.O. + Supply Air Smoke Detector 7C = Non-Fused Disconnect + Non-Powered 115v C.O. 7K = Non-Fused Disconnect + Non-Powered 115v C.O.+ SA Smoke detector 8A = Non-Fused Disconnect + SA Smoke detector														
<b>Factory Installed Options</b>														
A = Aluminum / Copper Cond & Evap Coil B = Precoat Alum/Copper Cond & Alum / Copper Evap C = E-Coated Alum/Copper Cond & Alum / Copper Evap D = E-Coated Alum / Copper Cond & Evap E = Copper/Copper Cond & Alum/Copper Evap F = Copper/Copper Cond & Evap														
<b>Condenser / Evaporator Coil Configuration</b>														
A = Sales Digit														

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

CATEGORY	ITEM	FACTORY INSTALLED OPTION	FIELD INSTALLED ACCESSORY
<b>Cabinet</b>	Thru-the-base electrical connections		X
	Supply Duct Cover (15 ton only)		X
<b>Coil Options</b>	Copper/Copper indoor and/or outdoor coils	X	
	Pre-coated outdoor coils	X	
	Premium, E-coated outdoor coils	X	
<b>Condenser Protection</b>	Condenser coil hail guard (louvered design)		X
<b>Controls</b>	Smoke detector (supply air)	X	
	Time Guard II compressor delay control circuit		X
	Phase Monitor		X
<b>Economizers &amp; Outdoor Air Dampers</b>	Economizer (for electro-mechanical controlled RTUs)	X	X
	Motorized 2 position outdoor-air damper	X	X
	Manual outdoor-air damper		X
	Barometric relief <sup>1</sup>	X	X
	Power exhaust		X
<b>Economizer Sensors &amp; IAQ Devices</b>	Single dry bulb temperature sensors <sup>2</sup>	X	X
	Single enthalpy sensors <sup>2</sup>	X	X
	Differential enthalpy sensors <sup>2</sup>		X
	CO <sub>2</sub> sensor (wall, duct, or unit mounted) <sup>2</sup>		X
<b>Indoor Motor &amp; Drive</b>	Multiple motor and drive packages	X	
<b>Electric Heat</b>	Electric Resistance Heaters		X
	Single Point Kit		X
<b>Low Ambient Control</b>	Winter start kit <sup>3</sup>		X
	Head pressure controller <sup>3</sup>		X
<b>Power Options</b>	Convenience outlet (unpowered)	X	
	Non-fused disconnect <sup>4</sup>	X	
<b>Roof Curbs</b>	Roof curb 14" (356mm)		X
	Roof curb 24" (610mm)		X

**NOTES:**

1. Included with economizer.
2. Sensors used to optimize economizer performance.
3. See application data for assistance.
4. Available on units with MOCP's of 80 amps or less

## FACTORY OPTIONS AND/OR ACCESSORIES

### **Economizer (dry–bulb or enthalpy)**

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

Economizers are available, installed and tested by the factory, with either enthalpy or dry–bulb temperature inputs for electromechanical controllers. Additional sensors are available as accessories to optimize the economizers.

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

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

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

### **Smoke Detectors**

Smoke detectors immediately shut down the rooftop unit when smoke is detected. Supply air smoke detectors are available, installed by the factory.

### **Louvered Hail Guards**

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

### **Convenience Outlet (un–powered)**

Lower service bills by including a convenience outlet in your specification. 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**

Superior internal building pressure control. This field–installed accessory may eliminate the need for costly, external pressure control fans.

### **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 authorized commercial thermostats.

### **Motorized 2–Position Damper**

A 2–position, motorized outdoor air damper is available as a field installed accessory and 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**

Accessory manual outdoor air dampers are an economical way to bring in ventilation air.

### **Head Pressure Controller**

The 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 controller 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**

The accessory winter start kit extends the low ambient limit of your rooftop to 25°F (–4°C). The kit bypasses the low pressure switch, preventing nuisance tripping of the low pressure switch. Other low ambient precautions may still be prudent.

### **Alternate Motors and Drives**

Some applications need larger horsepower motors, some need more airflow, and some need both. Regardless of the case, your unit 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 an accessory, 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 main power lines, as well as control power.

### **Electric Heaters**

RAS units offer a full–line of accessory heaters. The heaters are very easy to use / install and are pre–engineered and certified.

### **Supply Duct Cover**

This supply duct cover is required when field converting the factory standard vertical duct supply to horizontal duct supply configuration. One required per unit. (180 size only)

## ACCESSORIES – RAS036–180

FLAT ROOF CURBS		
Model Number	Description	Use With Model Size
CRRFCURB001A01	14" High Roof Curb. Ductwork attaches to the roof curb. Includes thru-the-bottom capability.	036 – 072
CRRFCURB003A01		090 – 150
CRRFCURB074A00		180
CRRFCURB002A01	24" High Roof Curb. Ductwork attaches to the roof curb. Includes thru-the-bottom capability.	036 – 072
CRRFCURB004A01		090 – 150
CRRFCURB075A00		180
ECONOMIZERS		
Model Number	Description	Use With Model Size
DNECOMZR020A02	Vertical EconoMi\$er IV with solid-state controller, gear-driven, 3-position modulating damper, spring return actuator, up to 100% barometric relief, supply and outdoor air sensors, and CO2 sensor compatible.	036 – 072
DNECOMZR021A03	Vertical EconoMi\$er IV with solid-state controller, gear-driven, 3-position modulating damper, spring return actuator, up to 100% barometric relief, supply and outdoor air sensors, and CO2 sensor compatible.	090 – 150
DNECOMZR062A00	Vertical EconoMi\$er IV with solid-state controller, gear-driven, 3-position modulating damper, spring return actuator, up to 100% barometric relief, supply and outdoor air sensors, and CO2 sensor compatible.	180
DNECOMZR024A02	Horizontal EconoMi\$er IV with solid-state controller, gear-driven, 3-position modulating damper, spring return actuator, up to 100% barometric relief, supply and outdoor air sensors, and CO2 sensor compatible.	036 – 072
DNECOMZR025A02	Horizontal EconoMi\$er IV with solid-state controller, gear-driven, 3-position modulating damper, spring return actuator, up to 100% barometric relief, supply and outdoor air sensors, and CO2 sensor compatible.	090 – 150
DNECOMZR064A00	Horizontal EconoMi\$er IV with solid-state controller, gear-driven, 3-position modulating damper, spring return actuator, up to 100% barometric relief, supply and outdoor air sensors, and CO2 sensor compatible.	180
POWER EXHAUST		
Model Number	Description	Use With Model Size
DNPWREXH030A01	Vertical Power Exhaust 208/230 volt (1 or 3 Phase)	036 – 072
DNPWREXH021A01	Vertical Power Exhaust 460 volt	036 – 072
DNPWREXH022A01	Vertical Power Exhaust 208/230 volt (1 or 3 Phase)	090 – 150
DNPWREXH023A01	Vertical Power Exhaust 460 volt	090 – 150
DNPWREXH080A00	Vertical Power Exhaust 208/230 volt	180
DNPWREXH081A00	Vertical Power Exhaust 460 volt	180
DNPWREXH028A01	Horizontal Power Exhaust 208/230 & 575 volt (1 or 3 Phase)	036 – 150
DNPWREXH029A01	Horizontal Power Exhaust 460 volt	036 – 150
DNPWREXH082A00	Horizontal Power Exhaust 208/230 & 575 volt	180
DNPWREXH083A00	Horizontal Power Exhaust 460 volt	180
575V TRANSFORMER		
Model Number	Description	Use With Model Size
1171494 <sup>2</sup>	Transformer for conversion from 575v to 208/230v power exhaust applications.	ALL

## ACCESSORIES – RAS036–180 (cont.)

<b>MANUAL OUTDOOR AIR DAMPERS</b>		
<b>Model Number</b>	<b>Description</b>	<b>Use With Model Size</b>
CRMANDPR001A03	25% Open Manual Fresh Air Damper	036 – 072
CRMANDPR001A02	50% Open Manual Fresh Air Damper	036 – 072
CRMANDPR002A03	25% Open Manual Fresh Air Damper	090 – 150
CRMANDPR002A02	50% Open Manual Fresh Air Damper	090 – 150
CRMANDPR011A00	50% Open Manual Fresh Air Damper	180
<b>MOTORIZED OUTDOOR AIR DAMPERS</b>		
<b>Model Number</b>	<b>Description</b>	<b>Use With Model Size</b>
CRTWOPOS010A00	Motorized 2 position outdoor air damper (25–100% Outdoor Air)	036 – 072
CRTWOPOS011A00	Motorized 2 position outdoor air damper (25–100% Outdoor Air)	090 – 150
CRTWOPOS014A00	Motorized 2 position outdoor air damper (25–100% Outdoor Air)	180
<b>ECONOMIZER SENSORS</b>		
<b>Model Number</b>	<b>Description</b>	<b>Use With Model Size</b>
DNTEMPSN002A00	Outdoor or Return Dry Bulb Temperature Sensor used with Electro–Mechanical control.	ALL Economizers
DNCBDIOX005A00	CO <sub>2</sub> Sensor for use in return airstream. Also includes Aspirator Box required for Duct Mounting.	ALL Economizers
DNENTDIF004A00	Return Air Enthalpy Sensor used with Electro–Mechanical controls, use with AXB078ENT for differential enthalpy control.	ALL Economizers
AXB078ENT	Differential Enthalpy Control Upgrade	ALL Economizers
<b>SPECIAL – 180 SIZE SPECIFIC ASSESSORIES</b>		
<b>Model Number</b>	<b>Description</b>	<b>Use With Model Size</b>
CRDISBKT001A00	Disconnect Switch Bracket – Provides a pre engineered and sized mounting bracket for applications requiring a unit mounted fused disconnect of greater than 100 amps. Bracket assures that no damage will occur to coils when mounting with screws and other fasteners.	180
CRDUCTCV002A00	Supply Duct Cover – This supply duct cover is required when field converting the factory standard vertical duct supply to horizontal duct supply configuration. One required per unit.	180
<b>THROUGH-THE-BOTTOM/CURB POWER CONNECTION</b>		
<b>Model Number</b>	<b>Description</b>	<b>Use With Model Size</b>
CRBTMPWR001A01	Thru–the–bottom electrical connections and thru–the–curb gas connections. Includes a 3/4–inch diameter liquid tight conduit fitting for high voltage power wires	036 – 072
CRBTMPWR002A01	Thru–the–bottom electrical connections and thru–the–curb gas connections. Includes a 1–1/4–inch diameter liquid tight conduit fitting for high voltage power wires	090 – 150
CRBTMPWR003A01	Thru–the–bottom power, control, and gas connections. Includes a 3/4–inch diameter liquid tight conduit fitting for high voltage power wires	036 – 072
CRBTMPWR004A01	Thru–the–bottom power, control, and gas connections. Includes a 1–1/4–inch diameter liquid tight conduit fitting for high voltage power wires	090 – 150
CRBTMPWR005A00	Thru–the–bottom power, control, and gas connections. Includes a 1–1/4 inch diameter liquid tight conduit fitting for high voltage power wires	180
CRBTMPWR006A00	Thru–the–bottom power, control, and gas connections. Includes a 1–1/2 inch diameter liquid tight conduit fitting for high voltage power wires	
CRBTMPWR007A00	Thru–the–bottom power, control, and gas connections. Includes a 2 inch diameter liquid tight conduit fitting for high voltage power wires	

## ACCESSORIES – RAS036–180 (cont.)

LOW AMBIENT CONTROLS *		
Model Number	Description	Use With Model Size
32LT900301 <sup>1</sup>	Motormaster I Solid-State Variable Speed Motor Controller enables cooling down to -20° F by varying the speed on the condenser fan.	036 – 121 208/230-1-60, 208/203-3-60, 575-3-60
32LT900611 <sup>1</sup>	MotorMaster I Solid-State Variable Speed Motor Controller enables cooling down to -20° F by varying the speed on the condenser fan.	036 – 121 460-3-60
CPLOWAMB001A00	Motormaster® II Low Ambient Control – Enables cooling system to operate down to 0° F by cycling condenser fan on and off. The control is activated by a temperature sensor. No motor change-out required.	036 – 121 208/230-3-60, 460-3-60 <sup>4</sup>
1171974 <sup>2</sup>	Motormaster I Compatible Condenser Fan Motor	036 – 121 208/230-1-60, 208/230-3-60, 575-3-60
1171975 <sup>2</sup>	Motormaster I Compatible Condenser Fan Motor	036 – 121 460-3-60
CRLOWAMB030A00 <sup>3</sup>	Motormaster V Low Ambient Kit. Mechanical cooling operation down to -20° F (- 29° C)	150 208/230-3-60
CRLOWAMB031A00 <sup>3</sup>	Motormaster V Low Ambient Kit. Mechanical cooling operation down to -20° F (- 29° C)	150 460-3-60
CRLOWAMB032A00 <sup>3</sup>	Motormaster V Low Ambient Kit. Mechanical cooling operation down to -20° F (- 29° C).	150 575-3-60
CRLOWAMB039A00	Motormaster I Low Ambient Kit. Mechanical cooling operation down to -20° F (- 29° C). Kit includes 3 motors, MotorMaster controller, wiring label, and required wire ties and connectors, DNWINSTR001A00 also required (one per refrigerant circuit)	180 208/230-3-60
CRLOWAMB040A00	Motormaster I Low Ambient Kit. Mechanical cooling operation down to -20° F (- 29° C). Kit includes 3 motors, MotorMaster controller, wiring label, and required wire ties and connectors ) 575 Volt models also require CRTRXKIT002A00 plus DNWINSTR001A00 also required (one per refrigerant circuit)	180 460-3-60
CRTRXKIT001A00	Motormaster I Low Ambient Control – Transformer Kit. Must be used in conjunction with Low Ambient Controller if used on 575-3-60 volt models.	180 575-3-60

CONTROL UPGRADE KITS		
Model Number	Description	Use With Model Size
NRTIMEGD001A00	Time Guard II	036 – 180
CRSDTEST001A00	Remote keyed attenuator / test / reset station	036 – 180
DNWINSTR001A00	Electronic phase monitor breaks “R” control signal if trouble is detected. (Allows operation down to 25°F from standard 40°F.)	036 – 180
CRPHASE3001A02	Phase Monitor Control	036 – 180 (3 Phase only)
CRPHASE3002A00	Phase Monitor Control	036 – 180 (575v only)

HAIL GUARDS		
Model Number	Description	Use With Model Size
CRLVHLGD011A00	Louvered Condenser Coil Hail Guard	036
CRLVHLGD012A00	Louvered Condenser Coil Hail Guard	048 – 060
CRLVHLGD013A00	Louvered Condenser Coil Hail Guard	072
CRLVHLGD014A00	Louvered Condenser Coil Hail Guard	090, 091
CRLVHLGD015A00	Louvered Condenser Coil Hail Guard	101
CRLVHLGD016A00	Louvered Condenser Coil Hail Guard	102, 120, 121, 150
CRLVHLGD032A00	Louvered Condenser Coil Hail Guard	180

\*See usage tables in kit instructions.

<sup>1</sup> Requires motor change out. Sizes 036–072 require one (1) Low Ambient Controller and one (1) compatible condenser fan motor for change-out. Sizes 090–121 require one (1) Low Ambient Controller and two (2) compatible condenser fan motors for change-out.

See Motormaster I kit instructions for capacitor replacement information.

<sup>2</sup> Available from FAST Parts.

<sup>3</sup> No motor change is required on these specific models.

<sup>4</sup> One DNWINSTR001A00 also required per refrigerant circuit.



## ACCESSORIES – RAS036–180 (cont.)

<b>ELECTRIC HEATERS</b>			
<b>Model Number</b>	<b>Voltage</b>	<b>Nominal Power (kW)</b>	<b>Used With Model Size</b>
CRHEATER101A00	208/230	4.4	036 – 072
CRHEATER102A00	208/230	6.5	036 – 072
CRHEATER103B00	208/230	8.7	036 – 060
CRHEATER104B00	208/230	10.5	036 – 072
CRHEATER105A00	208/230	16	036 – 072
CRHEATER106A00	460	6	036 – 072
CRHEATER107A00	460	8.8	036
CRHEATER108A00	460	11.5	036 – 072
CRHEATER109A00	460	14	036 – 072
CRHEATER110A00	208/230	16	090 – 150
CRHEATER111A00	208/230	24.8	090 – 121
CRHEATER112A00	208/230	32	090 – 150
CRHEATER113A00	460	16.5	090 – 150
CRHEATER114A00	460	27.8	090 – 150
CRHEATER115A00	460	33	090 – 150
CRHEATER116A00	460	13.9	090 – 150
CRHEATER117A00	208/230	10.4	090 – 150
CRHEATER118A00	575	17	090 – 150
CRHEATER119A00	575	34	090 – 150
CRHEATER288A00	208/230	26.5	180
CRHEATER289A00	460	26.5	180
CRHEATER290A00	575	26.5	180
CRHEATER291A00	208/230	16.5	180
CRHEATER292A00	460	16.5	180
CRHEATER293A00	575	16.5	180
CRHEATER294A00	208/230	33.5	180
CRHEATER295A00	460	33.5	180
CRHEATER296A00	575	33.5	180
<b>SINGLE POINT WIRING KITS</b>			
<b>Model Number</b>	<b>Voltage</b>	<b>Used With Model Size</b>	
CRSINGLE037A00	208/230/460–3–60	072	
CRSINGLE038A00	208/230–3–60	048, 60	
CRSINGLE040A00	208/230–1–60	036, 048, 60	
CRSINGLE042A00	208/230/460/575–3–60	090, 091	
CRSINGLE043A00	208/230–3–60	090, 091	
CRSINGLE044A00	460/575–3–60	090, 091	
CRSINGLE045A00	208/230–3–60	090, 091	
CRSINGLE047A00	208/230/460/575–3–60	101, 102, 120, 121, 150, 180	
CRSINGLE049A00	208/230–3–60	101, 102, 120, 121, 150, 180	
CRSINGLE050A00	460/575–3–60	101, 102, 120, 121, 150, 180	
CRSINGLE051A00	208/230–3–60	101, 102, 120, 121, 150, 180	
CRSINGLE053A00	208/230–3–60	180	

**Table 2 – AHRI COOLING RATING TABLE – Single Stage Cooling**

UNIT RAS	COOLING STAGES	NOM. CAPACITY (TONS)	NET COOLING CAPACITY (MBH)	TOTAL POWER (KW)	SEER	EER	IEER
036	1	3	34.6	3.1	13.0	11.0	–
048	1	4	45.0	4.0	13.0	11.0	–
060	1	5	59.0	5.5	13.0	10.8	–
072	1	6	70.0	6.4	–	11.2	11.4
091	1	7.5	88.0	8.0	–	11.2	11.4
101	1	8.5	97.0	8.8	–	11.2	11.4
121	1	10	117.0	10.6	–	11.2	11.4

**Table 3 – AHRI COOLING RATING TABLE – Two Stage Cooling**

UNIT RAS	COOLING STAGES	NOM. CAPACITY (TONS)	NET COOLING CAPACITY (MBH)	TOTAL POWER (kW)	SEER	EER	IEER
090	2	7.5	83.0	7.4	N/A	11.2	11.7
102	2	8.5	99.0	9.0	N/A	11.2	11.7
120	2	10	114.0	10.1	N/A	11.3	12.2
150	2	12.5	140.0	12.7	N/A	11.0	11.2
180	2	15	174.0	15.8	N/A	11.0	11.5

**LEGEND**

- AHRI – Air-Conditioning, Heating & 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 AHRI Standard 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 AHRI Standard 340/360.
3. All RAS units comply with ASHRAE 90.1 2001, 2004 Energy Standard for minimum SEER and EER requirements.
4. RAS 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>.



Use of the AHRI Certified TM Mark indicates a manufacturer's participation in the program. For verification of certification for individual products, go to [www.ahridirectory.org](http://www.ahridirectory.org).

**Table 4 – MINIMUM – MAXIMUM AIRFLOWS ELECTRIC HEAT**

UNIT RAS	COOLING		ELECTRIC HEATERS	
	Minimum	Maximum	Minimum	Maximum
036	900	1500	900	1500
048	1200	2000	1200	2000
060	1500	2500	1500	2500
072	1800	3000	1800	3000
090/091	2250	3750	2250*	3750
101/102	2550	4250	2250*	4250
120/121	3000	5000	3000*	5000
150	3600	6000	3000*	6000
180	4500	7500	4500	7500

\* Minimum electric heat CFM exceptions :

UNIT RAS	UNIT VOLTAGE	HEATER KW	UNIT CONFIGURATION	REQUIRED MINIMUM CFM
120 150	208/230	42.4	Horizontal	3200
120 150	208/230	50.0	Horizontal	3200
120 150	460	50.0	Horizontal or Vertical	3200
090/091 101/102 120/121 150	575	17.0	Horizontal or Vertical	2800
		34.0		2350

**Table 5 – SOUND PERFORMANCE TABLE**

UNIT RAS	COOLING STAGES	OUTDOOR SOUND (dB)								
		A-WEIGHTED	63	125	250	500	1000	2000	4000	8000
036	1	80	90.6	80.9	80.2	76	74.6	71.3	68.5	63.9
048	1	81	90.9	84.6	79.5	77.9	76.5	71.1	66.9	62.5
060	1	78	84.0	82.2	76.3	74.8	72.5	68.8	65.6	61.8
072	1	78	88.8	81.8	76.9	74.4	73.3	69.8	66.3	62.7
091	1	82	90.1	82.6	81.0	79.4	77.0	73.0	70.4	66.7
090	2	82	85.8	84.3	80.5	78.7	76.4	72.7	68.3	65.1
101	1	83	91.2	86.4	81.9	81.0	78.3	73.9	71.4	67.3
102	2	82	88.6	85.0	81.6	79.5	77.4	74.1	71.0	66.3
121	1	82	88.6	85.0	81.6	79.5	77.4	74.1	71.0	66.3
120	2	82	89.0	83.1	80.5	78.5	75.5	71.6	69.6	69.3
150	2	87	87.0	85.2	84.6	84.9	82.2	78.4	75.3	72.9
180	2	87	87.0	85.2	84.6	84.9	82.2	78.4	75.3	72.9

**LEGEND**

dB – Decibel



Use of the AHRI Certified TM Mark indicates a manufacturer's participation in the program. For verification of certification for individual products, go to [www.ahridirectory.org](http://www.ahridirectory.org).

**NOTES:**

1. Outdoor sound data is measure in accordance with AHRI 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. A-weighted measurements are taken in accordance with AHRI standard 270–95.

**Table 6 – PHYSICAL DATA (COOLING) 3 – 6 TONS**

		<b>RAS036</b>	<b>RAS048</b>	<b>RAS060</b>	<b>RAS072</b>
<b>Refrigeration System</b>					
# Circuits / # Comp. / Type		1 / 1 / Scroll	1 / 1 / Scroll	1 / 1 / Scroll	1 / 1 / Scroll
Refrig. (R-410A) charge per circuit A/B (lbs-oz)		5-10 / -	8-8 / -	10-11 / -	14-2 / -
Metering Device		Fixed Metering Device			
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
<b>Evap. Coil</b>					
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 <sup>2</sup> )		5.5	5.5	5.5	7.3
Condensate Drain Conn. Size		3/4"	3/4"	3/4"	3/4"
<b>Evap. Fan and Motor</b>					
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	-
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	48	56	-
	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	1 / Belt
	Max BHP	1.2	1.2	1.5	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 3 phase	Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt	1 / Belt
	Max BHP	1.2	1.2	2.4	2.9*
	RPM Range	770-1175	770-1175	1035-1466	1173-1518
	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	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
<b>Cond. Coil</b>					
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 <sup>2</sup> )		14.6	16.5	16.5	21.3
<b>Cond. fan / motor</b>					
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
<b>Filters</b>					
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

\* RTPF – Round Tube Plate Fin Coil Design

**Table 6 – (Cont.) PHYSICAL DATA (COOLING) 7.5 – 8.5 TONS**

		<b>RAS091</b>	<b>RAS090</b>	<b>RAS101</b>	<b>RAS102</b>
<b>Refrigeration System</b>					
# Circuits / # Comp. / Type		1 / 1 / Scroll	2 / 2 / Scroll	1 / 1 / Scroll	2 / 2 / Scroll
RTPF models R-410a charge A/B (lbs – oz)		13 – 12	8 – 5 / 8 – 2	15 – 4	10 – 5 / 10 – 12
Metering device		Fixed Metering Device			
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
<b>Evap. Coil</b>					
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		3 / 15	3 / 15	3 / 15	3 / 15
total face area (ft <sup>2</sup> )		8.9	8.9	11.1	11.1
Condensate drain conn. size		3/4"	3/4"	3/4"	3/4"
<b>Evap. fan and motor</b>					
Standard Static 3 phase	Motor Qty / Drive type	1 / Belt	1 / Belt	1 / Belt	1 / Belt
	Max BHP	1.7	1.7	1.7	1.7
	RPM range	489–747	489–747	518–733	518–733
	motor frame size	56	56	56	56
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter (in)	15 x 15	15 x 15	15 x 15	15 x 15
Medium Static 3 phase	Motor Qty / Drive type	1 / Belt	1 / Belt	1 / Belt	1 / Belt
	Max BHP	2.9	2.9	2.4	2.4
	RPM range	733–949	733–949	690–936	690–936
	motor frame size	56	56	56	56
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter (in)	15 x 15	15 x 15	15 x 15	15 x 15
High Static 3 phase	Motor Qty / Drive type	1 / Belt	1 / Belt	1 / Belt	1 / Belt
	Max BHP	4.7	4.7	3.7	3.7
	RPM range	909–1102	909–1102	838–1084	838–1084
	motor frame size	145TY	145TY	56	56
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter (in)	15 x 15	15 x 15	15 x 15	15 x 15
<b>Cond. Coil</b>					
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 / 17	2 / 17	2 / 17	2 / 17
Total Face Area (ft <sup>2</sup> )		20.5	20.5	21.4	25.1
<b>Cond. fan / motor</b>					
Qty / Motor drive type		2 / direct	2 / direct	2 / direct	2 / direct
Motor HP / RPM		1/4 / 1100	1/4 / 1100	1/4 / 1100	1/4 / 1100
Fan diameter (in)		22	22	22	22
<b>Filters</b>					
RA Filter # / size (in)		4 / 16 x 20 x 2	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	1 / 20 x 24 x 1

\* RTPF – Round Tube Plate Fin Coil Design

**Table 6 – (Cont.) PHYSICAL DATA (COOLING) 10 – 15 TONS**

Refrigeration System		RAS121	RAS120	RAS150	RAS180
		# Circuits / # Comp. / Type RTPF models R-410a charge A/B (lbs – oz) Metering device High–press. Trip / Reset (psig) Low–press. Trip / Reset (psig)	1 / 1 / Scroll 20 – 0 / –	2 / 2 / Scroll 10 – 5 / 10 – 3	2 / 2 / Scroll 11 – 0 / 11 – 6
		Fixed Metering Device			
		630 / 505	630 / 505	630 / 505	630 / 505
		54 / 117	54 / 117	54 / 117	54 / 117
<b>Evap. Coil</b>					
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		4 / 15	4 / 15	4 / 15	3 / 15
total face area (ft <sup>2</sup> )		11.1	11.1	11.1	17.5
Condensate drain conn. size		3/4"	3/4"	3/4"	3/4"
<b>Evap. fan and motor</b>					
Standard Static 3 phase	Motor Qty / Drive type	1 / Belt	1 / Belt	1 / Belt	1 / Belt
	Max BHP	2.4	2.4	2.9	2.9
	RPM range	591–838	591–838	652–843	507–676
	motor frame size	56	56	56	56
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter (in)	15 x 15	15 x 15	15 x 15	18 x 18
Medium Static 3 phase	Motor Qty / Drive type	1 / Belt	1 / Belt	1 / Belt	1 / Belt
	Max BHP	3.7	3.7	3.7	3.7
	RPM range	838–1084	838–1084	838–1084	627–851
	motor frame size	56	56	56	56
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter (in)	15 x 15	15 x 15	15 x 15	18 x 18
High Static 3 phase	Motor Qty / Drive type	1 / Belt	1 / Belt	1 / Belt	1 / Belt
	Max BHP	4.7	4.7	4.7	6.1
	RPM range	1022–1240	1022–1240	1022–1240	776–955
	motor frame size	14	14	14	S184T
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter (in)	15 x 15	15 x 15	15 x 15	18 x 18
High Static High Efficiency 3 phase *	Motor Qty / Drive type	–	–	–	1 / Belt
	Max BHP	–	–	–	6.1
	RPM range	–	–	–	776–955
	motor frame size	–	–	–	S184T
	Fan Qty / Type	–	–	–	1 / Centrifugal
	Fan Diameter (in)	–	–	–	18 x 18
<b>Cond. Coil</b>					
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 / 17	2 / 17	3 / 17	2/17
total face area (ft <sup>2</sup> )		25.1	25.1	25.1	2 @ 23.1
<b>Cond. fan / motor</b>					
Qty / Motor drive type		2 / direct	2 / direct	1 / direct	3 / direct
Motor HP / RPM		1/4 / 1100	1/4 / 1100	1 / 1175	1/4 / 1100
Fan diameter (in)		22	22	30	22
<b>Filters</b>					
RA Filter # / Size (in)		4 / 20 x 20 x 2	4 / 20 x 20 x 2	4 / 20 x 20 x 2	6 / 18 x 24 x 2 V2 / 24 x 27 x 1
OA inlet screen # / Size (in)		1 / 20 x 24 x 1	1 / 20 x 24 x 1	1 / 20 x 24 x 1	H1 / 30 x 39 x 1

\* RTPF – Round Tube Plate Fin Coil Design

**Table 7 – ELECTRIC HEAT – ELECTRICAL DATA, 3 – 15 TONS**

Unit	Voltage-Ph-Hz	IFM Type	Electric Heater Part Number CRHEATERXXXXXX	Nominal Power	APP Power	Single Point Kit Part Number CRSINGLEXXXXXX	
						No C.O. Or Unpwr'd C.O.	
						No P.E.	W/P.E. (pwr'd from/unit)
RAS036	208/230-1-60	STD	101A00	4.4	3.3/4.0	-	-
			102A00	6.5	4.9/6.0	-	-
			103B00	8.7	6.5/8.0	037A00	037A00
			104B00	10.5	7.9/9.6	040A00	040A00
			102A00,102A00	13	9.8/11.9	040A00	040A00
		MED	101A00	4.4	3.3/4.0	-	-
			102A00	6.5	4.9/6.0	-	-
			103B00	8.7	6.5/8.0	037A00	037A00
			104B00	10.5	7.9/9.6	040A00	040A00
			102A00,102A00	13	9.8/11.9	040A00	040A00
	208/230-3-60	STD	101A00	4.4	3.3/4.0	-	-
			102A00	6.5	4.9/6.0	-	-
			103B00	8.7	6.5/8.0	-	-
			104B00	10.5	7.9/9.6	-	-
			105A00	16	12.0/14.7	037A00	037A00
		MED	101A00	4.4	3.3/4.0	-	-
			102A00	6.5	4.9/6.0	-	-
			103B00	8.7	6.5/8.0	-	-
			104B00	10.5	7.9/9.6	-	-
			105A00	16	12.0/14.7	037A00	037A00
	HIGH	101A00	4.4	3.3/4.0	-	-	
		102A00	6.5	4.9/6.0	-	-	
		103B00	8.7	6.5/8.0	-	-	
		104B00	10.5	7.9/9.6	-	-	
105A00		16	12.0/14.7	037A00	037A00		
460-3-60	STD	106A00	6	5.5	-	-	
		107A00	8.8	8.1	-	-	
		108A00	11.5	10.6	-	-	
		109A00	14	12.9	-	-	
	MED	106A00	6	5.5	-	-	
		107A00	8.8	8.1	-	-	
		108A00	11.5	10.6	-	-	
		109A00	14	12.9	-	-	
	HIGH	106A00	6	5.5	-	-	
		107A00	8.8	8.1	-	-	
		108A00	11.5	10.6	-	-	
		109A00	14	12.9	-	-	

**LEGEND**

- APP PWR – 208 / 230V / 460V / 575V
- C.O. – Convenient outlet
- FLA – Full load amps
- IFM – Indoor fan motor
- NOM PWR –240V / 480V / 600V
- P.E. – Power exhaust
- UNPWRD – Unpowered convenient outlet

**Table 7 ELECTRIC HEAT – ELECTRICAL DATA, 3 – 15 TONS**

Unit	Voltage-Ph-Hz	IFM Type	Electric Heater Part Number CRHEATERXXXXXX	Nominal Power	APP Power	Single Point Kit Part Number CRSINGLEXXXXXX	
						No C.O. Or Unpwrd C.O.	
						No P.E.	W/P.E. (pwrd from/unit)
RAS048	208/230-1-60	STD	101A00	4.4	3.3/4.0	-	-
			103B00	8.7	6.5/8.0	037A00	037A00
			102A00,102A00	13	9.8/11.9	040A00	040A00
			103B00,103B00	17.4	13.1/16.0	040A00	040A00
		104B00,104B00	21	15.8/19.3	040A00	040A00	
		MED	101A00	4.4	3.3/4.0	-	-
			103B00	8.7	6.5/8.0	037A00	037A00
			102A00,102A00	13	9.8/11.9	040A00	040A00
	103B00,103B00		17.4	13.1/16.0	040A00	040A00	
	104B00,104B00	21	15.8/19.3	040A00	040A00		
	208/230-3-60	STD	102A00	6.5	4.9/6.0	-	-
			103B00	8.7	6.5/8.0	-	-
			105A00	16	12.0/14.7	037A00	037A00
			104B00,104B00	21	15.8/19.3	038A00	038A00
		MED	102A00	6.5	4.9/6.0	-	-
			103B00	8.7	6.5/8.0	-	-
			105A00	16	12.0/14.7	037A00	037A00
			104B00,104B00	21	15.8/19.3	038A00	038A00
		HIGH	102A00	6.5	4.9/6.0	-	-
			103B00	8.7	6.5/8.0	-	-
			105A00	16	12.0/14.7	037A00	037A00
			104B00,104B00	21	15.8/19.3	038A00	038A00
	460-3-60	STD	106A00	6	5.5	-	-
			108A00	11.5	10.6	-	-
109A00			14	12.9	-	-	
108A00,108A00			23	21.1	037A00	037A00	
MED		106A00	6	5.5	-	-	
		108A00	11.5	10.6	-	-	
		109A00	14	12.9	-	-	
		108A00,108A00	23	21.1	037A00	037A00	
HIGH		106A00	6	5.5	-	-	
		108A00	11.5	10.6	-	-	
		109A00	14	12.9	-	-	
		108A00,108A00	23	21.1	037A00	037A00	

**LEGEND**

- APP PWR – 208 / 230V / 460V / 575V
- C.O. – Convenient outlet
- FLA – Full load amps
- IFM – Indoor fan motor
- NOM PWR – 240V / 480V / 600V
- PE. – Power exhaust
- UNPWDRD – Unpowered convenient outlet



**Table 7 ELECTRIC HEAT – ELECTRICAL DATA, 3 – 15 TONS**

Unit	Voltage-Ph-Hz	IFM Type	Electric Heater Part Number CRHEATERXXXXXX	Nominal Power	APP Power	Single Point Kit Part Number CRSINGLEXXXXXX	
						No C.O. Or Unpwrd C.O.	
						No P.E.	W/P.E. (pwrd from/unit)
<b>RAS060</b>	208/230–1–60	STD	102A00	6.5	4.9/6.0	–	–
			103B00	8.7	6.5/8.0	037A00	037A00
			102A00,102A00	13	9.8/11.9	040A00	040A00
			103B00,103B00	17.4	13.1/16.0	040A00	040A00
			104B00,104B00	21	15.8/19.3	040A00	040A00
		MED	102A00	6.5	4.9/6.0	–	–
			103B00	8.7	6.5/8.0	037A00	037A00
			102A00,102A00	13	9.8/11.9	040A00	040A00
			103B00,103B00	17.4	13.1/16.0	040A00	040A00
			104B00,104B00	21	15.8/19.3	040A00	040A00
	208/230–3–60	STD	102A00	6.5	4.9/6.0	–	–
			104B00	10.5	7.9/9.6	–	–
			105A00	16	12.0/14.7	037A00	037A00
			104B00,104B00	21	15.8/19.3	038A00	038A00
			104B00,105A00	26.5	19.9/24.3	038A00	038A00
		MED	102A00	6.5	4.9/6.0	–	–
			104B00	10.5	7.9/9.6	–	–
			105A00	16	12.0/14.7	037A00	037A00
			104B00,104B00	21	15.8/19.3	038A00	038A00
			104B00,105A00	26.5	19.9/24.3	038A00	038A00
		HIGH	102A00	6.5	4.9/6.0	–	–
			104B00	10.5	7.9/9.6	–	–
			105A00	16	12.0/14.7	037A00	037A00
			104B00,104B00	21	15.8/19.3	038A00	038A00
460–3–60	STD	106A00	6	5.5	–	–	
		108A00	11.5	10.6	–	–	
		109A00	14	12.9	–	–	
		108A00,108A00	23	21.1	037A00	037A00	
		108A00,109A00	25.5	23.4	037A00	037A00	
	MED	106A00	6	5.5	–	–	
		108A00	11.5	10.6	–	–	
		109A00	14	12.9	–	–	
		108A00,108A00	23	21.1	037A00	037A00	
		108A00,109A00	25.5	23.4	037A00	037A00	
	HIGH	106A00	6	5.5	–	–	
		108A00	11.5	10.6	–	–	
		109A00	14	12.9	–	–	
		108A00,108A00	23	21.1	037A00	037A00	
			108A00,109A00	25.5	23.4	037A00	037A00

**LEGEND**

- APP PWR – 208 / 230V / 460V / 575V
- C.O. – Convenient outlet
- FLA – Full load amps
- IFM – Indoor fan motor
- NOM PWR – 240V / 480V / 600V
- P.E. – Power exhaust
- UNPWRD – Unpowered convenient outlet

**Table 7 ELECTRIC HEAT – ELECTRICAL DATA, 3 – 15 TONS**

Unit	Voltage-Ph-Hz	IFM Type	Electric Heater Part Number CRHEATERXXXXXX	Nominal Power	APP Power	Single Point Kit Part Number CRSINGLEXXXXXX	
						No C.O. Or Unpwrd C.O.	
						No P.E.	W/P.E. (pwrd from/unit)
RAS072	208/230-3-60	STD	102A00	6.5	4.9/6.0	-	-
			104B00	10.5	7.9/9.6	-	-
			105A00	16.0	12.0/14.7	037A00	037A00
			104B00,104B00	21.0	15.8/19.3	038A00	038A00
			104B00,105A00	26.5	19.9/24.3	038A00	038A00
		MED	102A00	6.5	4.9/6.0	-	-
			104B00	10.5	7.9/9.6	-	-
			105A00	16.0	12.0/14.7	037A00	037A00
			104B00,104B00	21.0	15.8/19.3	038A00	038A00
			104B00,105A00	26.5	19.9/24.3	038A00	038A00
		HIGH	102A00	6.5	4.9/6.0	-	-
			104B00	10.5	7.9/9.6	-	-
			105A00	16.0	12.0/14.7	037A00	037A00
			104B00,104B00	21.0	15.8/19.3	038A00	038A00
			104B00,105A00	26.5	19.9/24.3	038A00	038A00
	460-3-60	STD	106A00	6.0	5.5	-	-
			108A00	11.5	10.6	-	-
			109A00	14.0	12.9	-	-
			108A00,108A00	23.0	21.1	037A00	037A00
			108A00,109A00	25.5	23.4	037A00	037A00
		MED	106A00	6.0	5.5	-	-
			108A00	11.5	10.6	-	-
			109A00	14.0	12.9	-	-
			108A00,108A00	23.0	21.1	037A00	037A00
HIGH	106A00	6.0	5.5	-	-		
	108A00	11.5	10.6	-	-		
	109A00	14.0	12.9	-	-		
	108A00,108A00	23.0	21.1	037A00	037A00		
			108A00,109A00	25.5	23.4	037A00	037A00

**LEGEND**

- APP PWR – 208 / 230V / 460V / 575V
- C.O. – Convenient outlet
- FLA – Full load amps
- IFM – Indoor fan motor
- NOM PWR –240V / 480V / 600V
- P.E. – Power exhaust
- UNPWRD – Unpowered convenient outlet

**Table 7 ELECTRIC HEAT – ELECTRICAL DATA, 3 – 15 TONS**

Unit	Voltage-Ph-Hz	IFM Type	Electric Heater Part Number CRHEATERXXXXXX	Nominal Power	APP Power	Single Point Kit Part Number CRSINGLEXXXXXX	
						No C.O. Or Unpwr'd C.O.	
						No P.E.	W/P.E. (pwr'd from/unit)
RAS091	208/230-3-60	STD	117A00	10.4	7.8/9.6	042A00	042A00
			110A00	16.0	12.0/14.7	042A00	042A00
			111A00	24.8	18.6/22.8	043A00	043A00
			112A00	32.0	24.0/29.4	043A00	043A00
			112A00,117A00	42.4	31.8/38.9	045A00	045A00
		MED	117A00	10.4	7.8/9.6	042A00	042A00
			110A00	16.0	12.0/14.7	042A00	043A00
			111A00	24.8	18.6/22.8	043A00	043A00
			112A00	32.0	24.0/29.4	043A00	043A00
			112A00,117A00	42.4	31.8/38.9	045A00	045A00
		HIGH	117A00	10.4	7.8/9.6	042A00	042A00
			110A00	16.0	12.0/14.7	043A00	043A00
	111A00		24.8	18.6/22.8	043A00	043A00	
	112A00		32.0	24.0/29.4	043A00	043A00	
	112A00,117A00		42.4	31.8/38.9	045A00	045A00	
	460-3-60	STD	116A00	13.9	12.8	042A00	042A00
			113A00	16.5	15.2	042A00	042A00
			114A00	27.8	25.5	042A00	042A00
			115A00	33.0	30.3	042A00	042A00
			114A00,116A00	41.7	38.3	044A00	044A00
		MED	116A00	13.9	12.8	042A00	042A00
			113A00	16.5	15.2	042A00	042A00
			114A00	27.8	25.5	042A00	042A00
			115A00	33.0	30.3	042A00	042A00
114A00,116A00			41.7	38.3	044A00	044A00	
HIGH		116A00	13.9	12.8	042A00	042A00	
		113A00	16.5	15.2	042A00	042A00	
	114A00	27.8	25.5	042A00	042A00		
	115A00	33.0	30.3	042A00	044A00		
	114A00,116A00	41.7	38.3	044A00	044A00		
575-3-60	STD	118A00	17.0	17.0	042A00	042A00	
		119A00	34.0	34.0	042A00	042A00	
	MED	118A00	17.0	17.0	042A00	042A00	
		119A00	34.0	34.0	042A00	042A00	
	HIGH	118A00	17.0	17.0	042A00	042A00	
		119A00	34.0	34.0	042A00	044A00	

**LEGEND**

- APP PWR – 208 / 230V / 460V / 575V
- C.O. – Convenient outlet
- FLA – Full load amps
- IFM – Indoor fan motor
- NOM PWR – 240V / 480V / 600V
- P.E. – Power exhaust
- UNPWRD – Unpowered convenient outlet

**Table 7 ELECTRIC HEAT – ELECTRICAL DATA, 3 – 15 TONS**

Unit	Voltage-Ph-Hz	IFM Type	Electric Heater Part Number CRHEATERXXXXXX	Nominal Power	APP Power	Single Point Kit Part Number CRSINGLEXXXXXX	
						No C.O. Or Unpwr'd C.O.	
						No P.E.	W/P.E. (pwr'd from/unit)
RAS090	208/230-3-60	STD	117A00	10.4	7.8/9.6	042A00	042A00
			110A00	16.0	12.0/14.7	042A00	042A00
			111A00	24.8	18.6/22.8	043A00	043A00
			112A00	32.0	24.0/29.4	043A00	043A00
			112A00,117A00	42.4	31.8/38.9	045A00	045A00
		MED	117A00	10.4	7.8/9.6	042A00	042A00
			110A00	16.0	12.0/14.7	042A00	043A00
			111A00	24.8	18.6/22.8	043A00	043A00
			112A00	32.0	24.0/29.4	043A00	043A00
			112A00,117A00	42.4	31.8/38.9	045A00	045A00
		HIGH	117A00	10.4	7.8/9.6	042A00	042A00
			110A00	16.0	12.0/14.7	043A00	043A00
	111A00		24.8	18.6/22.8	043A00	043A00	
	112A00		32.0	24.0/29.4	043A00	043A00	
	112A00,117A00		42.4	31.8/38.9	045A00	045A00	
	460-3-60	STD	116A00	13.9	12.8	042A00	042A00
			113A00	16.5	15.2	042A00	042A00
			114A00	27.8	25.5	042A00	042A00
			115A00	33.0	30.3	042A00	042A00
			114A00,116A00	41.7	38.3	044A00	044A00
		MED	116A00	13.9	12.8	042A00	042A00
			113A00	16.5	15.2	042A00	042A00
			114A00	27.8	25.5	042A00	042A00
			115A00	33.0	30.3	042A00	042A00
114A00,116A00			41.7	38.3	044A00	044A00	
HIGH		116A00	13.9	12.8	042A00	042A00	
		113A00	16.5	15.2	042A00	042A00	
	114A00	27.8	25.5	042A00	042A00		
	115A00	33.0	30.3	042A00	044A00		
	114A00,116A00	41.7	38.3	044A00	044A00		
575-3-60	STD	118A00	17.0	17.0	042A00	042A00	
		119A00	34.0	34.0	042A00	042A00	
	MED	118A00	17.0	17.0	042A00	042A00	
		119A00	34.0	34.0	042A00	042A00	
	HIGH	118A00	17.0	17.0	042A00	042A00	
		119A00	34.0	34.0	042A00	044A00	

**LEGEND**

- APP PWR – 208 / 230V / 460V / 575V
- C.O. – Convenient outlet
- FLA – Full load amps
- IFM – Indoor fan motor
- NOM PWR – 240V / 480V / 600V
- P.E. – Power exhaust
- UNPWRD – Unpowered convenient outlet

**Table 7 ELECTRIC HEAT – ELECTRICAL DATA, 3 – 15 TONS**

Unit	Voltage-Ph-Hz	IFM Type	Electric Heater Part Number CRHEATERXXXXXX	Nominal Power	APP Power	Single Point Kit Part Number CRSINGLEXXXXXX	
						No C.O. Or Unpwr'd C.O.	
						No P.E.	W/P.E. (pwr'd from/unit)
RAS101	208/230-3-60	STD	117A00	10.4	7.8/9.6	047A00	047A00
			110A00	16.0	12.0/14.7	047A00	047A00
			111A00	24.8	18.6/22.8	049A00	049A00
			112A00	32.0	24.0/29.4	049A00	049A00
			112A00,117A00	42.4	31.8/38.9	051A00	051A00
		MED	117A00	10.4	7.8/9.6	047A00	047A00
			110A00	16.0	12.0/14.7	047A00	047A00
			111A00	24.8	18.6/22.8	049A00	049A00
			112A00	32.0	24.0/29.4	049A00	049A00
			112A00,117A00	42.4	31.8/38.9	051A00	051A00
		HIGH	117A00	10.4	7.8/9.6	047A00	049A00
			110A00	16.0	12.0/14.7	049A00	049A00
	111A00		24.8	18.6/22.8	049A00	049A00	
	112A00		32.0	24.0/29.4	049A00	049A00	
	112A00,117A00		42.4	31.8/38.9	051A00	051A00	
	460-3-60	STD	116A00	13.9	12.8	047A00	047A00
			113A00	16.5	15.2	047A00	047A00
			114A00	27.8	25.5	047A00	047A00
			115A00	33.0	30.3	047A00	047A00
			114A00,116A00	41.7	38.3	050A00	050A00
		MED	116A00	13.9	12.8	047A00	047A00
			113A00	16.5	15.2	047A00	047A00
			114A00	27.8	25.5	047A00	047A00
			115A00	33.0	30.3	047A00	047A00
114A00,116A00			41.7	38.3	050A00	050A00	
HIGH		116A00	13.9	12.8	047A00	047A00	
		113A00	16.5	15.2	047A00	047A00	
	114A00	27.8	25.5	047A00	047A00		
	115A00	33.0	30.3	047A00	047A00		
	114A00,116A00	41.7	38.3	050A00	050A00		
575-3-60	STD	118A00	17.0	17.0	047A00	047A00	
		119A00	34.0	34.0	047A00	047A00	
	MED	118A00	17.0	17.0	047A00	047A00	
		119A00	34.0	34.0	047A00	047A00	
	HIGH	118A00	17.0	17.0	047A00	047A00	
		119A00	34.0	34.0	047A00	047A00	

**LEGEND**

- APP PWR – 208 / 230V / 460V / 575V
- C.O. – Convenient outlet
- FLA – Full load amps
- IFM – Indoor fan motor
- NOM PWR – 240V / 480V / 600V
- P.E. – Power exhaust
- UNPWRD – Unpowered convenient outlet

**Table 7 ELECTRIC HEAT – ELECTRICAL DATA, 3 – 15 TONS**

Unit	Voltage–Ph–Hz	IFM Type	Electric Heater Part Number CRHEATERXXXXXX	Nominal Power	APP Power	Single Point Kit Part Number CRSINGLEXXXXXX		
						No C.O. Or Unpwr'd C.O.		
						No P.E.	W/P.E. (pwr'd from/unit)	
RAS102	208/230–3–60	STD	117A00	10.4	7.8/9.6	047A00	047A00	
			110A00	16.0	12.0/14.7	047A00	047A00	
			111A00	24.8	18.6/22.8	049A00	049A00	
			112A00	32.0	24.0/29.4	049A00	049A00	
			112A00,117A00	42.4	31.8/38.9	051A00	051A00	
		MED	117A00	10.4	7.8/9.6	047A00	047A00	
			110A00	16.0	12.0/14.7	047A00	047A00	
			111A00	24.8	18.6/22.8	049A00	049A00	
			112A00	32.0	24.0/29.4	049A00	049A00	
			112A00,117A00	42.4	31.8/38.9	051A00	051A00	
		HIGH	117A00	10.4	7.8/9.6	047A00	047A00	
			110A00	16.0	12.0/14.7	049A00	049A00	
	111A00		24.8	18.6/22.8	049A00	049A00		
	112A00		32.0	24.0/29.4	049A00	049A00		
				112A00,117A00	42.4	31.8/38.9	051A00	051A00
	460–3–60	STD	116A00	13.9	12.8	047A00	047A00	
			113A00	16.5	15.2	047A00	047A00	
			114A00	27.8	25.5	047A00	047A00	
			115A00	33.0	30.3	047A00	047A00	
			114A00,116A00	41.7	38.3	050A00	050A00	
		MED	116A00	13.9	12.8	047A00	047A00	
			113A00	16.5	15.2	047A00	047A00	
			114A00	27.8	25.5	047A00	047A00	
			115A00	33.0	30.3	047A00	047A00	
114A00,116A00			41.7	38.3	050A00	050A00		
HIGH		116A00	13.9	12.8	047A00	047A00		
		113A00	16.5	15.2	047A00	047A00		
	114A00	27.8	25.5	047A00	047A00			
	115A00	33.0	30.3	047A00	047A00			
			114A00,116A00	41.7	38.3	050A00	050A00	
575–3–60	STD	118A00	17.0	17.0	047A00	047A00		
		119A00	34.0	34.0	047A00	047A00		
	MED	118A00	17.0	17.0	047A00	047A00		
		119A00	34.0	34.0	047A00	047A00		
	HIGH	118A00	17.0	17.0	047A00	047A00		
		119A00	34.0	34.0	047A00	047A00		

**LEGEND**

- APP PWR – 208 / 230V / 460V / 575V
- C.O. – Convenient outlet
- FLA – Full load amps
- IFM – Indoor fan motor
- NOM PWR –240V / 480V / 600V
- P.E. – Power exhaust
- UNPWRD – Unpowered convenient outlet

**Table 7 ELECTRIC HEAT – ELECTRICAL DATA, 3 – 15 TONS**

Unit	Voltage-Ph-Hz	IFM Type	Electric Heater Part Number CRHEATERXXXXXX	Nominal Power	APP Power	Single Point Kit Part Number CRSINGLEXXXXXX	
						No C.O. Or Unpwr'd C.O.	
						No P.E.	W/P.E. (pwr'd from/unit)
RAS121	208/230-3-60	STD	117A00	10.4	7.8/9.6	047A00	047A00
			110A00	16.0	12.0/14.7	047A00	047A00
			112A00	32.0	24.0/29.4	049A00	049A00
			112A00,117A00	42.4	31.8/38.9	051A00	051A00
			112A00,110A00	50.0	37.6/45.9	051A00	051A00
		MED	117A00	10.4	7.8/9.6	047A00	049A00
			110A00	16.0	12.0/14.7	049A00	049A00
			112A00	32.0	24.0/29.4	049A00	049A00
			112A00,117A00	42.4	31.8/38.9	051A00	051A00
			112A00,110A00	50.0	37.6/45.9	051A00	051A00
		HIGH	117A00	10.4	7.8/9.6	049A00	049A00
			110A00	16.0	12.0/14.7	049A00	049A00
	112A00		32.0	24.0/29.4	049A00	049A00	
	112A00,117A00		42.4	31.8/38.9	051A00	051A00	
	112A00,110A00		50.0	37.6/45.9	051A00	051A00	
	460-3-60	STD	116A00	13.9	12.8	047A00	047A00
			113A00	16.5	15.2	047A00	047A00
			115A00	33.0	30.3	047A00	047A00
			114A00,116A00	41.7	38.3	050A00	050A00
			115A00,113A00	50.0	45.9	050A00	050A00
		MED	116A00	13.9	12.8	047A00	047A00
			113A00	16.5	15.2	047A00	047A00
			115A00	33.0	30.3	047A00	047A00
			114A00,116A00	41.7	38.3	050A00	050A00
115A00,113A00			50.0	45.9	050A00	050A00	
HIGH		116A00	13.9	12.8	047A00	047A00	
		113A00	16.5	15.2	047A00	047A00	
	115A00	33.0	30.3	047A00	050A00		
	114A00,116A00	41.7	38.3	050A00	050A00		
	115A00,113A00	50.0	45.9	050A00	050A00		
575-3-60	STD	118A00	17.0	17.0	047A00	047A00	
		119A00	34.0	34.0	047A00	047A00	
		118A00,119A00	51.0	51.0	050A00	050A00	
	MED	118A00	17.0	17.0	047A00	047A00	
		119A00	34.0	34.0	047A00	047A00	
		118A00,119A00	51.0	51.0	050A00	050A00	
	HIGH	118A00	17.0	17.0	047A00	047A00	
		119A00	34.0	34.0	047A00	050A00	
		118A00,119A00	51.0	51.0	050A00	050A00	

**LEGEND**

- APP PWR – 208 / 230V / 460V / 575V
- C.O. – Convenient outlet
- FLA – Full load amps
- IFM – Indoor fan motor
- NOM PWR – 240V / 480V / 600V
- P.E. – Power exhaust
- UNPWRD – Unpowered convenient outlet

**Table 7 ELECTRIC HEAT – ELECTRICAL DATA, 3 – 15 TONS**

Unit	Voltage-Ph-Hz	IFM Type	Electric Heater Part Number CRHEATERXXXXXX	Nominal Power	APP Power	Single Point Kit Part Number CRSINGLEXXXXXX	
						No C.O. Or Unpwr'd C.O.	
						No P.E.	W/P.E. (pwr'd from/unit)
<b>RAS120</b>	208/230-3-60	STD	117A00	10.4	7.8/9.6	047A00	047A00
			110A00	16.0	12.0/14.7	047A00	047A00
			112A00	32.0	24.0/29.4	049A00	049A00
			112A00,117A00	42.4	31.8/38.9	051A00	051A00
			112A00,110A00	50.0	37.6/45.9	051A00	051A00
		MED	117A00	10.4	7.8/9.6	047A00	047A00
			110A00	16.0	12.0/14.7	049A00	049A00
			112A00	32.0	24.0/29.4	049A00	049A00
			112A00,117A00	42.4	31.8/38.9	051A00	051A00
			112A00,110A00	50.0	37.6/45.9	051A00	051A00
		HIGH	117A00	10.4	7.8/9.6	047A00	049A00
			110A00	16.0	12.0/14.7	049A00	049A00
	112A00		32.0	24.0/29.4	049A00	049A00	
	112A00,117A00		42.4	31.8/38.9	051A00	051A00	
	112A00,110A00		50.0	37.6/45.9	051A00	051A00	
	460-3-60	STD	116A00	13.9	12.8	047A00	047A00
			113A00	16.5	15.2	047A00	047A00
			115A00	33.0	30.3	047A00	047A00
			114A00,116A00	41.7	38.3	050A00	050A00
			115A00,113A00	50.0	45.9	050A00	050A00
		MED	116A00	13.9	12.8	047A00	047A00
			113A00	16.5	15.2	047A00	047A00
			115A00	33.0	30.3	047A00	047A00
			114A00,116A00	41.7	38.3	050A00	050A00
115A00,113A00			50.0	45.9	050A00	050A00	
HIGH		116A00	13.9	12.8	047A00	047A00	
		113A00	16.5	15.2	047A00	047A00	
	115A00	33.0	30.3	047A00	050A00		
	114A00,116A00	41.7	38.3	050A00	050A00		
	115A00,113A00	50.0	45.9	050A00	050A00		
575-3-60	STD	118A00	17.0	17.0	047A00	047A00	
		119A00	34.0	34.0	047A00	047A00	
		118A00,119A00	51.0	51.0	050A00	050A00	
	MED	118A00	17.0	17.0	047A00	047A00	
		119A00	34.0	34.0	047A00	047A00	
		118A00,119A00	51.0	51.0	050A00	050A00	
	HIGH	118A00	17.0	17.0	047A00	047A00	
		119A00	34.0	34.0	047A00	050A00	
		118A00,119A00	51.0	51.0	050A00	050A00	

**LEGEND**

- APP PWR – 208 / 230V / 460V / 575V
- C.O. – Convenient outlet
- FLA – Full load amps
- IFM – Indoor fan motor
- NOM PWR – 240V / 480V / 600V
- P.E. – Power exhaust
- UNPWRD – Unpowered convenient outlet



**Table 7 ELECTRIC HEAT – ELECTRICAL DATA, 3 – 15 TONS**

Unit	Voltage-Ph-Hz	IFM Type	Electric Heater Part Number CRHEATERXXXXXX	Nominal Power	APP Power	Single Point Kit Part Number CRSINGLEXXXXXX	
						No C.O. Or Unpwr'd C.O.	
						No P.E.	W/P.E. (pwr'd from/unit)
<b>RAS150</b>	208/230-3-60	STD	117A00	10.4	7.8/9.6	049A00	049A00
			110A00	16.0	12.0/14.7	049A00	049A00
			112A00	32.0	24.0/29.4	049A00	049A00
			112A00,117A00	42.4	31.8/38.9	051A00	051A00
			112A00,110A00	50.0	37.6/45.9	051A00	051A00
		MED	117A00	10.4	7.8/9.6	049A00	049A00
			110A00	16.0	12.0/14.7	049A00	049A00
			112A00	32.0	24.0/29.4	049A00	049A00
			112A00,117A00	42.4	31.8/38.9	051A00	051A00
			112A00,110A00	50.0	37.6/45.9	051A00	051A00
		HIGH	117A00	10.4	7.8/9.6	049A00	049A00
			110A00	16.0	12.0/14.7	049A00	049A00
			112A00	32.0	24.0/29.4	049A00	049A00
			112A00,117A00	42.4	31.8/38.9	051A00	051A00
			112A00,110A00	50.0	37.6/45.9	051A00	051A00
	460-3-60	STD	116A00	13.9	12.8	047A00	047A00
			113A00	16.5	15.2	047A00	047A00
			115A00	33.0	30.3	047A00	047A00
			114A00,116A00	41.7	38.3	050A00	050A00
			115A00,113A00	50.0	45.9	050A00	050A00
		MED	116A00	13.9	12.8	047A00	047A00
			113A00	16.5	15.2	047A00	047A00
			115A00	33.0	30.3	047A00	047A00
			114A00,116A00	41.7	38.3	050A00	050A00
			115A00,113A00	50.0	45.9	050A00	050A00
		HIGH	116A00	13.9	12.8	047A00	047A00
			113A00	16.5	15.2	047A00	047A00
115A00			33.0	30.3	047A00	050A00	
114A00,116A00			41.7	38.3	050A00	050A00	
115A00,113A00			50.0	45.9	050A00	050A00	
575-3-60	STD	118A00	17.0	17.0	047A00	047A00	
		119A00	34.0	34.0	047A00	047A00	
		118A00,119A00	51.0	51.0	050A00	050A00	
	MED	118A00	17.0	17.0	047A00	047A00	
		119A00	34.0	34.0	047A00	047A00	
		118A00,119A00	51.0	51.0	050A00	050A00	
	HIGH	118A00	17.0	17.0	047A00	047A00	
		119A00	34.0	34.0	047A00	050A00	
		118A00,119A00	51.0	51.0	050A00	050A00	

**LEGEND**

- APP PWR – 208 / 230V / 460V / 575V
- C.O. – Convenient outlet
- FLA – Full load amps
- IFM – Indoor fan motor
- NOM PWR – 240V / 480V / 600V
- P.E. – Power exhaust
- UNPWRD – Unpowered convenient outlet

**Table 7 ELECTRIC HEAT – ELECTRICAL DATA, 3 – 15 TONS**



Unit	Nominal V-Ph-Hz	IFM TYPE	ELECTRIC HEATER PART NUMBER CRHEATERXXXXXX	NOM PWR (kW)	APP PWR (kW)	SINGLE POINT KIT PART NUMBER CRSINGLEXXXXXX	
						NO C.O. or UNPWRD C.O.	
						NO P.E.	w/P.E. (pwrd fr/unit)
RAS180	208/230-3-60	STD	291A00	16.5	12.4/15.2	049A00	049A00
			294A00	33.5	25.2/30.8	049A00	049A00
			288A00,294A00	43.5	32.7/40.0	051A00	051A00
			291A00,294A00	50.0	37.6/45.9	051A00	051A00
			294A00,294A00	67.0	50.3/61.5	053A00	053A00
		MED	291A00	16.5	12.4/15.2	049A00	049A00
			294A00	33.5	25.2/30.8	049A00	049A00
			288A00,294A00	43.5	32.7/40.0	051A00	051A00
			291A00,294A00	50.0	37.6/45.9	051A00	051A00
			294A00,294A00	67.0	50.3/61.5	053A00	053A00
		HIGH High Efficiency	291A00	16.5	12.4/15.2	049A00	049A00
			294A00	33.5	25.2/30.8	049A00	049A00
	288A00,294A00		43.5	32.7/40.0	051A00	051A00	
	291A00,294A00		50.0	37.6/45.9	051A00	051A00	
	460-3-60	STD	292A00	16.5	15.2	-	-
			295A00	33.5	30.8	047A00	047A00
			289A00,295A00	43.5	40.0	050A00	050A00
			292A00,295A00	50.0	45.9	050A00	050A00
			295A00,295A00	67.0	61.5	050A00	050A00
		MED	292A00	16.5	15.2	-	-
			295A00	33.5	30.8	047A00	047A00
			289A00,295A00	43.5	40.0	050A00	050A00
			292A00,295A00	50.0	45.9	050A00	050A00
			295A00,295A00	67.0	61.5	050A00	050A00
HIGH High Efficiency		292A00	16.5	15.2	-	-	
		295A00	33.5	30.8	050A00	050A00	
	289A00,295A00	43.5	40.0	050A00	050A00		
	292A00,295A00	50.0	45.9	050A00	050A00		
575-3-60	STD	293A00	16.5	15.2	-	-	
		296A00	33.5	30.8	047A00	047A00	
		290A00,296A00	43.5	40.0	047A00	050A00	
		293A00,296A00	50.0	45.9	047A00	047A00	
		296A00,296A00	67.0	61.5	050A00	050A00	
	MED	293A00	16.5	15.2	-	-	
		296A00	33.5	30.8	047A00	047A00	
		290A00,296A00	43.5	40.0	047A00	050A00	
		293A00,296A00	50.0	45.9	047A00	047A00	
		296A00,296A00	67.0	61.5	050A00	050A00	
	HIGH High Efficiency	293A00	16.5	15.2	-	-	
		296A00	33.5	30.8	047A00	047A00	
290A00,296A00		43.5	40.0	050A00	050A00		
293A00,296A00		50.0	45.9	050A00	050A00		
296A00,296A00	296A00	67.0	61.5	050A00	050A00		

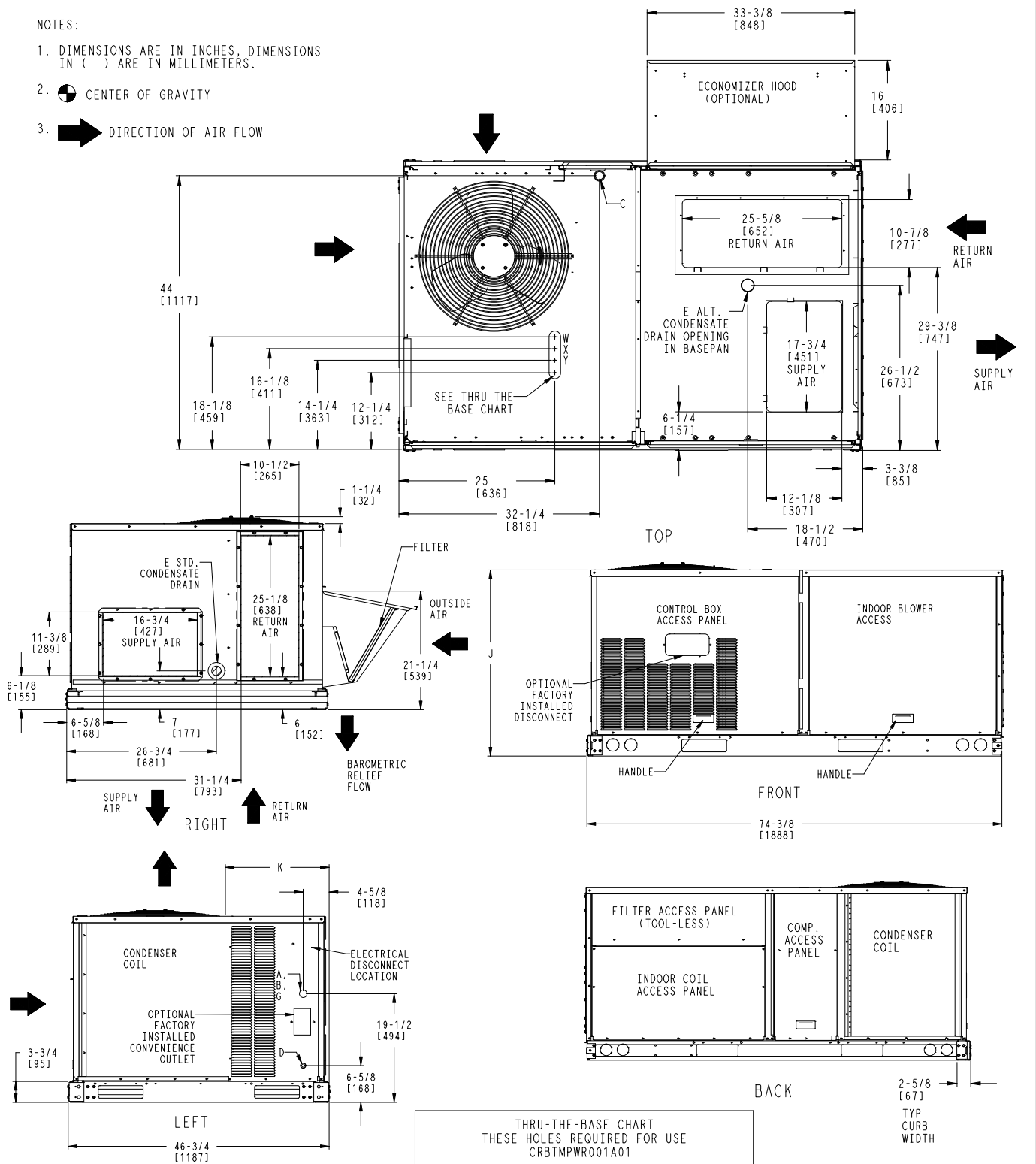
**LEGEND**

- APP PWR – 208 / 230V / 460V / 575V
- C.O. – Convenient outlet
- FLA – Full load amps
- IFM – Indoor fan motor
- NOM PWR – 240V / 480V / 600V
- P.E. – Power exhaust
- UNPWRD – Unpowered convenient outlet

# BASE UNIT DIMENSIONS – RAS036-072

**NOTES:**

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



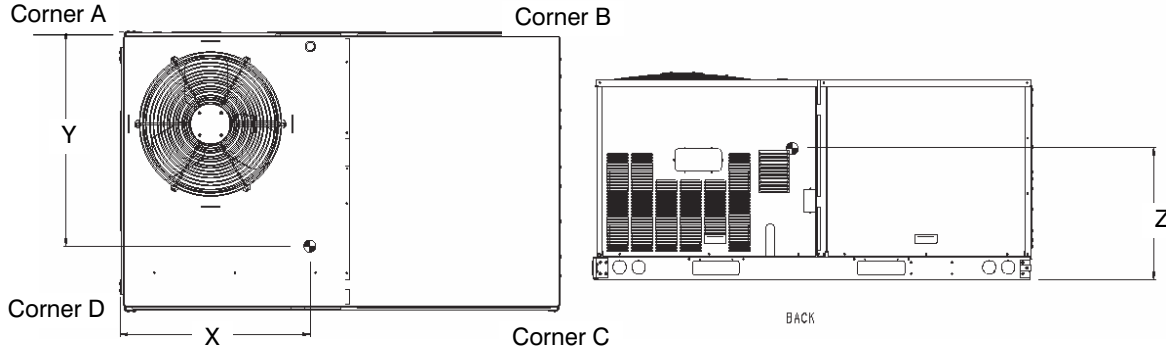
CONNECTION SIZES	
A	1 3/8" DIA [35] FIELD POWER SUPPLY HOLE
B	2" DIA [51] POWER SUPPLY KNOCKOUT
C	1 3/4" DIA [44] GAUGE ACCESS PLUG
D	7/8" DIA [22] FIELD CONTROL WIRING HOLE
E	3/4"-14 NPT CONDENSATE DRAIN
G	2 1/2" DIA [64] POWER SUPPLY KNOCK-OUT

THRU-THE-BASE CHART THESE HOLES REQUIRED FOR USE CRBTMPWR001A01			
	THREADED CONDUIT SIZE	WIRE USE	REQ'D HOLE SIZES (MAX.)
W	1/2"	ACC.	7/8" (22.2)
X	1/2"	24V	7/8" (22.2)
Y *	3/4" (001)	POWER	1 1/8" (28.4)
	FOR "THRU-THE-BASEPAN" FACTORY OPTION, FITTINGS FOR ONLY X & Y ARE PROVIDED		
*	SELECT EITHER 3/4" OR 1/2" FOR POWER, DEPENDING ON WIRE SIZE		

UNIT	J	K
<b>036</b>	33 3/8 [847]	18 5/8 [472]
<b>048</b>	33 3/8 [847]	14 7/8 [377]
<b>060</b>	33 3/8 [847]	14 7/8 [377]
<b>072</b>	41 3/8 [1051]	14 7/8 [377]

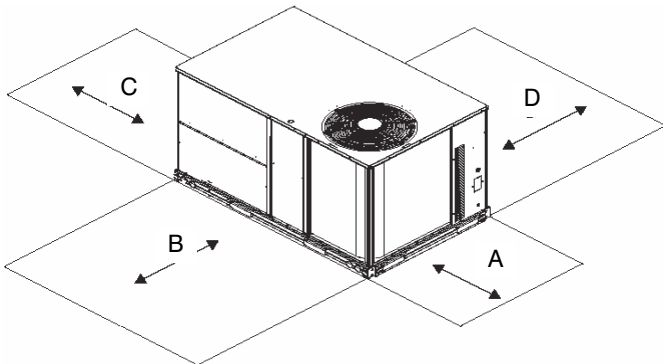
## WEIGHT & CLEARANCE DIMENSIONS – RAS036–072 (cont.)

UNIT	BASE UNIT WEIGHT		Corner Weight A		Corner Weight B		Corner Weight C		Corner Weight D		Center of Gravity In [mm]		
	LBS	KG	LBS	KG	LBS	KG	LBS	KG	LBS	KG	X	Y	Z
RAS036	438	199	108	49	115	52	110	50	104	47	38 [965]	22 [559]	17–1/4 [438]
RAS048	494	224	122	55	130	59	125	57	117	53	38 [965]	22 [559]	17–1/2 [445]
RAS060	524	238	130	59	138	63	132	60	124	56	38 [965]	22 [559]	17–3/4 [451]
RAS072	607	275	150	68	160	73	153	69	144	65	38 [965]	22 [559]	20–3/4 [527]



### UNIT CLEARANCES

LOC	DIMENSION	CONDITION
A	48" (1219 mm) 18" (457 mm) 18" (457 mm) 12" (305 mm)	Unit disconnect is mounted on panel No disconnect, convenience outlet option Recommended service clearance Minimum clearance
B	42" (1067 mm) 36" (914 mm) Special	Surface behind servicer is grounded (e.g., metal, masonry wall) 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) 18" (457 mm)	Side condensate drain is used Minimum clearance
D	48" (1219 mm) 42" (1067 mm) 36" (914 mm) Special	No flue discharge accessory installed, surface is combustible material Surface behind servicer is grounded (e.g., metal, masonry wall, another unit) 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



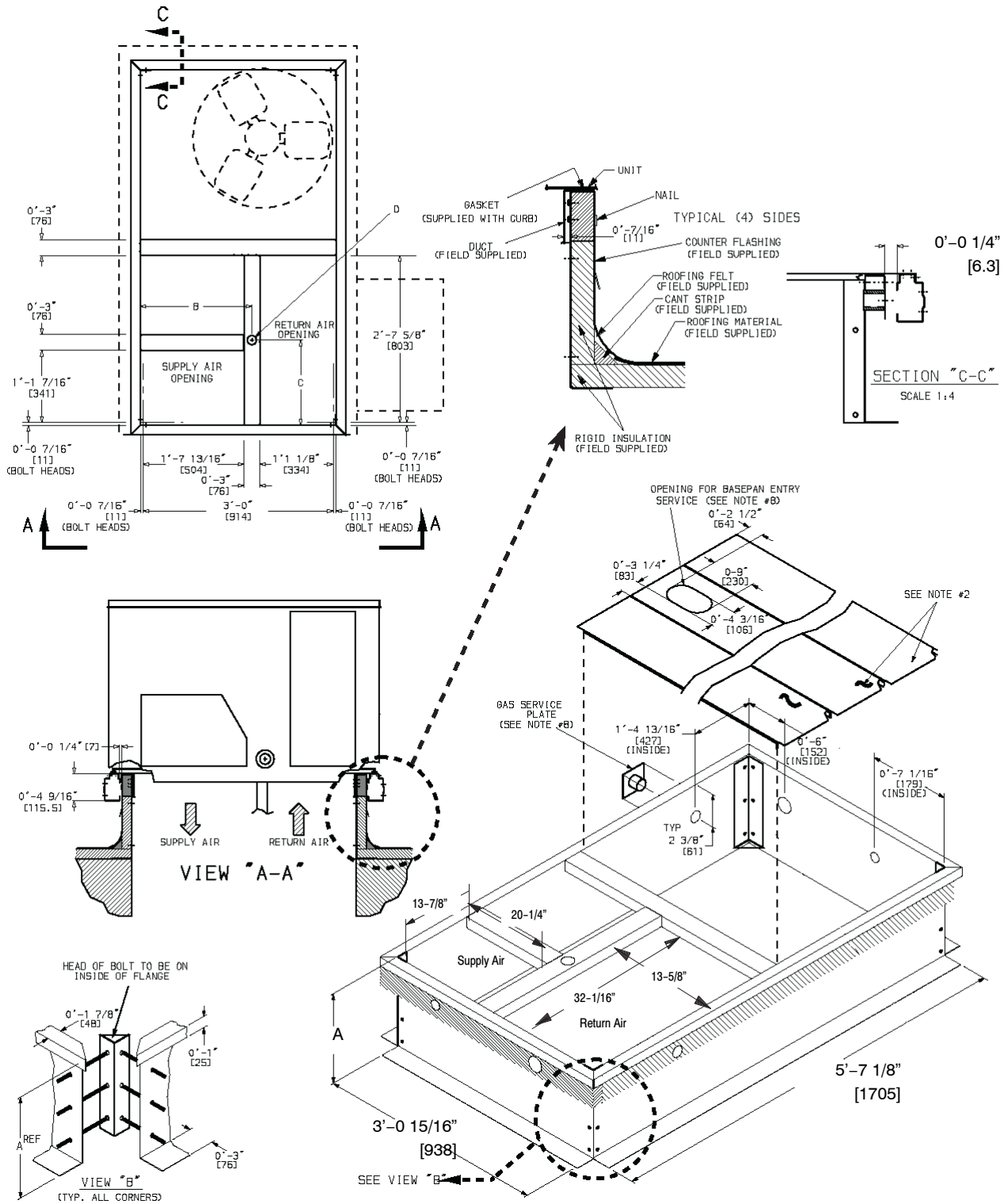
# ROOF CURB DETAILS – RAS036–072

Roof Curb Accessory	A	Unit Size
CRRFCURB001A01	1' 2" [356]	RAS036–072
CRRFCURB002A01	2' 0" [610]	

**NOTES:**

1. Roofcurb accessory is shipped disassembled.
2. Insulated panels, 1" thick polyurethane foam, 1–3/4# density.
3. Dimensions in. [ ] in millimeters.
4. Roofcurb 16ga steel.
5. Attach ductwork to curb (Flanges of duct rest on curb)
6. Service clearance 4' on each side.
7. ➡ Direction of airflow.
8. Connector pkg. CRBTMPWR001A01 is for thru-the-curb connections. Pkg. CRBTMPWR003A01 is for thru-the-bottom connections.

Connector Pkg. Acc.	B	C	D Alt. Drain Hole	Gas	Power	Control	Accessory Power
CRBTMPWR001A01	1' 9–11/16" [551]	1' 4" [406]	11–3/4" [44.5]	3/4" [19] NPT	3/4" [19] NPT	1/2" [12.7] NPT	1/2" [12.7] NPT
CRBTMPWR003A01				1/2" [12.7] NPT			



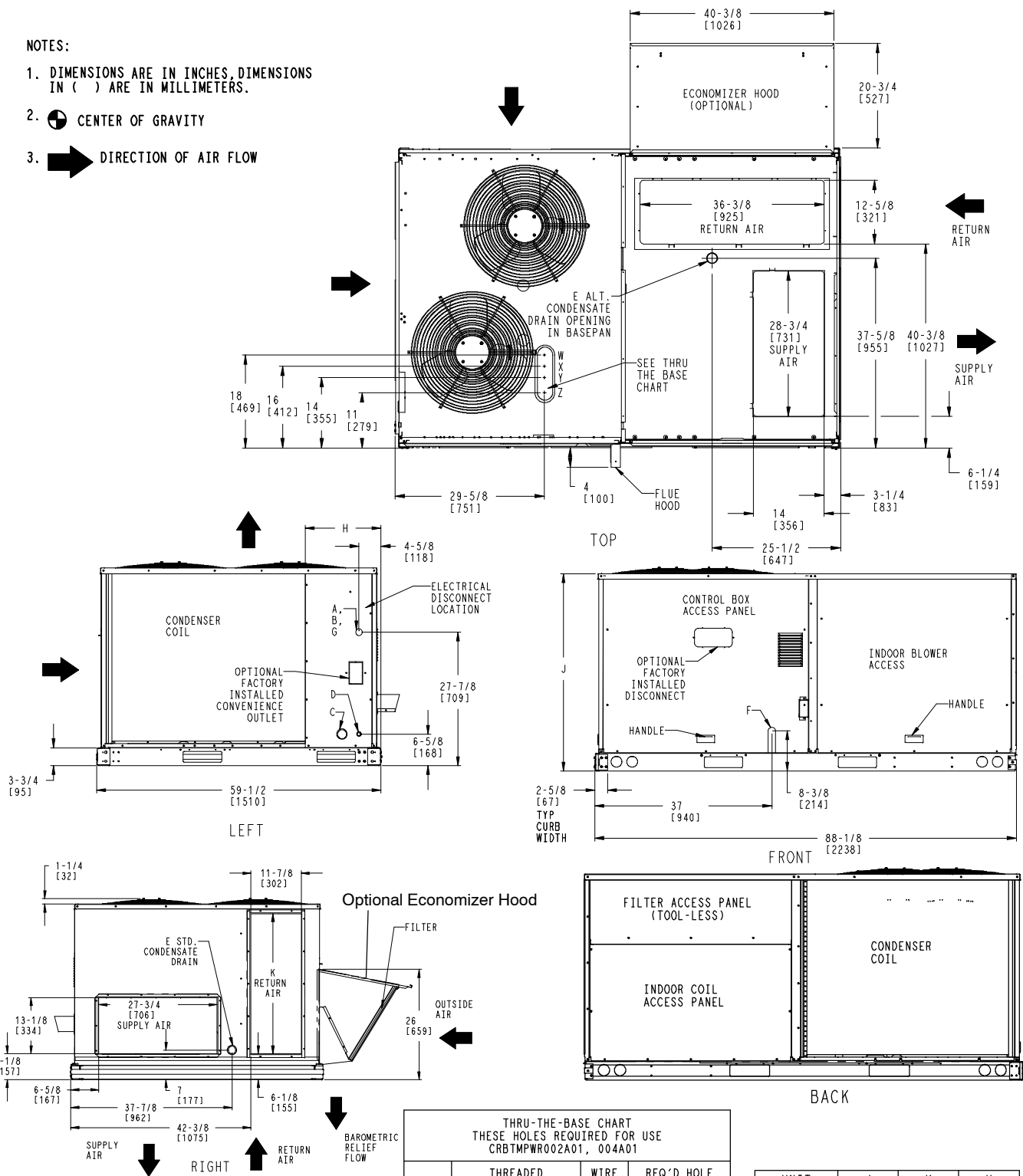
# BASE UNIT DIMENSIONS - RAS090-121

**NOTES:**

1. DIMENSIONS ARE IN INCHES, DIMENSIONS IN ( ) ARE IN MILLIMETERS.

2.  CENTER OF GRAVITY

3.  DIRECTION OF AIR FLOW



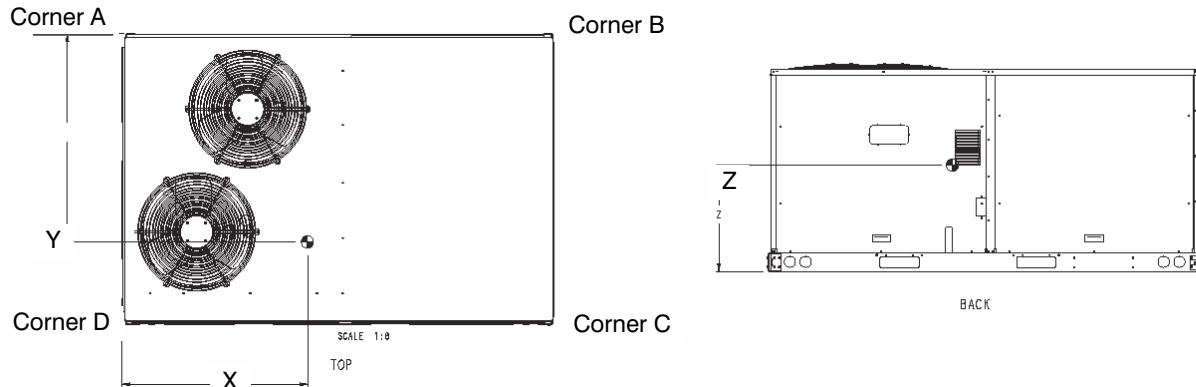
CONNECTION SIZES			
A	1 3/8" DIA [35]	FIELD POWER SUPPLY HOLE	
B	2 1/2" [64] DIA	POWER SUPPLY KNOCKOUT	
C	1 3/4" DIA [51]	GAUGE ACCESS PLUG	
D	7/8" DIA [22]	FIELD CONTROL WIRING HOLE	
E	3/4"-14 NPT	CONDENSATE DRAIN	
F	1/2"-14 NPT	GAS CONNECTION	
G	3/4"-14 NPT	GAS CONNECTION	
	2" DIA [51]	POWER SUPPLY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

THRU-THE-BASE CHART THESE HOLES REQUIRED FOR USE CRBTMPWR002A01, 004A01			
	THREADED CONDUIT SIZE	WIRE USE	REQ'D HOLE SIZES (MAX.)
W	1/2"	ACC.	7/8" (22.2)
X	1/2"	24V	7/8" (22.2)
Y	1 1/4" (002,004)	POWER	1 3/4" (44.4)
Z **, *	(004) 3/4" FPT	GAS	1 5/8" (41.3)
FOR "THRU-THE-BASEPAN" FACTORY OPTION, FITTINGS FOR ONLY X, Y, & Z ARE PROVIDED			
* FOR HEAT SIZES "D" & "S" - A FIELD SUPPLIED 1/2" ADAPTER IS REQUIRED BETWEEN BASE PAN FITTING AND GAS VALVE.			
**	(002) PROVIDES 3/4" FPT THRU CURB FLANGE & FITTING.		

UNIT	J	K	H
<b>091</b>	41-1/4 [1048]	33-3/4 [857]	15-7/8 [403]
<b>101</b>	49-3/8 [1253]	36-3/8 [925]	27-7/8 [708]
<b>121</b>	49-3/8 [1253]	36-3/8 [925]	15-7/8 [403]
<b>090</b>	41-1/4 [1048]	33-3/4 [857]	15-7/8 [403]
<b>102</b>	49-3/8 [1253]	36-3/8 [925]	15-7/8 [403]
<b>120</b>	49-3/8 [1253]	36-3/8 [925]	15-7/8 [403]

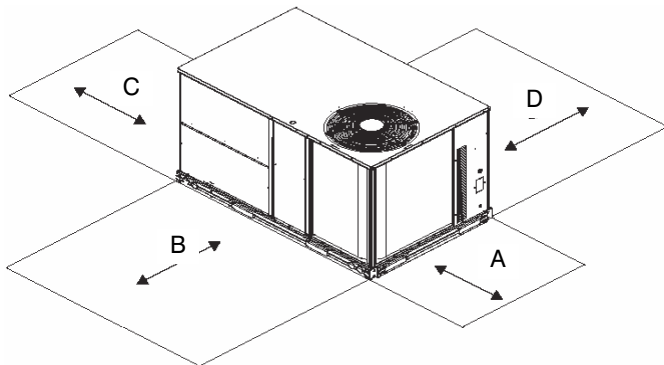
## WEIGHT & CLEARANCE DIMENSIONS – RAS090–121 (cont.)

UNIT	BASE UNIT WEIGHT		Corner Weight A		Corner Weight B		Corner Weight C		Corner Weight D		Center of Gravity In [mm]		
	LBS	KG	LBS	KG	LBS	KG	LBS	KG	LBS	KG	X	Y	Z
RAS091	705	320	172	78	142	65	177	80	214	97	40 [1013]	33 [838]	21 [540]
RAS101	845	384	206	94	167	76	212	96	261	119	40 [1003]	33 [845]	24 [610]
RAS121	855	388	210	95	180	82	215	98	250	114	41 [1035]	32 [822]	25 [641]
RAS090	760	345	158	72	155	70	222	101	225	102	44 [1111]	35 [889]	20 [508]
RAS102	855	388	223	101	171	77	200	91	261	119	38 [975]	32 [816]	19 [486]
RAS120	865	393	225	102	173	79	203	92	264	120	38 [975]	32 [816]	19 [486]



### UNIT CLEARANCES

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)	If dimension-A is 36"
	Special	Check for sources of flue products within 10-ft of unit fresh air intake hood
C	36" (914 mm)	Side condensate drain is used
D	18" (457 mm)	Minimum clearance
	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)



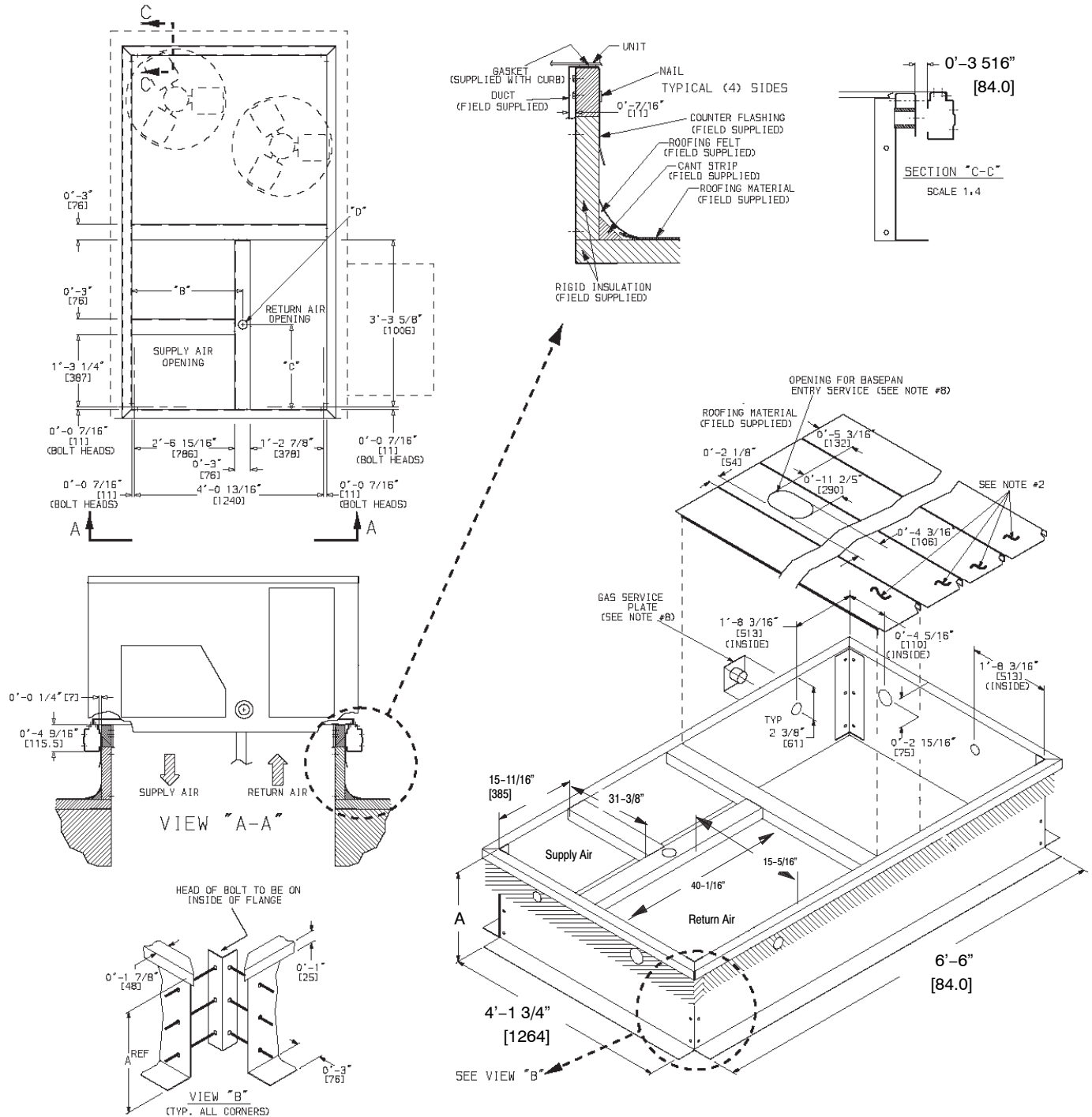
# ROOF CURB DETAILS – RAS090 – 150

Roof Curb Accessory	A	Unit Size
CRRFCURB003A01	1' 2" [356]	RAS090-150
CRRFCURB004A01	2' 0" [610]	

**NOTES:**

1. Roofcurb accessory is shipped disassembled.
2. Insulated panels, 1" thick polyurethane foam, 1-3/4# density.
3. Dimensions in. [ ] in millimeters.
4. Roofcurb 16ga steel.
5. Attach ductwork to curb (Flanges of duct rest on curb)
6. Service clearance 4' on each side.
7. ➔ Direction of airflow.
8. Connector pkg. CRBTMPWR002A01 is for thru-the-curb connections. Pkg. CRBTMPWR004A01 is for thru-the-bottom connections.



Connector Pkg. Acc.	B	C	D Alt. Drain Hole	Gas	Power	Control	Accessory Power
CRBTMPWR002A01	2' 8V-7/16" [827]	1' 10I-15/16" [583]	11-3/4" [44.5]	3/4" [19] NPT	11-1/4" [31.7] NPT	1/2" [12.7] NPT	1/2" [12.7] NPT
CRBTMPWR004A01							

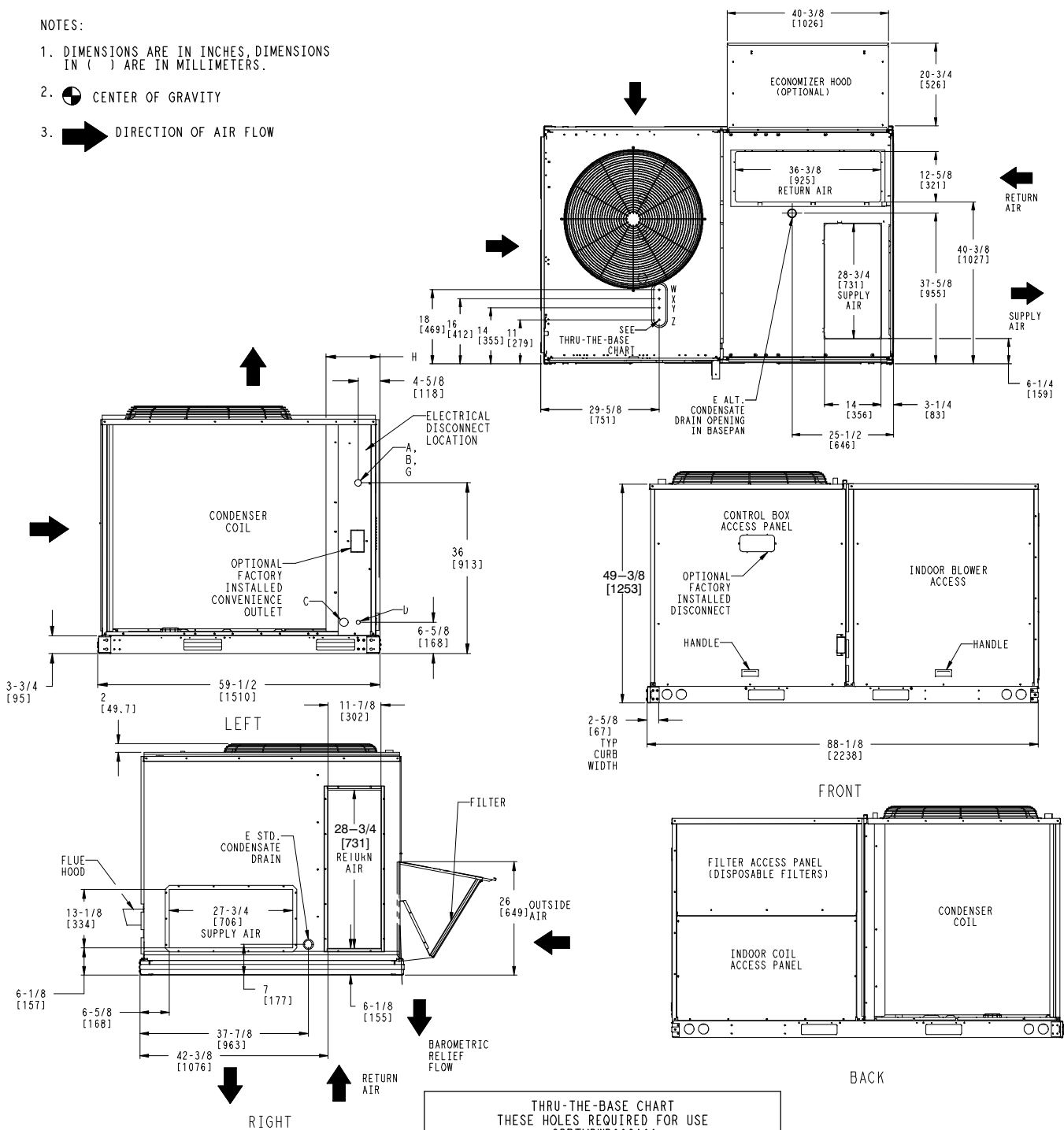




# BASE UNIT DIMENSIONS – RAS150

**NOTES:**

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



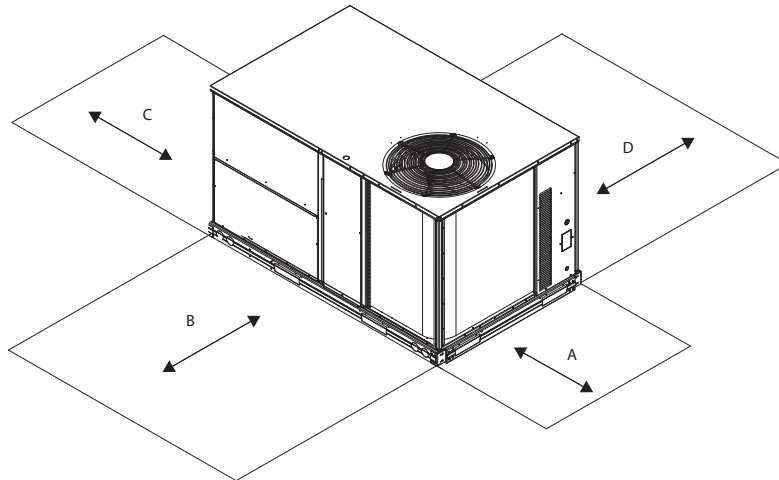
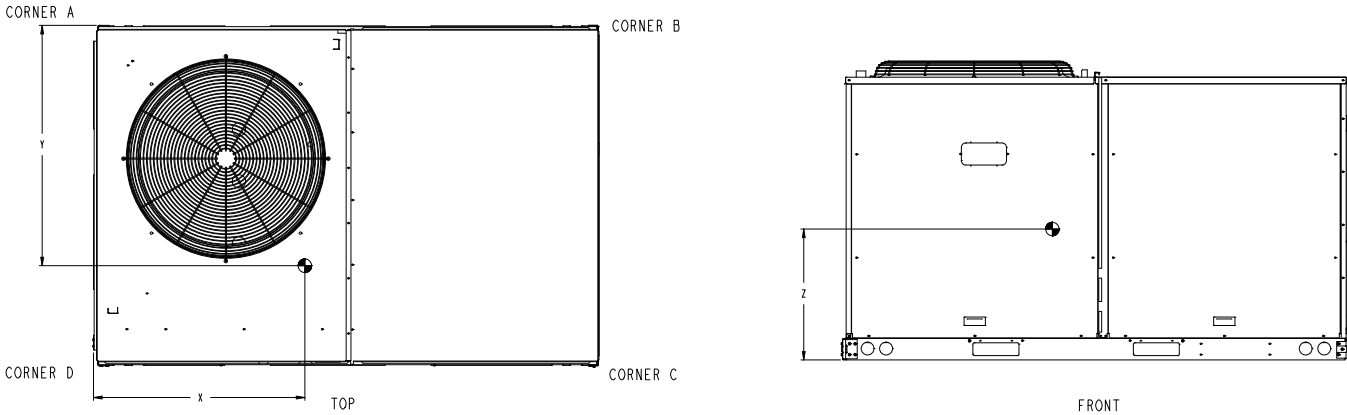
CONNECTION SIZES	
A	1 3/8" [35] DIA FIELD POWER SUPPLY HOLE
B	2 1/2" [64] DIA POWER SUPPLY KNOCKOUT
C	1 3/4" [51] DIA GAUGE ACCESS PLUG
D	7/8" [22] DIA FIELD CONTROL WIRING HOLE
E	3/4"-14 NPT CONDENSATE DRAIN
G	2" [51] DIA POWER SUPPLY KNOCK-OUT

THRU-THE-BASE CHART THESE HOLES REQUIRED FOR USE CRBTMPWR02A01			
	THREADED CONDUIT SIZE	WIRE USE	REQ'D HOLE SIZES (MAX.)
W	1/2"	ACC.	7/8" (22.2)
X	1/2"	24V	7/8" (22.2)
Y	1 1/4" (002,004)	POWER	1 3/4" (44.4)
FOR "THRU-THE-BASEPAN" FACTORY OPTION, FITTINGS FOR ONLY X, Y ARE PROVIDED			

UNIT	H
150	15-7/8 [403]

# BASE UNIT DIMENSIONS – RAS150

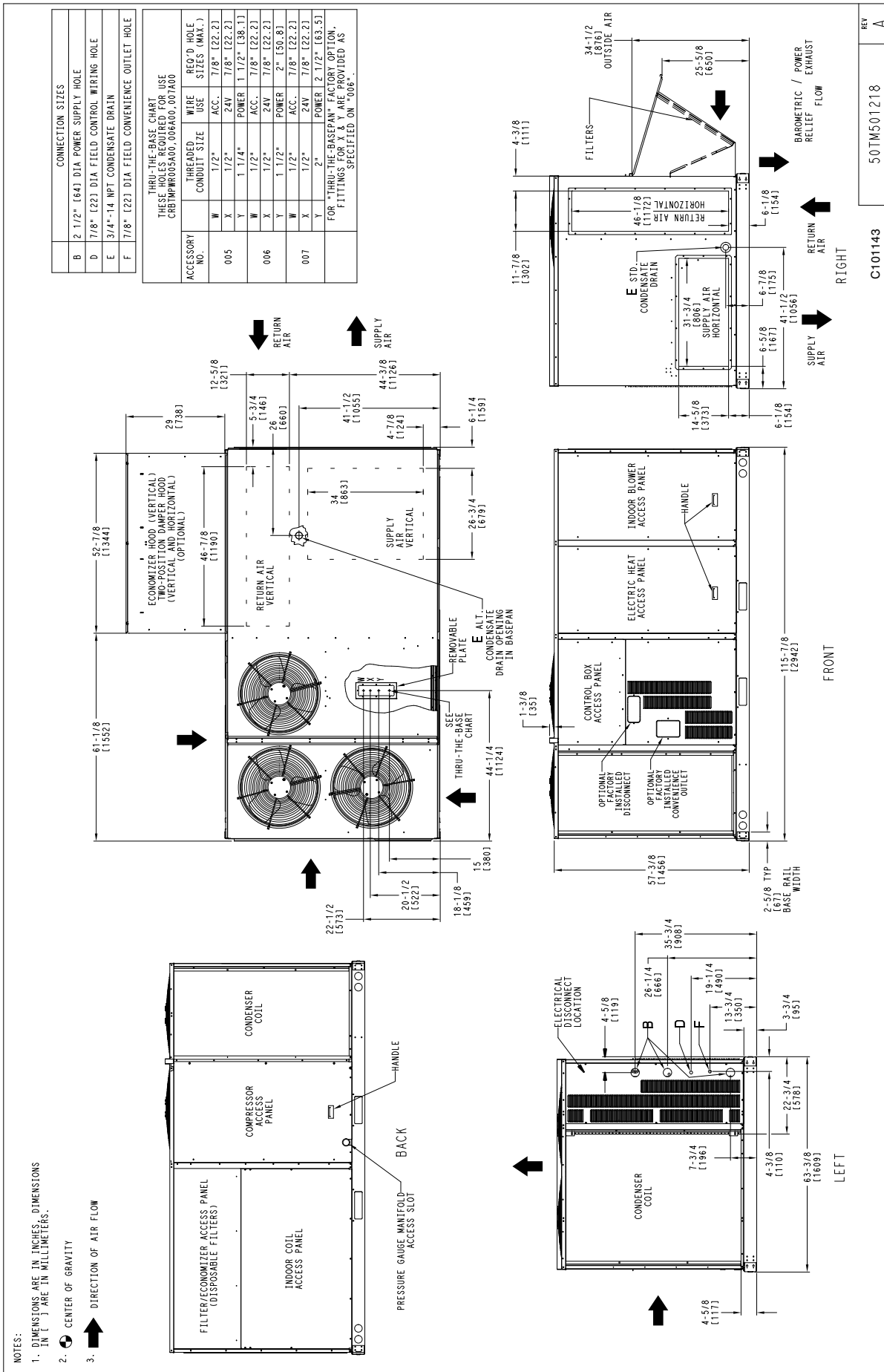
UNIT	STD. UNIT WEIGHT		CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)		C.G.		
	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	X	Y	Z
RAS150	1075	489	340	155	155	70	181	82	399	181	27–1/2 [721]	32 [813]	20–1/2 [523]



Service Clearance

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) Special	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	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)

# BASE UNIT DIMENSIONS - RAS180

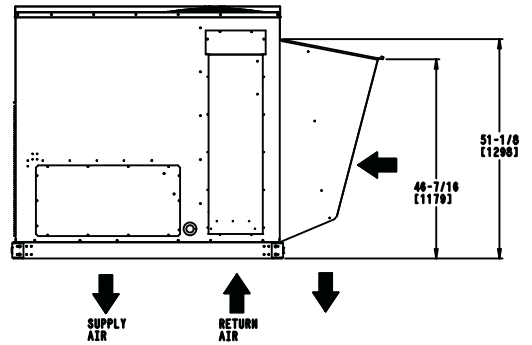
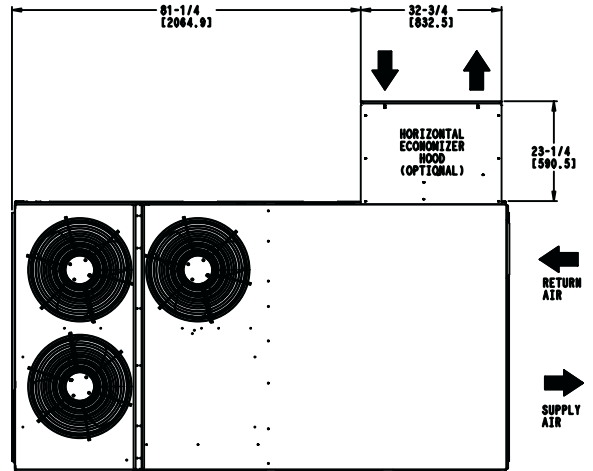
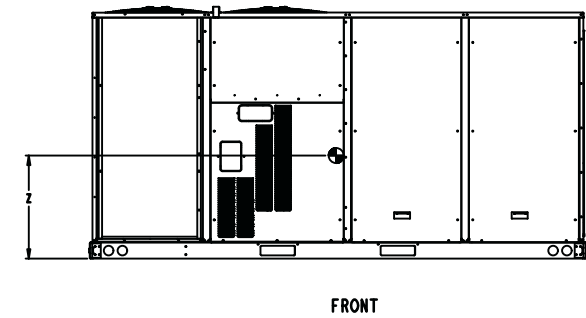
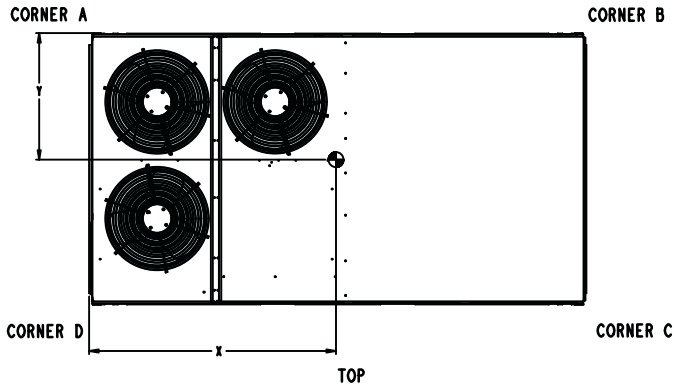


REV A  
 50TM501218  
 C-101143

# BASE UNIT DIMENSIONS – RAS180

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
RAS180	1305	593	268	122	325	148	389	177	322	146	58 1/2 [1486]	32 [813]	21 [533]

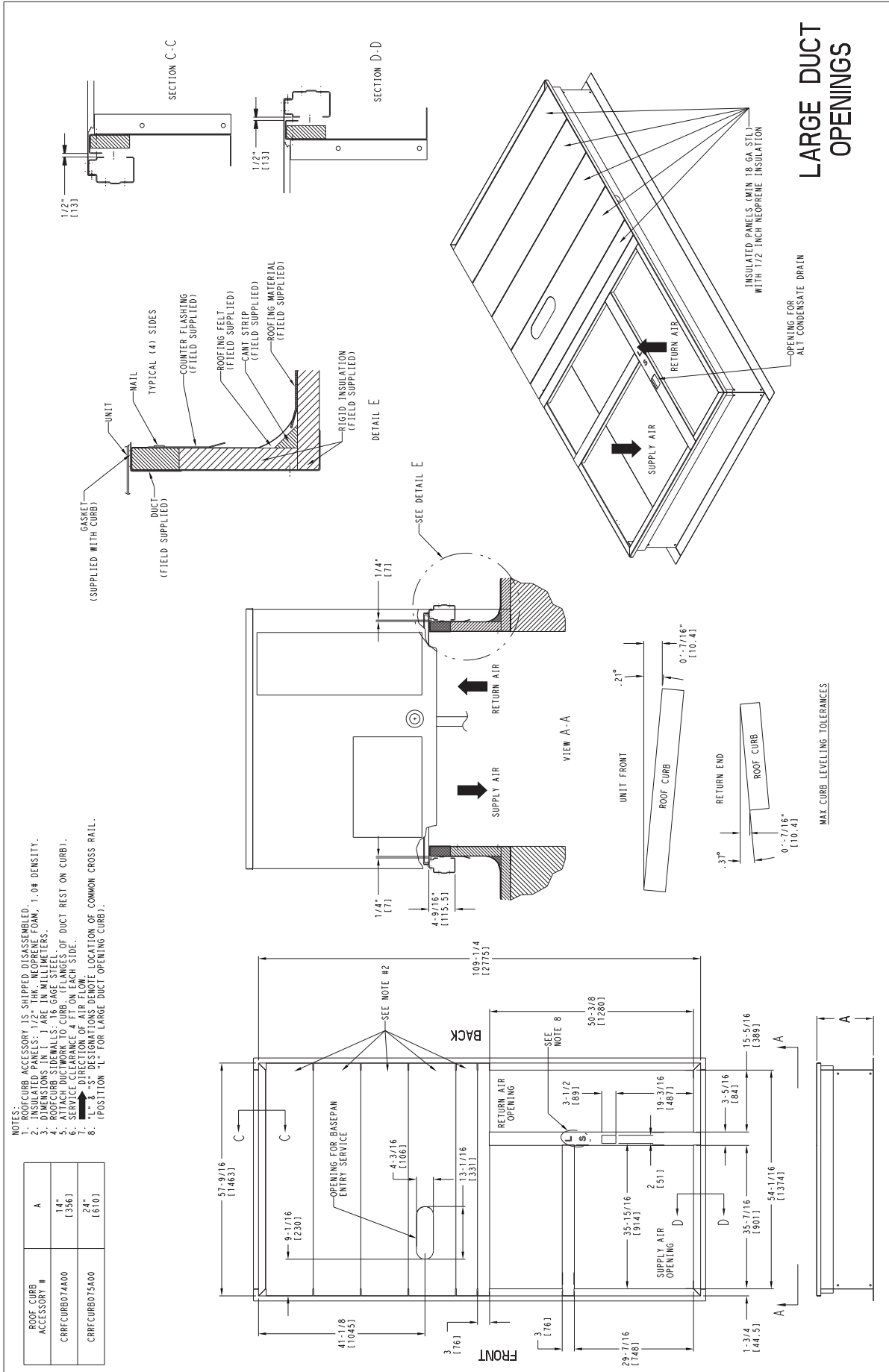
STANDARD UNIT WEIGHT IS WITHOUT ELECTRIC HEAT & WITHOUT PACKAGING.



**HORIZONTAL ECONOMIZER**

C101116

# ROOF CURB DETAILS - RAS180



## OPTION / ACCESSORY WEIGHTS

OPTION / ACCESSORY	OPTION / ACCESSORY WEIGHTS																	
	04		05		06		07		08		09		12		14		16	
	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
Power Exhaust – vertical	50	23	50	23	50	23	50	23	75	34	75	34	75	34	75	34	85	39
Power Exhaust – horizontal	30	14	30	14	30	14	30	14	30	14	30	14	30	14	30	14	75	34
Economizer	50	23	50	23	50	23	50	23	75	34	75	34	75	34	75	34	115	52
Two Position damper	39	18	39	18	39	18	39	18	58	26	58	26	58	26	58	26	65	29
Manual Dampers	12	5	12	5	12	5	12	5	18	8	18	8	18	8	18	8	25	11
Hail Guard (louvered)	16	7	16	7	16	7	16	7	34	15	34	15	34	15	34	15	45	20
Cu/Cu Condenser Coil <sup>1</sup>	6	3	13	6	13	6	15	7	12	5	23	10	23	10	23	10	190	86
Cu/Cu Cond. & Evaporator Coils <sup>1</sup>	12	5	19	9	21	10	26	12	25	11	49	22	49	22	49	22	280	127
Roof Curb (14–in. curb)	115	52	115	52	115	52	115	52	143	65	143	65	143	65	143	65	180	82
Roof Curb (24–in. curb)	197	89	197	89	197	89	197	89	245	111	245	111	245	111	245	111	255	116
CO <sub>2</sub> sensor	5	2	5	2	5	2	5	2	5	2	5	2	5	2	5	2	5	2
Electric Heater	30	14	30	14	30	14	30	14	45	20	45	20	45	20	45	20	25	11
Single Point Kit	10	5	10	5	10	5	10	5	12	5	12	5	12	5	15	7	25	11
Optional Indoor Motor / Drive	10	5	10	5	10	5	10	5	15	7	15	7	15	7	15	7	45	20
Motor Master Controller	35	16	35	16	35	16	35	16	35	16	35	16	35	16	40	18	35	16
Supply Smoke Detector	5	2	5	2	5	2	5	2	5	2	5	2	5	2	5	2	5	2
Non–Fused Disconnect	15	7	15	7	15	7	15	7	15	7	15	7	15	7	15	7	15	7
Non–Powered Convenience outlet	5	2	5	2	5	2	5	2	5	2	5	2	5	2	5	2	5	2
Enthalpy Sensor	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1
Differential Enthalpy Sensor	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1

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

<sup>1</sup> Where Available

# APPLICATION DATA

## Min operating ambient temp (cooling):

In mechanical cooling mode, your rooftop can safely operate down to an outdoor ambient temperature of 25°F (-4°C), with an accessory winter start kit; 40°F (4°C) standard min operating temperature. It is possible to provide cooling at lower outdoor ambient temperatures by using less outside air, economizers, and/or accessory low ambient kits.

## Max operating ambient temp (cooling):

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

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

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

### Airflow:

All units are draw-through in cooling mode.

## Outdoor air application strategies:

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

## Motor limits, break horsepower (BHP):

Due to the internal unit design, air path, and specially designed motors, the full horsepower (maximum continuous BHP) band, as listed in Table 6, can be used with the utmost confidence. There is no need for extra safety factors, the motors are designed and rigorously tested to use the entire, listed BHP range without either nuisance tripping or premature motor failure.

## Sizing a rooftop

Bigger isn't necessarily better. While an air conditioner needs to have enough capacity to meet the 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 short cycling ( quick on-off cycles ) which results in 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 representative for assistance.

## Low ambient applications

The optional 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 rooftop can operate to ambient temperatures down to -20°F (-29°C) using the recommended accessory Motormaster low ambient controller.

## Winter start

A winter start kit extends the low ambient limit of your rooftop to 25°F (-4°C). The kit bypasses the low pressure switch, preventing nuisance tripping of the low pressure switch. Other low ambient precautions may still be prudent.

# SELECTION PROCEDURE (WITH RAS072 EXAMPLE)<sup>1</sup>

## 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)
TC <sub>Load</sub>	69.0 MBH
SHC <sub>Load</sub>	51.0 MBH
Vertical supply air	2100 CFM
Heating load	85.0 MBH
External static pressure	0.66 in.wg
Electrical characteristics	230–3–60

## II. Make an initial guess at cooling tons.

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

$$\text{Refrig. tons} = 69.0 / 12 = 5.75 \text{ tons}$$

In this case, start by looking at the RAS072.

## III. Look up the rooftop's TC and SHC.

Table 11 shows that, at the application's supply air CFM, mixed air and ambient temperatures, the RAS072 supplies:

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

$$\text{SHC} = 54.4 \text{ MBH.}$$

## IV. Calculate the building latent heat load.

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

$$\text{LHC}_{\text{Load}} = 69.0 \text{ MBH} - 51.0 \text{ MBH} = 18.0 \text{ MBH}$$

## V. Calculate RTU latent heat capacity.

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

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

## VI. Compare RTU capacities to loads.<sup>2,3</sup>

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

## VII. Select factory options (FIOP)

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

## VIII. Calculate the total static pressure.

External static pressure	0.66 in. wg
--------------------------	-------------

Sum of FIOP / Accessory static	+0.14 in. wg
--------------------------------	--------------

Total Static Pressure	0.80 in. wg
-----------------------	-------------

## IX. Look up the indoor fan RPM & BHP.

Table 34 shows, at 2100 CFM & ESP= 0.8, RPM = 1268 & BHP = 1.52

## X. Determine electrical requirements.

Table 58 shows the MCA and MOCP of a RAS072 (without convenience outlet) as:

$$\text{MCA} = 30.5 \text{ amps} \ \& \ \text{MOCP} = 45.0 \text{ amps}$$

$$\text{Min. disconnect size: FLA} = 30 \ \& \ \text{LRA} = 157.$$

## LEGEND

BHP	— Break horsepower
FLA	— Full load amps
LC	— Latent capacity
LRA	— Lock rotor amp
MBH	— (1,000) BTUH
MCA	— Min. circuit ampacity
MOCP	— Max. over-current protection
RPM	— Revolutions per minute
RTU	— Rooftop unit
SHC	— Sensible heat capacity
TC	— Total capacity

## NOTES:

1. Selection software saves time by performing many of the steps above. Contact your sales representative for assistance.
2. Selecting a unit with a SHC slightly lower than the SHC<sub>Load</sub> is often better than oversizing. Slightly lower SHC's will help control indoor humidity, and prevent temperature swings.
3. If the rooftop's capacity meets the Sensible Heat Load, but not the Latent Heat Load.
4. Indoor fan motor efficiency is available in Tables 46–57. Use the decimal form in the equation, eg. 80% = .8.



**Table 8 – COOLING CAPACITIES**

**1 STAGE COOLING**

**3 TONS**

RAS036			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 TC	28.1	28.1	31.7	26.3	26.3	29.8	24.5	24.5	27.7	22.6	22.6	25.5
		58 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 TC	30.3	30.3	31.0	27.8	27.8	29.8	25.1	25.1	28.4	22.6	22.6	26.5
		62 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 TC	35.5	35.5	35.5	33.1	33.1	33.1	30.5	30.5	30.5	27.5	27.5	27.5
	72 TC	39.0	39.0	39.0	37.1	37.1	37.1	35.1	35.1	35.1	32.7	32.7	32.7	
	72 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 TC	-	41.4	41.4	-	39.6	39.6	-	37.6	37.6	-	35.4	35.4	
	76 SHC	-	16.0	21.0	-	15.4	20.2	-	14.6	19.3	-	13.8	18.3	
	1050 Cfm	EAT (wb)	58 TC	30.2	30.2	34.2	28.4	28.4	32.2	26.5	26.5	30.0	24.5	24.5
58 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 TC			31.9	31.9	34.2	29.4	29.4	32.8	26.7	26.7	31.2	24.5	24.5	28.8
62 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 TC			36.7	36.7	36.7	34.8	34.8	34.8	32.2	32.2	32.2	29.1	29.1	29.1
72 TC		40.1	40.1	40.1	38.2	38.2	38.2	36.1	36.1	36.1	33.7	33.7	33.7	
72 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 TC		-	42.4	42.4	-	40.6	40.6	-	38.5	38.5	-	36.2	36.2	
76 SHC		-	16.6	22.2	-	15.9	21.3	-	15.2	20.4	-	14.4	19.5	
1200 Cfm		EAT (wb)	58 TC	32.2	32.2	36.4	30.4	30.4	34.3	28.4	28.4	32.1	26.3	26.3
	58 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 TC		33.3	33.3	37.0	30.8	30.8	35.5	28.4	28.4	33.4	26.3	26.3	30.9
	62 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 TC		37.7	37.7	37.7	35.6	35.6	35.6	33.4	33.4	33.4	30.4	30.4	30.4
	72 TC	40.9	40.9	40.9	39.0	39.0	39.0	36.9	36.9	36.9	34.4	34.4	34.4	
	72 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 TC	-	43.1	43.1	-	41.3	41.3	-	39.1	39.1	-	36.8	36.8	
	76 SHC	-	17.1	23.1	-	16.4	22.3	-	15.7	21.4	-	14.9	20.5	
	1350 Cfm	EAT (wb)	58 TC	-	-	-	32.1	32.1	36.3	30.0	30.0	34.0	27.9	27.9
58 SHC			-	-	-	27.9	32.1	36.3	26.1	30.0	34.0	24.2	27.9	31.5
62 TC			28.4	28.4	30.5	32.2	32.2	37.8	30.1	30.1	35.3	27.9	27.9	32.8
62 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 TC			33.2	33.2	33.2	36.4	36.4	36.4	34.1	34.1	34.1	31.5	31.5	32.0
72 TC		37.5	37.5	37.5	39.7	39.7	39.7	37.5	37.5	37.5	35.0	35.0	35.0	
72 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 TC		-	40.1	40.1	-	41.8	41.8	-	39.6	39.6	-	37.3	37.3	
76 SHC		-	15.3	22.7	-	16.8	23.2	-	16.1	22.3	-	15.3	21.5	
1500 Cfm		EAT (wb)	58 TC	28.1	28.1	34.2	33.7	33.7	38.1	31.6	31.6	35.7	29.3	29.3
	58 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 TC		30.3	30.3	33.8	33.7	33.7	39.6	31.6	31.6	37.1	29.4	29.4	34.5
	62 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 TC		35.5	35.5	35.5	36.9	36.9	36.9	34.6	34.6	34.9	32.0	32.0	34.0
	72 TC	39.0	39.0	39.0	40.2	40.2	40.2	38.0	38.0	38.0	35.5	35.5	35.5	
	72 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 TC	-	41.4	41.4	-	42.2	42.2	-	40.0	40.0	-	-	-	
	76 SHC	-	16.0	24.3	-	17.2	24.0	-	16.5	23.2	-	-	-	

**LEGEND:**

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

**Table 9 – COOLING CAPACITIES**

**1 STAGE COOLING**

**4 TONS**

RAS048			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
1200 Cfm	EAT (wb)	58 TC	-	-	-	-	-	-	36.1	36.1	40.7	34.3	34.3	38.6
		58 SHC	-	-	-	-	-	-	31.5	36.1	40.7	29.9	34.3	38.6
		62 TC	43.1	43.1	43.1	40.8	40.8	40.8	38.4	38.4	39.4	35.9	35.9	38.2
		62 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 TC	47.4	47.4	47.4	45.2	45.2	45.2	42.9	42.9	42.9	40.3	40.3	40.3
	67 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 TC	51.1	51.1	51.1	49.1	49.1	49.1	46.8	46.8	46.8	43.9	43.9	43.9	
	72 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 TC	-	53.3	53.3	-	51.5	51.5	-	49.2	49.2	-	45.9	45.9	
	76 SHC	-	20.8	27.4	-	20.2	26.8	-	19.3	25.7	-	18.3	24.6	
1400 cfm	EAT (wb)	58 TC	41.9	41.9	47.3	40.1	40.1	45.3	38.2	38.2	43.2	36.3	36.3	41.0
		58 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 TC	44.6	44.6	45.4	42.3	42.3	44.2	39.8	39.8	42.9	37.3	37.3	41.6
		62 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 TC	48.7	48.7	48.7	46.6	46.6	46.6	44.2	44.2	44.2	41.4	41.4	41.4
	67 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 TC	52.2	52.2	52.2	50.3	50.3	50.3	47.8	47.8	47.8	44.8	44.8	44.8	
	72 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 TC	-	54.1	54.1	-	52.3	52.3	-	49.9	49.9	-	46.4	46.4	
	76 SHC	-	21.5	29.0	-	20.8	28.0	-	19.9	26.9	-	18.8	25.7	
1600 Cfm	EAT (wb)	58 TC	44.0	44.0	49.6	42.1	42.1	47.4	40.1	40.1	45.2	38.1	38.1	43.0
		58 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 TC	45.7	45.7	48.6	43.5	43.5	47.5	41.0	41.0	46.0	38.5	38.5	44.4
		62 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 TC	49.8	49.8	49.8	47.6	47.6	47.6	45.1	45.1	45.1	42.3	42.3	42.3
	67 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 TC	53.0	53.0	53.0	51.1	51.1	51.1	48.6	48.6	48.6	45.4	45.4	45.4	
	72 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 TC	-	54.6	54.6	-	52.8	52.8	-	50.4	50.4	-	46.8	46.8	
	76 SHC	-	22.0	29.9	-	21.3	29.0	-	20.3	27.9	-	19.2	26.6	
1800 Cfm	EAT (wb)	58 TC	44.0	44.0	50.3	42.1	42.1	48.1	40.1	40.1	45.9	38.0	38.0	43.5
		58 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 TC	45.7	45.7	49.5	43.5	43.5	48.3	41.0	41.0	46.8	38.4	38.4	45.2
		62 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 TC	49.8	49.8	49.8	47.6	47.6	47.6	45.1	45.1	45.1	42.3	42.3	42.3
	67 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 TC	53.0	53.0	53.0	51.1	51.1	51.1	48.6	48.6	48.6	45.4	45.4	45.4	
	72 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 TC	-	54.6	54.6	-	52.8	52.8	-	50.4	50.4	-	46.8	46.8	
	76 SHC	-	22.0	30.9	-	21.3	30.0	-	20.3	28.9	-	19.2	27.5	
2000 Cfm	EAT (wb)	58 TC	46.9	46.9	52.9	45.0	45.0	50.8	42.9	42.9	48.4	40.7	40.7	45.9
		58 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 TC	47.5	47.5	54.0	45.3	45.3	52.5	43.0	43.0	50.3	40.7	40.7	47.7
		62 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 TC	51.2	51.2	51.2	49.1	49.1	49.1	46.5	46.5	46.5	43.5	43.5	43.5
	67 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 TC	54.0	54.0	54.0	52.1	52.1	52.1	49.7	49.7	49.7	46.2	46.2	46.2	
	72 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 TC	-	55.2	55.2	-	53.5	53.5	-	51.0	51.0	-	47.3	47.3	
	76 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)
- SHC - Sensible heat capacity
- TC - Total cooling capacity





















**Table 19 – COOLING CAPACITIES**

**2 STAGE COOLING**

**15 TONS**

RAS180				Ambient Temperature												
				85			95			105			115			
				EA (dB)			EA (dB)			EA (dB)			EA (dB)			
				75	80	85	75	80	85	75	80	85	75	80	85	
4500 Cfm	EAT (wb)	58	TC	156.6	156.6	175.2	149.4	149.4	169.1	141.6	141.6	160.2	133.3	133.3	150.9	
			SHC	134.7	154.9	175.2	129.8	149.4	169.1	123.0	141.6	160.2	115.7	133.3	150.9	
		62	TC	166.7	166.7	166.9	158.0	158.0	162.6	147.6	147.6	157.2	136.8	136.8	150.3	
			SHC	122.8	144.9	166.9	118.6	140.6	162.6	113.5	135.3	157.2	107.4	128.8	150.3	
		67	TC	184.1	184.1	184.1	175.6	175.6	175.6	165.6	165.6	165.6	154.5	154.5	154.5	
			SHC	101.6	123.7	145.7	98.1	120.2	142.3	94.0	116.1	138.2	89.4	111.5	133.6	
	72	TC	200.3	200.3	200.3	192.0	192.0	192.0	182.9	182.9	182.9	172.2	172.2	172.2		
		SHC	78.7	101.1	123.5	75.5	97.9	120.2	72.1	94.4	116.7	68.2	90.5	112.7		
	76	TC	-	211.4	211.4	-	203.1	203.1	-	193.8	193.8	-	183.9	183.9		
		SHC	-	82.2	107.0	-	79.3	103.8	-	76.0	100.2	-	72.6	96.5		
	5250 Cfm	EAT (wb)	58	TC	165.2	165.2	186.9	158.2	158.2	179.0	150.0	150.0	169.7	141.3	141.3	160.0
				SHC	143.5	165.2	186.9	137.4	158.2	179.0	130.2	150.0	169.7	122.7	141.3	160.0
62			TC	172.3	172.3	181.7	163.4	163.4	176.9	153.1	153.1	169.3	143.4	143.4	161.4	
			SHC	131.6	156.6	181.7	127.1	152.0	176.9	120.5	144.9	169.3	114.1	137.8	161.4	
67			TC	189.5	189.5	189.5	180.9	180.9	180.9	170.7	170.7	170.7	159.1	159.1	159.1	
			SHC	107.2	132.4	157.5	103.8	129.0	154.1	99.9	125.1	150.4	95.3	120.6	145.8	
72		TC	205.0	205.0	205.0	196.5	196.5	196.5	187.1	187.1	187.1	176.4	176.4	176.4		
		SHC	80.9	106.1	131.3	77.7	102.9	128.1	74.4	99.5	124.7	70.6	95.8	121.0		
76		TC	-	215.4	215.4	-	206.8	206.8	-	197.1	197.1	-	186.9	186.9		
		SHC	-	85.0	113.0	-	82.0	109.8	-	78.8	106.4	-	75.4	102.8		
6000 Cfm		EAT (wb)	58	TC	172.7	172.7	195.4	165.5	165.5	187.3	157.1	157.1	177.8	148.1	148.1	167.7
				SHC	150.0	172.7	195.4	143.8	165.5	187.3	136.4	157.1	177.8	128.6	148.1	167.7
	62		TC	176.6	176.6	195.7	168.1	168.1	187.6	158.9	158.9	180.2	148.9	148.9	172.1	
			SHC	139.6	167.7	195.7	133.2	160.4	187.6	127.1	153.7	180.2	120.7	146.4	172.1	
	67		TC	193.6	193.6	193.6	184.8	184.8	184.8	174.7	174.7	174.7	162.7	162.7	162.7	
			SHC	112.3	140.3	168.3	108.9	137.0	165.2	105.2	133.5	161.7	100.7	129.0	157.3	
	72	TC	208.4	208.4	208.4	199.6	199.6	199.6	190.2	190.2	190.2	179.5	179.5	179.5		
		SHC	82.7	110.5	138.3	79.6	107.3	135.1	76.2	104.0	131.8	72.6	100.6	128.5		
	76	TC	-	218.2	218.2	-	209.5	209.5	-	199.5	199.5	-	189.0	189.0		
		SHC	-	87.5	118.6	-	84.5	115.2	-	81.1	111.3	-	77.5	107.3		
	6750 Cfm	EAT (wb)	58	TC	178.8	178.8	202.4	171.6	171.6	194.2	163.1	163.1	184.6	153.8	153.8	174.1
				SHC	155.3	178.8	202.4	149.0	171.6	194.2	141.6	163.1	184.6	133.5	153.8	174.1
62			TC	181.0	181.0	203.6	173.0	173.0	197.5	163.8	163.8	190.1	153.9	153.9	181.1	
			SHC	144.1	173.9	203.6	139.1	168.3	197.5	133.3	161.7	190.1	126.7	153.9	181.1	
67			TC	196.8	196.8	196.8	187.9	187.9	187.9	177.7	177.7	177.7	165.5	165.5	167.9	
			SHC	117.0	147.7	178.4	113.7	144.5	175.4	110.1	141.1	172.2	105.6	136.8	167.9	
72		TC	211.0	211.0	211.0	202.2	202.2	202.2	192.5	192.5	192.5	181.8	181.8	181.8		
		SHC	84.3	114.5	144.7	81.2	111.5	141.7	77.9	108.1	138.4	74.4	104.9	135.4		
76		TC	-	220.2	220.2	-	211.5	211.5	-	201.3	201.3	-	190.6	190.6		
		SHC	-	89.5	122.8	-	86.4	119.4	-	83.0	115.4	-	79.4	111.5		
7500 Cfm		EAT (wb)	58	TC	183.9	183.9	208.2	176.6	176.6	199.8	168.2	168.2	190.3	158.6	158.6	179.5
				SHC	159.7	183.9	208.2	153.3	176.6	199.8	146.0	168.2	190.3	137.7	158.6	179.5
	62		TC	185.1	185.1	212.5	177.1	177.1	206.2	168.3	168.3	197.9	158.7	158.7	186.7	
			SHC	149.5	181.0	212.5	144.5	175.4	206.2	138.7	168.3	197.9	130.8	158.7	186.7	
	67		TC	199.3	199.3	199.3	190.3	190.3	190.3	180.0	180.0	180.0	167.8	167.8	177.8	
			SHC	121.3	154.6	187.9	118.1	151.6	185.1	114.4	148.1	181.7	110.1	144.0	177.8	
	72	TC	213.0	213.0	213.0	204.1	204.1	204.1	194.2	194.2	194.2	183.5	183.5	183.5		
		SHC	85.8	118.2	150.5	82.7	115.2	147.7	79.4	111.9	144.4	76.0	108.8	141.6		
	76	TC	-	221.9	221.9	-	213.0	213.0	-	202.7	202.7	-	191.8	191.8		
		SHC	-	91.2	126.5	-	88.2	123.1	-	84.7	119.2	-	81.2	115.3		

**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)
- SHC – Sensible heat capacity
- TC – Total capacity

**Table 20 – STATIC PRESSURE ADDERS (Factory Options and/or Accessories)**

**Electric Heaters**

3 – 6 TONS										
CFM (in. wg)	600	900	1200	1400	1600	1800	2000	2200	2400	2600
1 Electric Heater Module	0.03	0.05	0.07	0.09	0.09	0.10	0.11	0.11	0.12	0.13
2 Electric Heater Modules	0.13	0.15	0.16	0.16	0.16	0.17	0.17	0.17	0.18	0.18

7.5 – 12.5 TONS																
CFM (in. wg)	2250	2500	2750	3000	3250	3500	3750	4000	4250	4500	4750	5000	5250	5500	5750	6000
1 Electric Heater Module	0.03	0.04	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13	0.14	0.15	0.16	0.18
2 Electric Heater Modules	0.04	0.05	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13	0.15	0.16	0.17	0.19	0.20

15 TON													
CFM	2813	3125	3438	3750	4063	4375	4688	5000	5313	5625	5938	6250	
Vertical - 1 Electric Heater Module	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.04	
Vertical - 2 Electric Heater Modules	0.02	0.03	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.08	
Horizontal - 1 Electric Heater Module	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07	0.08	0.09	
Horizontal - 2 Electric Heater Modules	0.02	0.03	0.03	0.04	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.08	

**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 20. 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, recommend the lower horsepower option.
5. For information on the electrical properties of motors, please see the Electrical information section of this book.
6. For more information on the performance limits of motors, see the application data section of this book.
7. The EPACT (Energy Policy Act of 1992) regulates energy requirements for specific types of indoor fan motors. Motors regulated by EPACT include any general purpose, T-frame (three-digit, 143 and larger), single-speed, foot mounted, polyphase, squirrel cage induction motors of NEMA (National Electrical Manufacturers Association) design A and B, manufactured for use in the United States. Ranging from 1 to 200 Hp, these continuous-duty motors operate on 230 and 460 volt, 60 Hz power. If a motor does not fit into these specifications, the motor does not have to be replaced by an EPACT compliant energy-efficient motor. Variable-speed motors are exempt from EPACT compliance requirements. Therefore, the indoor fan motors for the RAS036-180 units are exempt from these requirements.

# FAN PERFORMANCE

Table 21 – RAS036, 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
	<b>Field Supplied Drive<sup>1</sup></b>		<b>Standard Static Option</b>				<b>Medium Static Option</b>			
900	<b>554</b>	<b>0.14</b>	681	0.22	783	0.32	870	0.42	947	0.53
975	575	0.16	701	0.25	801	0.35	888	0.45	965	0.57
1050	597	0.18	721	0.28	821	0.38	906	0.49	983	0.61
1125	620	0.21	741	0.31	840	0.42	925	0.54	1001	0.66
1200	643	0.23	762	0.35	<b>860</b>	<b>0.46</b>	944	0.58	1020	0.71
1275	666	0.27	784	0.38	880	0.50	964	0.63	1039	0.76
1350	690	0.30	805	0.42	900	0.55	983	0.68	1058	0.82
1425	714	0.34	827	0.47	921	0.60	1003	0.74	1077	0.88
1500	738	0.38	849	0.52	942	0.66	1024	0.80	1097	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
	<b>Medium Static Option</b>					<b>Field Supplied Drive<sup>2</sup></b>				
900	1017	0.64	1082	0.76	1143	0.88	<b>1200</b>	<b>1.01</b>	<b>1254</b>	<b>1.14</b>
975	1035	0.68	1100	0.81	1160	0.93	<b>1217</b>	<b>1.07</b>	<b>1271</b>	<b>1.20</b>
1050	1053	0.73	1117	0.86	<b>1177</b>	<b>0.99</b>	<b>1234</b>	<b>1.13</b>	–	–
1125	1071	0.78	1135	0.92	<b>1195</b>	<b>1.05</b>	<b>1251</b>	<b>1.19</b>	–	–
1200	1089	0.84	1153	0.98	<b>1212</b>	<b>1.12</b>	–	–	–	–
1275	1107	0.90	1171	1.04	<b>1230</b>	<b>1.19</b>	–	–	–	–
1350	1126	0.96	<b>1189</b>	<b>1.11</b>	–	–	–	–	–	–
1425	1145	1.03	<b>1208</b>	<b>1.18</b>	–	–	–	–	–	–
1500	1164	1.10	–	–	–	–	–	–	–	–

**NOTE:** For more information, see General Fan Performance Notes.

**Boldface** indicates field-supplied drive is required.

1. Recommend using field-supplied fan pulley (part no. 1178488) and belt (part no. 1177401).
2. Recommend using field-supplied motor pulley (part no. 1175832), and belt (part no. 1178128).

Table 22 – RAS036, 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
	<b>Field Supplied Drive<sup>1</sup></b>		<b>Standard Static Option</b>				<b>Medium Static Option</b>			
900	<b>566</b>	<b>0.14</b>	690	0.23	791	0.32	879	0.42	957	0.52
975	590	0.17	711	0.26	811	0.36	897	0.46	975	0.57
1050	615	0.19	733	0.29	831	0.39	916	0.50	993	0.62
1125	640	0.22	755	0.33	851	0.43	936	0.55	1012	0.67
1200	666	0.25	778	0.36	873	0.48	956	0.60	1031	0.72
1275	692	0.29	802	0.41	894	0.53	976	0.65	1051	0.78
1350	719	0.33	825	0.45	916	0.58	997	0.71	1071	0.84
1425	746	0.37	850	0.50	939	0.63	1019	0.77	1091	0.91
1500	774	0.42	875	0.55	962	0.69	1041	0.83	1112	0.98

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
	<b>Medium Static Option</b>					<b>Field Supplied Drive<sup>2</sup></b>				
900	1029	0.63	1095	0.75	1157	0.86	<b>1216</b>	<b>0.99</b>	<b>1272</b>	<b>1.11</b>
975	1046	0.68	1112	0.80	1174	0.92	<b>1232</b>	<b>1.05</b>	<b>1287</b>	<b>1.18</b>
1050	1064	0.73	1129	0.86	<b>1190</b>	<b>0.98</b>	<b>1248</b>	<b>1.11</b>	–	–
1125	1082	0.79	1147	0.92	<b>1208</b>	<b>1.05</b>	<b>1265</b>	<b>1.18</b>	–	–
1200	1100	0.85	1165	0.98	<b>1225</b>	<b>1.12</b>	–	–	–	–
1275	1119	0.91	<b>1183</b>	<b>1.05</b>	<b>1243</b>	<b>1.19</b>	–	–	–	–
1350	1139	0.98	<b>1202</b>	<b>1.12</b>	–	–	–	–	–	–
1425	1159	1.05	<b>1221</b>	<b>1.20</b>	–	–	–	–	–	–
1500	<b>1179</b>	<b>1.13</b>	–	–	–	–	–	–	–	–

**NOTE:** For more information, see General Fan Performance Notes.

**Boldface** indicates field-supplied drive is required.

1. Recommend using field-supplied fan pulley (part no. 1178488) and belt (part no. 1177401).
2. Recommend using field-supplied motor pulley (part no. 1175832) and belt (part no. 1178128).

## FAN PERFORMANCE (cont.)

**Table 23 – RAS036, 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
	<b>Field Supplied Drive<sup>1</sup></b>		<b>Standard Static Option</b>				<b>Medium Static Option</b>			
900	<b>554</b>	<b>0.14</b>	681	0.22	783	0.32	870	0.42	947	0.53
975	575	0.16	701	0.25	801	0.35	888	0.45	965	0.57
1050	597	0.18	721	0.28	821	0.38	906	0.49	983	0.61
1125	620	0.21	741	0.31	840	0.42	925	0.54	1001	0.66
1200	643	0.23	762	0.35	<b>860</b>	<b>0.46</b>	944	0.58	1020	0.71
1275	666	0.27	784	0.38	880	0.50	964	0.63	1039	0.76
1350	690	0.30	805	0.42	900	0.55	983	0.68	1058	0.82
1425	714	0.34	827	0.47	921	0.60	1003	0.74	1077	0.88
1500	738	0.38	849	0.52	942	0.66	1024	0.80	1097	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
	<b>Medium Static Option</b>				<b>High Static Option</b>					
900	1017	0.64	1082	0.76	1143	0.88	1200	1.01	1254	1.14
975	1035	0.68	1100	0.81	1160	0.93	1217	1.07	1271	1.20
1050	1053	0.73	1117	0.86	<b>1177</b>	<b>0.99</b>	1234	1.13	1288	1.27
1125	1071	0.78	1135	0.92	1195	1.05	1251	1.19	1305	1.34
1200	1089	0.84	1153	0.98	1212	1.12	1269	1.26	1322	1.41
1275	1107	0.90	1171	1.04	1230	1.19	1286	1.33	1340	1.49
1350	1126	0.96	<b>1189</b>	<b>1.11</b>	1249	1.26	1304	1.41	1357	1.57
1425	1145	1.03	1208	1.18	1267	1.33	1323	1.49	1375	1.66
1500	1164	1.10	1227	1.25	1285	1.41	1341	1.58	1394	1.75

**NOTE:** For more information, see General Fan Performance Notes.

**Boldface** indicates field-supplied drive is required.

1. Recommend using field-supplied fan pulley (part no. 1178448) and belt (part no. 1177401).

**Table 24 – RAS036, 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
	<b>Field Supplied Drive<sup>1</sup></b>		<b>Standard Static Option</b>				<b>Medium Static Option</b>			
900	<b>566</b>	<b>0.14</b>	690	0.23	791	0.32	879	0.42	957	0.52
975	590	0.17	711	0.26	811	0.36	897	0.46	975	0.57
1050	615	0.19	733	0.29	831	0.39	916	0.50	993	0.62
1125	640	0.22	755	0.33	851	0.43	936	0.55	1012	0.67
1200	666	0.25	778	0.36	<b>873</b>	<b>0.48</b>	956	0.60	1031	0.72
1275	692	0.29	802	0.41	894	0.53	976	0.65	1051	0.78
1350	719	0.33	825	0.45	916	0.58	997	0.71	1071	0.84
1425	746	0.37	850	0.50	939	0.63	1019	0.77	1091	0.91
1500	774	0.42	<b>875</b>	<b>0.55</b>	962	0.69	1041	0.83	1112	0.98

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
	<b>Medium Static Option</b>				<b>High Static Option</b>					
900	1029	0.63	1095	0.75	1157	0.86	1216	0.99	1272	1.11
975	1046	0.68	1112	0.80	1174	0.92	1232	1.05	1287	1.18
1050	1064	0.73	1129	0.86	<b>1190</b>	<b>0.98</b>	1248	1.11	1304	1.25
1125	1082	0.79	1147	0.92	1208	1.05	1265	1.18	1320	1.32
1200	1100	0.85	1165	0.98	1225	1.12	1282	1.26	1337	1.40
1275	1119	0.91	<b>1183</b>	<b>1.05</b>	1243	1.19	1300	1.34	1354	1.49
1350	1139	0.98	1202	1.12	1262	1.27	1318	1.42	1372	1.57
1425	1159	1.05	1221	1.20	1280	1.35	1336	1.51	1390	1.66
1500	<b>1179</b>	<b>1.13</b>	1241	1.28	1300	1.44	1355	1.60	1408	1.76

**NOTE:** For more information, see General Fan Performance Notes.

**Boldface** indicates field-supplied drive is required.

1. Recommend using field-supplied fan pulley (part no. 1178448) and belt (part no. 1177401).

## FAN PERFORMANCE (cont.)

**Table 25 – RAS048, 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	0.35	860	0.46	944	0.58	1020	0.71
1300	674	0.28	791	0.40	887	0.52	970	0.65	1045	0.78
1400	706	0.33	820	0.45	914	0.59	997	0.72	1071	0.86
1500	738	0.38	849	0.52	942	0.66	1024	0.80	1097	0.95
1600	771	0.44	879	0.59	971	0.74	1051	0.89	1124	1.04
1700	804	0.51	910	0.66	1000	0.82	1079	0.98	1151	1.14
1800	837	0.59	941	0.75	1029	0.91	1107	1.08	–	–
1900	871	0.67	972	0.84	1059	1.02	1136	1.19	–	–
2000	906	0.76	1004	0.94	1089	1.12	–	–	–	–

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 <sup>1</sup>				
1200	1089	0.84	1153	0.98	1212	1.12	–	–	–	–
1300	1114	0.92	1177	1.06	–	–	–	–	–	–
1400	1139	1.01	1202	1.15	–	–	–	–	–	–
1500	1164	1.10	–	–	–	–	–	–	–	–
1600	1190	1.20	–	–	–	–	–	–	–	–
1700	–	–	–	–	–	–	–	–	–	–
1800	–	–	–	–	–	–	–	–	–	–

**NOTE:** For more information, see General Fan Performance Notes.

**Boldface** indicates field-supplied drive is required.

1. Recommend using field-supplied motor pulley (part no. 1175832) and belt (part no. 1178128).

**Table 26 – RAS048, 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	0.25	778	0.36	873	0.48	956	0.60	1031	0.72
1300	701	0.30	809	0.42	902	0.54	983	0.67	1057	0.80
1400	737	0.36	842	0.48	932	0.61	1012	0.75	1085	0.89
1500	774	0.42	875	0.55	962	0.69	1041	0.83	1112	0.98
1600	811	0.49	909	0.63	994	0.78	1071	0.93	1141	1.08
1700	849	0.57	943	0.72	1026	0.87	1101	1.03	1170	1.19
1800	887	0.65	978	0.81	1059	0.98	1133	1.14	–	–
1900	926	0.75	1014	0.92	1092	1.09	–	–	–	–
2000	965	0.86	1050	1.03	–	–	–	–	–	–

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 <sup>1</sup>				
1200	1100	0.85	1165	0.98	1225	1.12	–	–	–	–
1300	1126	0.94	1189	1.07	–	–	–	–	–	–
1400	1152	1.03	1215	1.17	–	–	–	–	–	–
1500	1179	1.13	–	–	–	–	–	–	–	–
1600	1206	1.24	–	–	–	–	–	–	–	–
1700	1235	1.36	–	–	–	–	–	–	–	–
1800	1264	1.48	–	–	–	–	–	–	–	–
1900	1293	1.62	–	–	–	–	–	–	–	–
2000	1324	1.77	–	–	–	–	–	–	–	–

**NOTE:** For more information, see General Fan Performance Notes.

**Boldface** indicates field-supplied drive is required.



# FAN PERFORMANCE (cont.)

Table 27 – RAS048, 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	0.35	860	0.46	944	0.58	1020	0.71
1300	674	0.28	791	0.40	887	0.52	970	0.65	1045	0.78
1400	706	0.33	820	0.45	914	0.59	997	0.72	1071	0.86
1500	738	0.38	849	0.52	942	0.66	1024	0.80	1097	0.95
1600	771	0.44	879	0.59	971	0.74	1051	0.89	1124	1.04
1700	804	0.51	910	0.66	1000	0.82	1079	0.98	1151	1.14
1800	837	0.59	941	0.75	1029	0.91	1107	1.08	1178	1.25
1900	871	0.67	972	0.84	1059	1.02	1136	1.19	1206	1.37
2000	906	0.76	1004	0.94	1089	1.12	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					High Static Option				
1200	1089	0.84	1153	0.98	1212	1.12	1269	1.26	1322	1.41
1300	1114	0.92	1177	1.06	1236	1.21	1292	1.36	1346	1.52
1400	1139	1.01	1202	1.15	1261	1.31	1316	1.47	1369	1.63
1500	1164	1.10	1227	1.25	1285	1.41	1341	1.58	1394	1.75
1600	1190	1.20	1252	1.36	1311	1.53	1366	1.70	1418	1.87
1700	1217	1.31	1278	1.48	1336	1.65	1391	1.83	1443	2.01
1800	1244	1.42	1305	1.60	1362	1.78	1416	1.97	1468	2.15
1900	1271	1.55	1331	1.73	1388	1.92	1442	2.11	1494	2.31
2000	1298	1.68	1358	1.87	1415	2.07	1468	2.27	–	–

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

**Boldface** indicates field-supplied drive is required.

1. Recommend using field-supplied fan pulley (part no. 1175314), motor pulley (part no. 1170551) and belt (part no. 1178451).

Table 28 – RAS048, 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	0.25	778	0.36	873	0.48	956	0.60	1031	0.72
1300	701	0.30	809	0.42	902	0.54	983	0.67	1057	0.80
1400	737	0.36	842	0.48	932	0.61	1012	0.75	1085	0.89
1500	774	0.42	875	0.55	962	0.69	1041	0.83	1112	0.98
1600	811	0.49	909	0.63	994	0.78	1071	0.93	1141	1.08
1700	849	0.57	943	0.72	1026	0.87	1101	1.03	1170	1.19
1800	887	0.65	978	0.81	1059	0.98	1133	1.14	1200	1.31
1900	926	0.75	1014	0.92	1092	1.09	1164	1.26	1231	1.44
2000	965	0.86	1050	1.03	1127	1.21	1197	1.39	1262	1.58

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	1100	0.85	1165	0.98	1225	1.12	1282	1.26	1337	1.40
1300	1126	0.94	1189	1.07	1249	1.22	1306	1.36	1360	1.51
1400	1152	1.03	1215	1.17	1274	1.32	1330	1.48	1384	1.63
1500	1179	1.13	1241	1.28	1300	1.44	1355	1.60	1408	1.76
1600	1206	1.24	1268	1.40	1326	1.56	1381	1.73	1433	1.90
1700	1235	1.36	1295	1.52	1352	1.69	1407	1.87	1459	2.04
1800	1264	1.48	1323	1.66	1380	1.84	1434	2.02	1485	2.20
1900	1293	1.62	1352	1.80	1408	1.99	1461	2.17	1512	2.37
2000	1324	1.77	1381	1.96	1436	2.15	1489	2.34	–	–

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

**Boldface** indicates field-supplied drive is required.

1. Recommend using field-supplied fan pulley (part no. 1175314), motor pulley (part no. 1170551) and belt (part no. 1178451).

# FAN PERFORMANCE (cont.)

**Table 29 – RAS060, 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
	<b>Field Supplied Drive<sup>1</sup></b>		<b>Standard Static Option</b>							
1500	<b>724</b>	<b>0.33</b>	837	0.45	937	0.59	1028	0.74	1111	0.91
1625	<b>765</b>	<b>0.40</b>	873	0.53	969	0.67	1056	0.83	1137	1.00
1750	806	0.48	909	0.61	1002	0.76	1087	0.92	1165	1.10
1875	849	0.57	947	0.71	1036	0.86	1118	1.03	1195	1.21
2000	892	0.67	986	0.82	1072	0.98	1151	1.15	1226	1.33
2125	935	0.79	1025	0.94	1108	1.11	1185	1.29	1258	1.47
2250	980	0.92	1066	1.08	1146	1.25	1220	1.43	–	–
2375	1024	1.06	1107	1.23	1184	1.41	–	–	–	–
2500	1069	1.22	1149	1.39	–	–	–	–	–	–

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
	<b>Medium Static Option</b>									
1500	1188	1.09	1261	1.29	1330	1.49	–	–	–	–
1625	1213	1.18	1284	1.38	–	–	–	–	–	–
1750	1239	1.28	1309	1.49	–	–	–	–	–	–
1875	1267	1.40	–	–	–	–	–	–	–	–
2000	–	–	–	–	–	–	–	–	–	–
2125	–	–	–	–	–	–	–	–	–	–
2250	–	–	–	–	–	–	–	–	–	–

**NOTE:** For more information, see General Fan Performance Notes.

1. Recommend using field-supplied fan pulley (part no. 1178034) and belt (part no. 1178127).

**Table 30 – RAS060, 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
	<b>Standard Static Option</b>									
1500	790	0.40	897	0.53	991	0.68	1075	0.83	1152	1.00
1625	837	0.48	940	0.62	1030	0.77	1112	0.94	1187	1.11
1750	885	0.58	983	0.73	1070	0.89	1150	1.06	1223	1.24
1875	934	0.69	1027	0.85	1112	1.01	1189	1.19	1260	1.38
2000	983	0.81	1073	0.98	1154	1.16	1229	1.34	–	–
2125	1033	0.95	1119	1.13	1198	1.31	1270	1.50	–	–
2250	1084	1.11	1166	1.29	1242	1.49	–	–	–	–
2375	1134	1.28	1214	1.48	–	–	–	–	–	–
2500	1185	1.48	–	–	–	–	–	–	–	–

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
	<b>Medium Static Option</b>									
1500	1224	1.18	1291	1.36	–	–	–	–	–	–
1625	1257	1.30	1323	1.49	–	–	–	–	–	–
1750	1292	1.43	–	–	–	–	–	–	–	–
1875	–	–	–	–	–	–	–	–	–	–
2000	–	–	–	–	–	–	–	–	–	–
2125	–	–	–	–	–	–	–	–	–	–
2250	–	–	–	–	–	–	–	–	–	–
2375	–	–	–	–	–	–	–	–	–	–
2500	–	–	–	–	–	–	–	–	–	–

**NOTE:** For more information, see General Fan Performance Notes.

**Boldface** indicates field-supplied drive is required.

# FAN PERFORMANCE (cont.)

Table 31 – RAS060, 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
	Field Supplied Drive <sup>1</sup>				Standard Static Option					
1800	<b>822</b>	<b>0.51</b>	<b>927</b>	<b>0.66</b>	<b>1018</b>	<b>0.82</b>	1100	0.98	1174	1.15
1950	<b>872</b>	<b>0.62</b>	<b>973</b>	<b>0.79</b>	<b>1061</b>	<b>0.95</b>	1140	1.13	1213	1.31
2100	<b>923</b>	<b>0.75</b>	<b>1019</b>	<b>0.92</b>	1104	1.10	1182	1.29	1253	1.48
2250	<b>974</b>	<b>0.90</b>	<b>1067</b>	<b>1.08</b>	1149	1.27	1224	1.46	1294	1.66
2400	<b>1026</b>	<b>1.06</b>	1115	1.26	1195	1.46	1268	1.66	1336	1.87
2550	1079	1.25	1164	1.46	1241	1.67	1312	1.88	1379	2.10
2700	1132	1.46	1214	1.67	1289	1.90	1358	2.12	1422	2.35
2850	1186	1.69	1264	1.92	1336	2.15	1404	2.39	<b>1467</b>	<b>2.63</b>
3000	1240	1.94	1315	2.18	<b>1385</b>	<b>2.43</b>	<b>1451</b>	<b>2.68</b>	<b>1512</b>	<b>2.93</b>

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (IN. WG)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	Standard Static Option						Medium Static Option			
1800	1244	1.33	1308	1.51	1369	1.70	1427	1.90	1483	2.10
1950	1281	1.49	1345	1.68	1405	1.88	<b>1462</b>	<b>2.09</b>	1517	2.30
2100	1320	1.67	1382	1.87	1441	2.08	1498	2.29	<b>1552</b>	<b>2.51</b>
2250	1359	1.87	1420	2.08	1479	2.29	<b>1534</b>	<b>2.51</b>	<b>1587</b>	<b>2.74</b>
2400	1400	2.09	<b>1460</b>	<b>2.31</b>	1517	2.53	1572	2.76	1624	2.99
2550	1441	2.33	1500	2.55	<b>1557</b>	<b>2.79</b>	1610	3.03	1662	3.27
2700	<b>1483</b>	<b>2.59</b>	<b>1541</b>	<b>2.83</b>	1597	3.07	1650	3.32	<b>1701</b>	<b>3.57</b>
2850	<b>1527</b>	<b>2.87</b>	1583	3.12	1638	3.37	<b>1690</b>	<b>3.63</b>	–	–
3000	<b>1571</b>	<b>3.18</b>	1626	3.44	1680	3.70	–	–	–	–

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

■ – High Static Option

**Boldface** indicates field-supplied drive is required.

1. Recommend using field-supplied fan pulley (part no. 1178034) and belt (part no. 1178127).

Table 32 – RAS060, 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									
1500	790	0.40	897	0.53	991	0.68	1075	0.83	1152	1.00
1625	837	0.48	940	0.62	1030	0.77	1112	0.94	<b>1187</b>	<b>1.11</b>
1750	885	0.58	983	0.73	1070	0.89	1150	1.06	1223	1.24
1875	934	0.69	1027	0.85	1112	1.01	<b>1189</b>	<b>1.19</b>	1260	1.38
2000	983	0.81	1073	0.98	1154	1.16	1229	1.34	1299	1.53
2125	1033	0.95	1119	1.13	<b>1198</b>	<b>1.31</b>	1270	1.50	1338	1.71
2250	<b>1084</b>	<b>1.11</b>	<b>1166</b>	<b>1.29</b>	1242	1.49	1312	1.69	1386	1.89
2375	1134	1.28	1214	1.48	1287	1.68	1355	1.89	1420	2.10
2500	1185	1.48	1262	1.68	1333	1.89	1399	2.10	1462	2.33

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	1224	1.18	1291	1.36	1354	1.56	1414	1.77	1472	1.98
1625	1257	1.30	1323	1.49	1385	1.69	1445	1.90	1501	2.12
1750	1292	1.43	1356	1.63	1418	1.83	1476	2.05	1532	2.27
1875	1327	1.57	1391	1.78	1451	1.99	<b>1509</b>	<b>2.21</b>	1564	2.44
2000	1364	1.74	1427	1.95	<b>1486</b>	<b>2.17</b>	1542	2.39	1596	2.63
2125	1402	1.92	1463	2.13	1521	2.36	1577	2.59	1630	2.83
2250	1441	2.11	<b>1501</b>	<b>2.34</b>	1558	2.57	1612	2.81	–	–
2375	<b>1481</b>	<b>2.33</b>	1539	2.56	1595	2.80	–	–	–	–
2500	1522	2.56	1579	2.80	–	–	–	–	–	–

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

**Boldface** indicates field-supplied drive is required.

# FAN PERFORMANCE (cont.)

Table 33 – RAS072, 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
	<b>Field Supplied Drive<sup>1</sup></b>				<b>Standard Static Option</b>					
1800	<b>822</b>	<b>0.51</b>	<b>927</b>	<b>0.66</b>	<b>1018</b>	<b>0.82</b>	1100	0.98	1174	1.15
1950	<b>872</b>	<b>0.62</b>	<b>973</b>	<b>0.79</b>	<b>1061</b>	<b>0.95</b>	1140	1.13	1213	1.31
2100	<b>923</b>	<b>0.75</b>	<b>1019</b>	<b>0.92</b>	1104	1.10	1182	1.29	1253	1.48
2250	<b>974</b>	<b>0.90</b>	<b>1067</b>	<b>1.08</b>	1149	1.27	1224	1.46	1294	1.66
2400	<b>1026</b>	<b>1.06</b>	1115	1.26	1195	1.46	1268	1.66	1336	1.87
2550	1079	1.25	1164	1.46	1241	1.67	1312	1.88	1379	2.10
2700	1132	1.46	1214	1.67	1289	1.90	1358	2.12	1422	2.35
2850	1186	1.69	1264	1.92	1336	2.15	1404	2.39	<b>1467</b>	<b>2.63</b>
3000	1240	1.94	1315	2.18	<b>1385</b>	<b>2.43</b>	<b>1451</b>	<b>2.68</b>	<b>1512</b>	<b>2.93</b>

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (IN. WG)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	<b>Standard Static Option</b>						<b>Medium Static Option</b>			
1800	1244	1.33	1308	1.51	1369	1.70	1427	1.90	1483	2.10
1950	1281	1.49	1345	1.68	1405	1.88	<b>1462</b>	<b>2.09</b>	1517	2.30
2100	1320	1.67	1382	1.87	1441	2.08	1498	2.29	<b>1552</b>	<b>2.51</b>
2250	1359	1.87	1420	2.08	1479	2.29	<b>1534</b>	<b>2.51</b>	<b>1587</b>	<b>2.74</b>
2400	1400	2.09	<b>1460</b>	<b>2.31</b>	1517	2.53	1572	2.76	1624	2.99
2550	1441	2.33	1500	2.55	<b>1557</b>	<b>2.79</b>	1610	3.03	1662	3.27
2700	<b>1483</b>	<b>2.59</b>	<b>1541</b>	<b>2.83</b>	1597	3.07	1650	3.32	1701	3.57
2850	<b>1527</b>	<b>2.87</b>	1583	3.12	1638	3.37	1690	3.63	–	–
3000	<b>1571</b>	<b>3.18</b>	1626	3.44	1680	3.70	–	–	–	–

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

■ – Medium Static Option

■ – High Static Option

**Boldface** indicates field-supplied drive is required.

1. Recommend using field-supplied fan pulley (part no. 1175830), motor pulley (part no. 1175849) and belt (part no. 1178128).

Table 34 – RAS072, 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
	<b>Field Supplied Drive<sup>1</sup></b>				<b>Standard Static Option</b>					
1800	<b>907</b>	<b>0.63</b>	<b>1006</b>	<b>0.80</b>	1092	0.97	1169	1.14	1239	1.32
1950	<b>965</b>	<b>0.77</b>	<b>1060</b>	<b>0.95</b>	1143	1.13	1218	1.32	1287	1.51
2100	<b>1024</b>	<b>0.93</b>	1115	1.12	1195	1.32	1268	1.52	1335	1.72
2250	1083	1.11	1170	1.32	1248	1.53	1319	1.74	1385	1.96
2400	1143	1.32	1227	1.54	1302	1.76	1371	1.99	1435	2.22
2550	1203	1.55	1284	1.78	1357	2.02	1424	2.26	<b>1487</b>	<b>2.50</b>
2700	1264	1.81	1342	2.06	1412	2.31	<b>1478</b>	<b>2.56</b>	1539	2.82
2850	1326	2.09	1400	2.36	<b>1469</b>	<b>2.62</b>	1532	2.89	1592	3.16
3000	1387	2.41	1459	2.69	1525	2.97	1587	3.25	1646	3.53

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
	<b>Standard Static Option</b>						<b>Medium Static Option</b>		<b>High Static Option</b>	
1800	1304	1.51	1365	1.69	1422	1.88	<b>1477</b>	<b>2.08</b>	1528	2.28
1950	1350	1.71	1410	1.91	<b>1467</b>	<b>2.11</b>	<b>1520</b>	<b>2.31</b>	1572	2.52
2100	1398	1.93	1457	2.14	1512	2.35	1565	2.57	1616	2.79
2250	1446	2.18	<b>1504</b>	<b>2.40</b>	1559	2.62	1611	2.85	1661	3.09
2400	<b>1496</b>	<b>2.45</b>	1552	2.68	1606	2.92	1658	3.16	1707	3.40
2550	1546	2.75	1601	2.99	1654	3.24	1705	3.50	–	–
2700	1597	3.07	1651	3.33	1703	3.59	–	–	–	–
2850	1648	3.43	1702	3.70	–	–	–	–	–	–
3000	–	–	–	–	–	–	–	–	–	–

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

**Boldface** indicates field-supplied drive is required.

1. Recommend using field-supplied fan pulley (part no. 1175830), motor pulley (part no. 1175849) and belt (part no. 1178128).

# FAN PERFORMANCE (cont.)

Table 35 – RAS090 / 091, 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
	<b>Field Supplied Drive<sup>1</sup></b>		<b>Standard Static Option</b>						<b>Medium Static Option</b>	
2250	<b>465</b>	<b>0.43</b>	555	0.64	629	0.86	694	1.10	753	1.34
2438	<b>488</b>	<b>0.51</b>	575	0.73	648	0.97	712	1.21	769	1.47
2625	510	0.60	595	0.84	666	1.09	729	1.34	786	1.62
2813	533	0.70	616	0.95	686	1.22	748	1.49	804	1.77
3000	557	0.82	637	1.08	705	1.36	766	1.64	822	1.94
3188	581	0.94	659	1.23	726	1.51	785	1.81	840	2.12
3375	606	1.08	681	1.38	746	1.68	805	2.00	859	2.32
3563	630	1.24	703	1.55	767	1.87	825	2.20	878	2.53
3750	655	1.41	726	1.74	789	2.07	845	2.41	897	2.76

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
	<b>Medium Static Option</b>						<b>High Static Option</b>			
2250	806	1.60	856	1.87	903	2.15	947	2.45	988	2.75
2438	822	1.74	872	2.03	918	2.32	961	2.62	1003	2.93
2625	839	1.90	887	2.19	933	2.49	977	2.81	1018	3.13
2813	856	2.06	904	2.37	949	2.68	992	3.01	1033	3.34
3000	873	2.24	921	2.56	966	2.89	1008	3.22	1049	3.56
3188	891	2.44	938	2.77	982	3.10	1025	3.45	1065	3.81
3375	909	2.65	955	2.99	1000	3.34	1041	3.70	1081	4.06
3563	927	2.88	973	3.23	1017	3.59	1059	3.96	1098	4.34
3750	946	3.12	992	3.48	1035	3.86	1076	4.24	<b>1115</b>	<b>4.63<sup>2</sup></b>

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

**Boldface** indicates field-supplied drive is required.

1. Recommend using field-supplied fan pulley (part no. 1178189), motor pulley (part no. 1175832) and belt (part no. 1178128).
2. Recommend using field-supplied fan pulley (part no. 1175896) and belt (part no. 1178182).

Table 36 – RAS090 / 091, 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
	<b>Standard Static Option</b>						<b>Medium Static Option</b>			
2250	511	0.53	591	0.73	660	0.95	722	1.19	779	1.44
2438	540	0.64	616	0.85	683	1.08	743	1.33	799	1.59
2625	569	0.76	642	0.99	706	1.23	765	1.49	819	1.76
2813	599	0.90	669	1.14	731	1.39	788	1.66	841	1.94
3000	630	1.06	696	1.31	756	1.58	811	1.86	863	2.15
3188	661	1.23	724	1.50	782	1.78	836	2.07	886	2.38
3375	692	1.43	753	1.71	809	2.00	861	2.31	910	2.62
3563	723	1.65	782	1.94	836	2.25	887	2.56	934	2.89
3750	755	1.89	811	2.20	864	2.52	913	2.84	959	3.18

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
	<b>Medium Static Option</b>						<b>High Static Option</b>			
2250	832	1.71	882	1.99	928	2.29	973	2.59	1015	2.92
2438	851	1.87	899	2.16	945	2.46	989	2.78	1031	3.11
2625	870	2.04	918	2.34	963	2.66	1006	2.98	1048	3.32
2813	890	2.24	937	2.55	982	2.87	1024	3.21	1065	3.55
3000	912	2.46	958	2.78	1001	3.11	1043	3.45	1083	3.80
3188	934	2.69	979	3.02	1022	3.36	1063	3.72	1102	4.08
3375	956	2.95	1000	3.29	1042	3.64	1083	4.00	<b>1122</b>	<b>4.38</b>
3563	980	3.23	1023	3.58	1064	3.94	<b>1104</b>	<b>4.32</b>	<b>1142</b>	<b>4.70</b>
3750	1004	3.54	1046	3.90	1086	4.27	<b>1125</b>	<b>4.65</b>	–	–

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

**Boldface** indicates field-supplied drive is required.

1. Recommend using field-supplied fan pulley (part no. 1175896) and belt (part no. 1178182).

# FAN PERFORMANCE (cont.)

Table 37 – RAS101 / 102, 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
	<b>Field Supplied Drive<sup>1</sup></b>		<b>Standard Static Option</b>							
2550	<b>438</b>	<b>0.39</b>	523	0.50	595	0.64	658	0.78	716	0.94
2763	<b>459</b>	<b>0.47</b>	541	0.60	611	0.73	673	0.88	730	1.05
2975	<b>481</b>	<b>0.56</b>	560	0.70	628	0.84	689	1.00	<b>745</b>	<b>1.16</b>
3188	<b>504</b>	<b>0.67</b>	580	0.82	646	0.97	705	1.13	760	1.30
3400	526	0.80	600	0.95	664	1.11	722	1.27	776	1.45
3613	550	0.94	620	1.10	683	1.26	740	1.43	793	1.62
3825	573	1.09	641	1.26	702	1.43	758	1.61	810	1.80
4038	597	1.26	663	1.44	722	1.62	777	1.81	827	2.00
4250	621	1.45	685	1.64	<b>743</b>	<b>1.83</b>	796	2.02	845	2.22

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
	<b>Medium Static Option</b>					<b>High Static Option</b>				
2550	769	1.11	819	1.30	865	1.49	909	1.70	951	1.92
2763	782	1.22	831	1.41	877	1.60	921	1.81	963	2.04
2975	796	1.34	845	1.53	890	1.73	933	1.94	974	2.16
3188	811	1.48	858	1.67	903	1.88	<b>946</b>	<b>2.09</b>	987	2.31
3400	826	1.63	873	1.83	917	2.04	959	2.25	1000	2.48
3613	842	1.81	888	2.01	932	2.22	973	2.44	1013	2.67
3825	858	2.00	903	2.20	<b>946</b>	<b>2.42</b>	988	2.64	1027	2.87
4038	875	2.20	<b>919</b>	<b>2.41</b>	962	2.63	1002	2.86	1041	3.10
4250	<b>892</b>	<b>2.43</b>	936	2.65	978	2.87	1018	3.10	1056	3.34

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

**Boldface** indicates field-supplied drive is required.

1. Recommend using field-supplied fan pulley (part no. 1178189) and belt (part no. 1179767).

Table 38 – RAS101 / 102, 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
	<b>Field Supplied Drive<sup>1</sup></b>		<b>Standard Static Option</b>						<b>Medium Static Option</b>	
2550	<b>477</b>	<b>0.43</b>	556	0.57	624	0.71	685	0.85	742	0.99
2763	<b>503</b>	<b>0.52</b>	578	0.67	644	0.82	704	0.97	759	1.13
2975	529	0.62	601	0.79	665	0.95	724	1.11	777	1.28
3188	556	0.74	625	0.92	687	1.09	<b>744</b>	<b>1.26</b>	796	1.44
3400	583	0.88	650	1.06	710	1.24	765	1.43	816	1.62
3613	611	1.03	675	1.22	733	1.42	787	1.61	836	1.81
3825	639	1.19	701	1.40	<b>757</b>	<b>1.61</b>	809	1.81	857	2.02
4038	668	1.38	727	1.60	781	1.81	832	2.03	879	2.25
4250	696	1.58	<b>753</b>	<b>1.81</b>	806	2.04	855	2.27	<b>901</b>	<b>2.50</b>

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (IN. WG)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	<b>Medium Static Option</b>					<b>High Static Option</b>				
2550	794	1.14	842	1.29	888	1.44	932	1.59	973	1.75
2763	810	1.28	858	1.44	903	1.60	<b>946</b>	<b>1.77</b>	987	1.93
2975	827	1.44	874	1.61	919	1.78	961	1.95	1001	2.13
3188	845	1.62	891	1.79	935	1.98	977	2.16	1017	2.34
3400	864	1.80	909	1.99	<b>952</b>	<b>2.18</b>	993	2.38	1033	2.57
3613	883	2.01	928	2.21	970	2.41	1010	2.61	1049	2.82
3825	903	2.23	<b>947</b>	<b>2.44</b>	988	2.65	1028	2.87	1066	3.08
4038	924	2.47	967	2.70	1008	2.92	1047	3.14	1084	3.37
4250	945	2.73	987	2.97	1027	3.20	1066	3.43	<b>1103</b>	<b>3.67<sup>2</sup></b>

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

**Boldface** indicates field-supplied drive is required.

1. Recommend using field-supplied fan pulley (part no. 1178189) and belt (part no. 1179767).

2. Recommend using field-supplied fan pulley (part no. 1175896), motor pulley (part no. 1178133) and belt (part no. 1178182).

# FAN PERFORMANCE (cont.)

Table 39 – RAS120 / 121, 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
	<b>Field Supplied Drive<sup>1</sup></b>		<b>Standard Static Option</b>							
3000	<b>523</b>	<b>0.58</b>	592	0.73	657	0.88	718	1.05	775	1.22
3250	<b>555</b>	<b>0.71</b>	620	0.87	681	1.04	739	1.21	794	1.39
3500	<b>588</b>	<b>0.86</b>	649	1.03	707	1.21	762	1.39	815	1.58
3750	621	1.03	679	1.21	734	1.40	786	1.59	837	1.79
4000	655	1.23	709	1.42	761	1.61	812	1.82	860	2.03
4250	689	1.45	741	1.65	790	1.86	838	2.07	885	2.29
4500	723	1.69	773	1.90	820	2.12	866	2.35	910	2.57
4750	758	1.96	805	2.19	850	2.42	894	2.65	937	2.89
5000	793	2.26	838	2.50	881	2.74	923	2.98	965	3.23

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (IN. WG)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	<b>Standard Static Opt.</b>		<b>Medium Static Option</b>							
3000	830	1.39	883	1.57	934	1.76	982	1.95	1029	2.14
3250	847	1.57	897	1.76	946	1.96	993	2.16	1039	2.36
3500	865	1.77	914	1.97	961	2.18	1007	2.38	1051	2.60
3750	885	1.99	932	2.20	978	2.42	1022	2.64	1065	2.86
4000	907	2.24	952	2.46	996	2.68	1038	2.91	1080	3.14
4250	930	2.51	973	2.74	1015	2.97	1057	3.21	1097	3.45
4500	954	2.81	996	3.05	1037	3.29	1076	3.54	1115	3.79
4750	979	3.13	1019	3.38	1059	3.63	1097	3.89	1135	4.15
5000	1005	3.49	1044	3.74	1082	4.01	1119	4.27	1156	4.55

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

**Boldface** indicates field-supplied drive is required.

1. Recommend using field-supplied fan pulley (part no. 1178190) and belt (part no. 1178181).

Table 40 – RAS120 / 121, 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
	<b>Field Supplied Drive<sup>1</sup></b>		<b>Standard Static Option</b>							
3000	<b>556</b>	<b>0.65</b>	623	0.80	684	0.95	738	1.11	789	1.26
3250	<b>590</b>	<b>0.79</b>	655	0.96	713	1.13	766	1.29	815	1.46
3500	625	0.96	687	1.14	742	1.32	794	1.50	841	1.68
3750	661	1.16	719	1.35	773	1.54	822	1.73	869	1.93
4000	697	1.37	753	1.58	804	1.79	852	1.99	897	2.20
4250	733	1.62	787	1.84	836	2.06	883	2.28	926	2.49
4500	770	1.89	821	2.13	869	2.36	914	2.59	956	2.82
4750	807	2.20	856	2.45	902	2.69	945	2.94	986	3.18
5000	844	2.54	891	2.80	936	3.06	978	3.31	1018	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
	<b>Medium Static Option</b>									
3000	836	1.42	881	1.57	923	1.73	963	1.89	1001	2.05
3250	861	1.63	904	1.79	945	1.96	985	2.13	1023	2.30
3500	886	1.86	929	2.04	969	2.22	1008	2.40	1045	2.58
3750	912	2.12	954	2.31	994	2.50	1031	2.70	1068	2.89
4000	940	2.40	980	2.61	1019	2.81	1056	3.02	1092	3.22
4250	968	2.71	1007	2.93	1045	3.15	1081	3.36	1117	3.58
4500	996	3.05	1035	3.28	1072	3.51	1108	3.74	1142	3.97
4750	1026	3.42	1063	3.66	1100	3.91	1135	4.15	1168	4.39
5000	1056	3.82	1093	4.08	1128	4.34	1162	4.59	–	–

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

**Boldface** indicates field-supplied drive is required.

1. Recommend using field-supplied fan pulley (part no. 1178190) and belt (part no. 1178181).

## FAN PERFORMANCE (cont.)

**Table 41 – RAS150, 3 PHASE, 12.5 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
	<b>Field Supplied Drive<sup>1</sup></b>		<b>Standard Static Option</b>							
3438	<b>580</b>	<b>0.82</b>	642	0.99	700	1.16	756	1.34	809	1.53
3750	<b>621</b>	<b>1.03</b>	679	1.21	734	1.40	786	1.59	837	1.79
4063	663	1.28	717	1.47	769	1.67	818	1.88	866	2.09
4375	706	1.56	757	1.77	805	1.98	<b>852</b>	<b>2.20</b>	897	2.43
4688	749	1.89	797	2.11	843	2.34	887	2.57	930	2.81
5000	793	2.26	838	2.50	881	2.74	923	2.98	965	3.23
5313	837	2.69	880	2.93	921	3.19	961	3.44	<b>1000</b>	<b>3.71</b>
5625	882	3.16	922	3.42	961	3.68	<b>999</b>	<b>3.95</b>	<b>1037</b>	<b>4.23</b>
5938	926	3.68	<b>964</b>	<b>3.96</b>	<b>1001</b>	<b>4.23</b>	<b>1038</b>	<b>4.52</b>	–	–
6250	<b>971</b>	<b>4.26</b>	<b>1007</b>	<b>4.55</b>	–	–	–	–	–	–

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (IN. WG)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	<b>Medium Static Option</b>									
3438	860	1.72	910	1.92	957	2.12	1003	2.32	1048	2.54
3750	885	1.99	932	2.20	978	2.42	1022	2.64	1065	2.86
4063	912	2.31	957	2.53	1001	2.75	1043	2.98	1084	3.22
4375	941	2.66	984	2.89	1026	3.13	1066	3.37	1106	3.62
4688	972	3.05	1013	3.29	1053	3.54	<b>1092</b>	<b>3.80</b>	1130	4.06
5000	1005	3.49	1044	3.74	1082	4.01	1119	4.27	1156	4.55
5313	1038	3.97	1076	4.24	1113	4.52	–	–	–	–
5625	1073	4.51	–	–	–	–	–	–	–	–
5938	–	–	–	–	–	–	–	–	–	–
6250	–	–	–	–	–	–	–	–	–	–

**NOTE:** For more information, see General Fan Performance Notes.

**Boldface** indicates field-supplied drive is required.

1. Recommend using field-supplied fan pulley (part no. 1178189) and belt (part no. 1179767).
2. Recommend using field-supplied fan pulley (part no. 1175896), motor pulley (part no. 1178133) and belt (part no. 1178182).

**Table 42 – RAS150, 3 PHASE, 12.5 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
	<b>Field Supplied Drive<sup>1</sup></b>		<b>Standard Static Option</b>							
3438	<b>616</b>	<b>0.92</b>	679	1.10	735	1.27	786	1.45	835	1.62
3750	661	1.16	719	1.35	773	1.54	822	1.73	869	1.93
4063	706	1.43	761	1.64	812	1.85	860	2.06	904	2.27
4375	752	1.75	804	1.98	852	2.20	898	2.43	941	2.65
4688	798	2.12	847	2.36	894	2.60	937	2.85	979	3.09
5000	844	2.54	891	2.80	936	3.06	978	3.31	1018	3.57
5313	891	3.01	936	3.28	978	3.56	<b>1019</b>	<b>3.83</b>	<b>1057</b>	<b>4.11</b>
5625	938	3.53	<b>981</b>	<b>3.83</b>	<b>1022</b>	<b>4.12</b>	<b>1060</b>	<b>4.41</b>	<b>1097</b>	<b>4.70</b>
5938	<b>986</b>	<b>4.12</b>	<b>1026</b>	<b>4.43</b>	–	–	–	–	–	–
6250	–	–	–	–	–	–	–	–	–	–

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
	<b>Medium Static Option</b>									
3438	880	1.80	922	1.98	963	2.15	1002	2.33	1039	2.51
3750	912	2.12	954	2.31	994	2.50	1031	2.70	1068	2.89
4063	947	2.48	987	2.68	1025	2.89	1062	3.10	1098	3.31
4375	982	2.88	1021	3.10	1058	3.32	1094	3.55	1129	3.77
4688	1018	3.33	1056	3.57	1093	3.81	1128	4.04	1162	4.29
5000	1056	3.82	1093	4.08	1128	4.34	1162	4.59	–	–
5313	1094	4.38	1130	4.65	–	–	–	–	–	–
5625	–	–	–	–	–	–	–	–	–	–
5938	–	–	–	–	–	–	–	–	–	–
6250	–	–	–	–	–	–	–	–	–	–

**NOTE:** For more information, see General Fan Performance Notes.

**Boldface** indicates field-supplied drive is required.

1. Recommend using field-supplied fan pulley (part no. 1178189) and belt (part no. 1179767).
2. Recommend using field-supplied fan pulley (part no. 1175896), motor pulley (part no. 1178133) and belt (part no. 1178182).



# FAN PERFORMANCE (cont.)

Table 43 – RAS180, 3 PHASE, 15 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
4500	425	0.76	490	1.02	550	1.30	607	1.61	664	1.96
4875	448	0.92	510	1.20	566	1.49	621	1.81	674	2.15
5250	472	1.10	531	1.40	584	1.70	636	2.03	686	2.38
5625	496	1.30	552	1.62	603	1.94	652	2.28	699	2.64
6000	520	1.52	574	1.86	623	2.20	670	2.55	715	2.92
6375	544	1.77	596	2.13	644	2.49	688	2.86	731	3.24
6750	568	2.05	618	2.43	664	2.81	707	3.19	749	3.59
7125	593	2.35	641	2.75	685	3.16	727	3.56	767	3.97
7500	617	2.69	664	3.11	707	3.53	747	3.95	786	4.38

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
4500	719	2.34	772	2.76	823	3.20	872	3.67	918	4.16
4875	725	2.54	776	2.95	825	3.40	873	3.87	919	4.37
5250	734	2.76	783	3.18	830	3.63	876	4.10	920	4.60
5625	746	3.03	791	3.44	836	3.89	880	4.36	923	4.86
6000	759	3.32	802	3.74	845	4.18	887	4.66	928	5.16
6375	773	3.64	814	4.07	855	4.52	895	4.99	935	5.49
6750	789	4.00	828	4.43	867	4.89	905	5.36	943	5.87
7125	806	4.39	844	4.84	881	5.29	917	5.78	---	---
7500	823	4.82	860	5.27	895	5.74	---	---	---	---

std static – 507–676 RPM, 2.9 max BHP  
 med static – 627–851 RPM, 3.7 max BHP  
 high static – 776–955 RPM, 6.1 max BHP

Table 44 – RAS180, 3 PHASE, 15 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
4500	423	0.77	487	0.99	545	1.22	601	1.47	655	1.73
4875	447	0.94	507	1.18	563	1.42	615	1.67	666	1.95
5250	471	1.13	528	1.38	581	1.64	631	1.91	679	2.19
5625	496	1.35	550	1.62	600	1.89	648	2.17	694	2.46
6000	520	1.59	572	1.88	620	2.17	666	2.46	710	2.76
6375	545	1.86	594	2.17	640	2.47	684	2.78	726	3.10
6750	571	2.17	617	2.48	661	2.81	704	3.13	744	3.46
7125	596	2.50	640	2.83	683	3.17	724	3.52	763	3.86
7500	622	2.87	663	3.22	705	3.58	744	3.93	782	4.30

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
4500	707	2.02	758	2.33	806	2.66	853	3.01	898	3.37
4875	716	2.24	764	2.55	811	2.89	856	3.24	900	3.61
5250	726	2.49	772	2.81	817	3.14	860	3.50	903	3.87
5625	738	2.77	782	3.09	825	3.43	867	3.79	908	4.17
6000	752	3.08	794	3.41	835	3.76	875	4.12	914	4.50
6375	767	3.42	807	3.76	846	4.12	885	4.49	923	4.87
6750	784	3.80	822	4.15	859	4.51	896	4.89	933	5.28
7125	801	4.22	838	4.58	874	4.95	909	5.33	944	5.73
7500	818	4.66	854	5.04	889	5.42	923	5.81	---	---

std static – 507–676 RPM, 2.9 max BHP  
 med static – 627–851 RPM, 3.7 max BHP  
 high static – 776–955 RPM, 6.1 max BHP

# FAN PERFORMANCE (cont.)

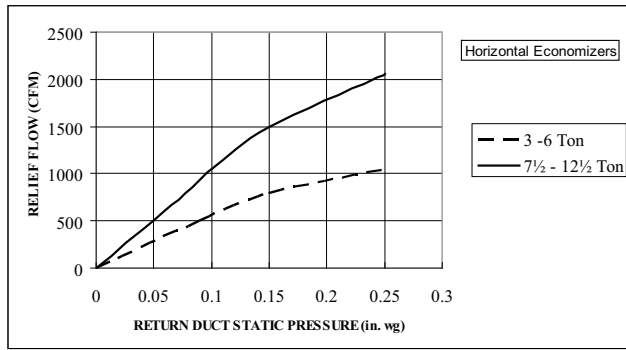
## Table 45 – PULLEY ADJUSTMENT

UNIT RAS		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
036	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
048	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
060	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
072	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
090/091	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
101/102	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
120/121	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
150	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
180	3 phase	Standard Static	676	659	642	625	608	592	575	558	541	524	507
		Medium Static	851	829	806	784	761	739	717	694	672	649	627
		High Static	955	937	919	901	883	866	848	830	812	794	776

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

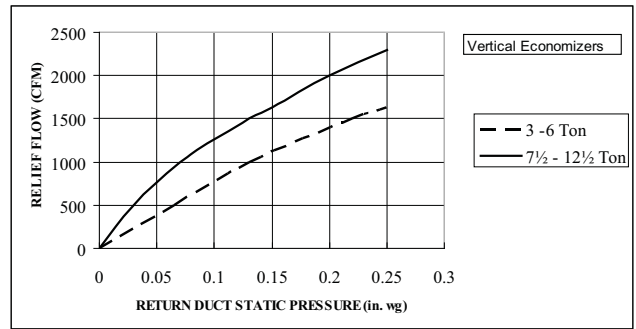
■ – Factory settings

# ECONOMIZER, BAROMETRIC RELIEF, AND PERFORMANCE



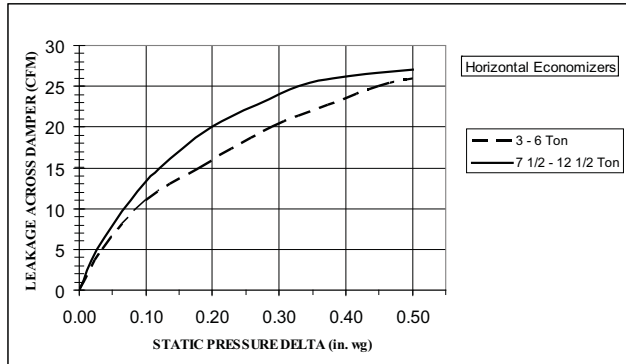
Barometric Relief Flow Capacity

C08070



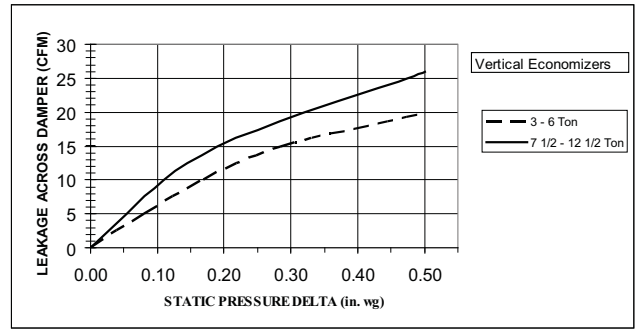
Barometric Relief Flow Capacity

C08073



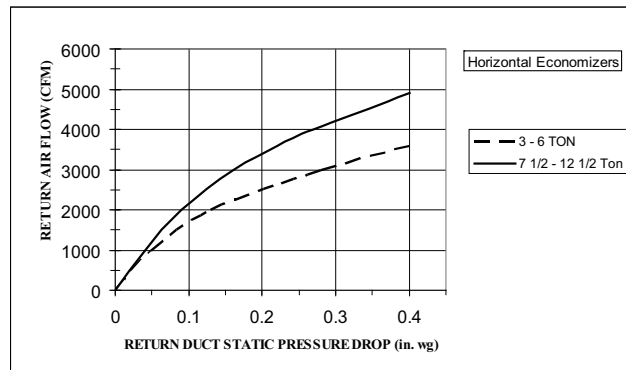
Outdoor Air Damper Leakage

C08071



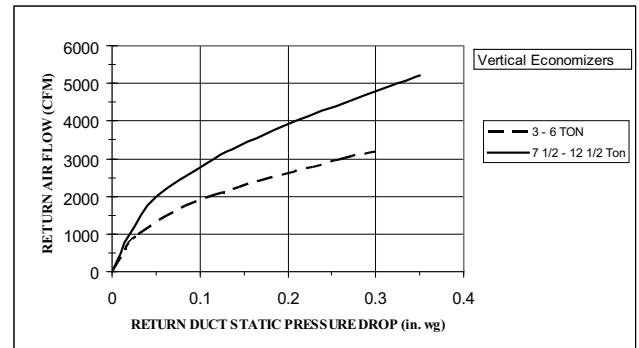
Outdoor Air Damper Leakage

C08074



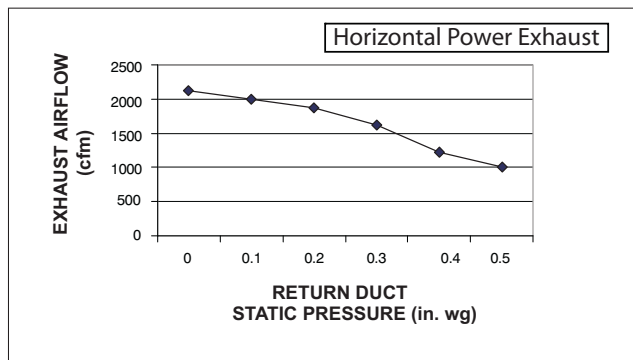
Return Air Pressure Drop

C08072



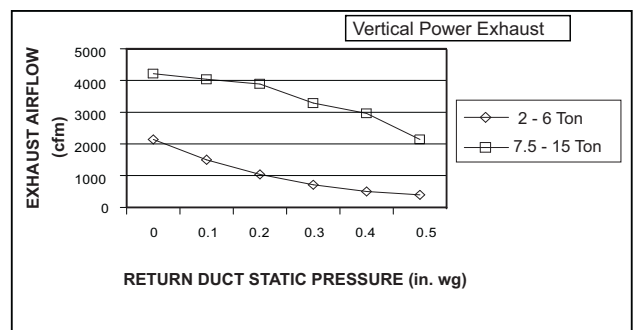
Return Air Pressure Drop

C08075



Horizontal Power Exhaust Performance

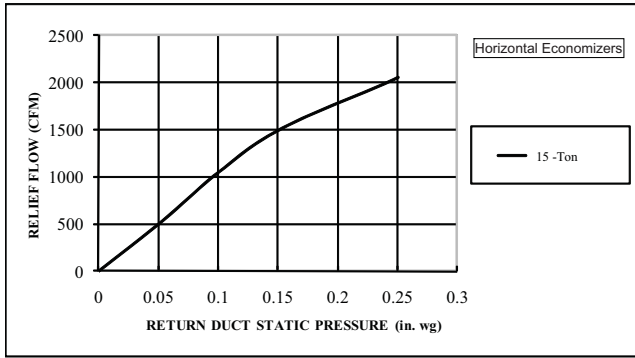
C08012



Power Exhaust Performance

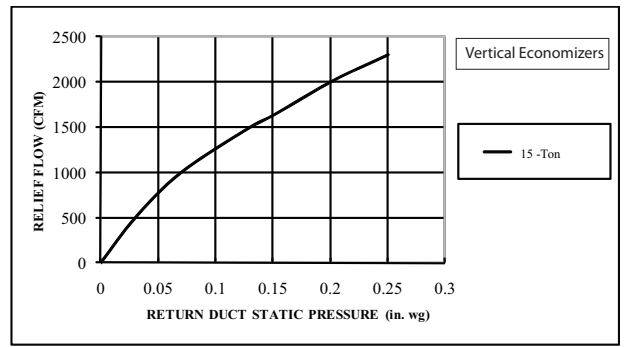
101125

# ECONOMIZER, BAROMETRIC RELIEF, AND PERFORMANCE (CONT.)



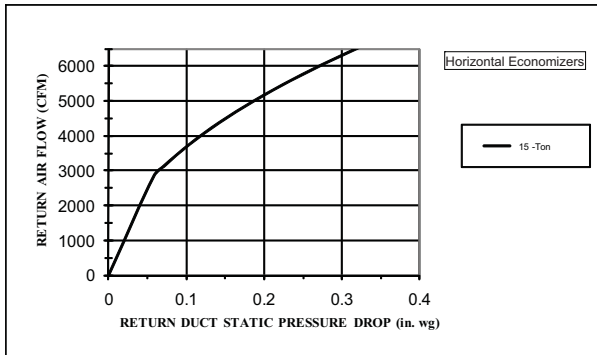
**Barometric Relief Flow-Horizontal 15 Ton**

C101120



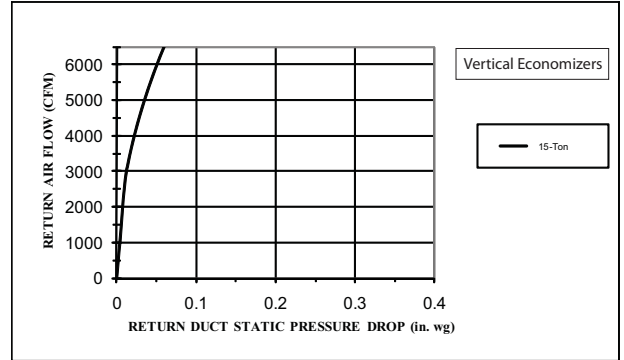
**Barometric Relief Flow-Vertical 15 Ton**

C101122



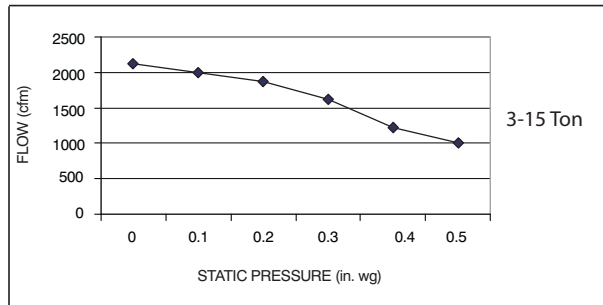
**Return Air Pressure Drop-Horizontal 15 Ton**

C101121



**Return Air Pressure Drop-Vertical 15 Tons**

C101123



**Horizontal Power Exhaust Performance**

C101124

# ELECTRICAL INFORMATION

## Table 46 – RAS036, 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

## Table 47 – RAS048, 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

## Table 48 – RAS060, 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

# ELECTRICAL INFORMATION (cont.)

**Table 49 – RAS072, 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 50 – RAS091, 7.5 TONS – 1 Stage Cooling**

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	4400	15.0	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	4400	15.0	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	4400	7.4	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	4400	5.9	81%	5.6

**Table 51 – RAS090, 7.5 TONS – 2 Stage Cooling**

V-Ph-Hz	VOLTAGE RANGE		COMP (Cir 1)		COMP (Cir 2)		OFM (ea)		IFM				
	MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	Max WATTS	Max AMP Draw	EFF at Full Load	FLA
208-3-60	187	253	13.6	83	13.6	83	325	1.5	STD	1448	5.5	80%	5.2
									MED	2278	7.9	81%	7.5
									HIGH	4400	15.0	81%	15.0
230-3-60	187	253	13.6	83	13.6	83	325	1.5	STD	1448	5.5	80%	5.2
									MED	2278	7.9	81%	7.5
									HIGH	4400	15.0	81%	15.0
460-3-60	414	506	6.1	41	6.1	41	325	0.8	STD	1448	2.7	80%	2.6
									MED	2278	3.6	81%	3.4
									HIGH	4400	7.4	81%	7.4
575-3-60	518	633	4.2	33	4.2	33	325	0.6	STD	1379	2.5	80%	2.4
									MED	3775	2.9	81%	2.8
									HIGH	4400	5.9	81%	5.6

# ELECTRICAL INFORMATION (cont.)

## Table 52 – RAS101, 8.5 TONS – 1 Stage Cooling

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

## Table 53 – RAS102, 8.5 TONS – 2 Stage Cooling

V-Ph-Hz	VOLTAGE RANGE		COMP (Cir 1)		COMP (Cir 2)		OFM (ea)		IFM				
	MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	Max WATTS	Max AMP Draw	EFF at Full Load	FLA
208-3-60	187	253	14.5	98	13.7	83	325	1.5	STD	1448	5.5	80%	5.2
									MED	2120	5.5	80%	5.2
									HIGH	2694	10.5	80%	10.0
230-3-60	187	253	14.5	98	13.7	83	325	1.5	STD	1448	5.5	80%	5.2
									MED	2120	5.5	80%	5.2
									HIGH	2694	10.5	80%	10.0
460-3-60	414	506	6.3	55	6.2	41	325	0.8	STD	1448	2.7	80%	2.6
									MED	2120	2.7	80%	2.6
									HIGH	2694	4.6	80%	4.4
575-3-60	518	633	6.0	41	4.8	33	325	0.6	STD	1379	2.5	80%	2.4
									MED	1390	2.1	80%	2.0
									HIGH	3775	2.9	81%	2.8

## Table 54 – RAS121, 10 TONS – 1 Stage Cooling

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	4400	15.0	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	4400	15.0	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	4400	7.4	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	4400	5.9	81%	5.6

# ELECTRICAL INFORMATION (cont.)

## Table 55 – RAS120, 10 TONS – 2 Stage Cooling

V-Ph-Hz	VOLTAGE RANGE		COMP (Cir 1)		COMP (Cir 2)		OFM (ea)		IFM				
	MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	Max WATTS	Max AMP Draw	EFF at Full Load	FLA
208-3-60	187	253	15.6	110	15.9	110	325	1.5	STD	2120	5.5	80%	5.2
									MED	3775	10.5	81%	10.0
									HIGH	4400	15.0	81%	15.0
230-3-60	187	253	15.6	110	15.9	110	325	1.5	STD	2120	5.5	80%	5.2
									MED	3775	10.5	81%	10.0
									HIGH	4400	15.0	81%	15.0
460-3-60	414	506	7.7	52	7.7	52	325	0.8	STD	2120	2.7	80%	2.6
									MED	3775	4.6	81%	4.4
									HIGH	4400	7.4	81%	7.4
575-3-60	518	633	5.8	39	5.7	39	325	0.6	STD	1390	2.1	80%	2.0
									MED	3775	2.9	81%	2.8
									HIGH	4400	5.9	81%	5.6

## Table 56 – RAS150, 12.5 TONS – 2 Stage Cooling

V-Ph-Hz	VOLTAGE RANGE		COMP (Cir 1)		COMP (Cir 2)		OFM (ea)		IFM				
	MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	Max WATTS	Max AMP Draw	EFF at Full Load	FLA
208-3-60	187	253	19.0	123	22.4	149	1288	6.2	STD	2615	7.9	81%	7.5
									MED	3775	10.5	81%	10.0
									HIGH	4400	15.0	81%	15.0
230-3-60	187	253	19.0	123	22.4	149	1288	6.2	STD	2615	7.9	81%	7.5
									MED	3775	10.5	81%	10.0
									HIGH	4400	15.0	81%	15.0
460-3-60	414	506	9.7	62	10.6	75	1288	3.1	STD	2615	3.6	81%	3.4
									MED	3775	4.6	81%	4.4
									HIGH	4400	7.4	81%	7.4
575-3-60	518	633	7.4	50	7.7	54	1288	2.5	STD	3775	2.9	81%	2.8
									MED	3775	2.9	81%	2.8
									HIGH	4400	5.9	81%	5.6

## Table 57 – RAS180, 15 TONS – 2 Stage Cooling

V-Ph-Hz	VOLTAGE RANGE		COMP (Cir 1)		COMP (Cir 2)		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208-3-60	187	253	25.0	164	25.0	164	1288	1.5	STD	81%	7.5
									MED	81%	10.0
									High-High Efficiency	89.5%	20.4
230-3-60	187	253	25.0	164	25.0	164	1288	1.5	STD	81%	7.5
									MED	81%	10.0
									High-High Efficiency	89.5%	20.4
460-3-60	414	506	12.2	100	12.8	100	1288	0.8	STD	81%	3.4
									MED	81%	4.4
									High-High Efficiency	89.5%	10.2
575-3-60	518	633	9.8	78	9.6	78	1288	0.6	STD	81%	2.8
									MED	81%	2.8
									High-High Efficiency	89.5%	9.0



**Table 58 – MCA/MOCP DETERMINATION NO C.O. OR UNPWRD C.O.**

Unit	NOM. V—PH—HZ	IFM TYPE	ELECTRIC HEATER		NO C.O. or UNPWR C.O.							
			Nom* (kW)	FLA	NO P.E.				w/ P.E. (pwrd fr/unit)			
					MCA	MOCP	DISC. SIZE		MCA	MOCP	DISC. SIZE	
							FLA	LRA			FLA	LRA
RAS036	208/230—1—60	STD	None	None	27.2	40	26	95	29.1	45	29	97
			3.3/4.4	15.9/18.3	27.2/29.0	40/40	26/27	95/95	29.1/31.4	45/45	29/29	97/97
			4.9/6.5	23.5/27.1	35.5/40.0	40/45	33/37	95/95	37.9/42.4	45/45	35/39	97/97
			6.5/8.7	31.4/36.3	45.4/51.5	50/60	42/47	95/95	47.8/53.9	50/60	44/50	97/97
			7.9/10.5	37.9/43.8	53.5/60.9	60/70	49/56	95/95	55.9/63.3	60/70	51/58	97/97
			9.8/13.0	46.9/54.2	64.8/73.9	70/80	60/68	95/95	67.1/76.3	70/80	62/70	97/97
	208/230—3—60	MED	None	None	27.2	40	26	95	29.1	45	29	97
			3.3/4.4	15.9/18.3	27.2/29.0	40/40	26/27	95/95	29.1/31.4	45/45	29/29	97/97
			4.9/6.5	23.5/27.1	35.5/40.0	40/45	33/37	95/95	37.9/42.4	45/45	35/39	97/97
			6.5/8.7	31.4/36.3	45.4/51.5	50/60	42/47	95/95	47.8/53.9	50/60	44/50	97/97
			7.9/10.5	37.9/43.8	53.5/60.9	60/70	49/56	95/95	55.9/63.3	60/70	51/58	97/97
			9.8/13.0	46.9/54.2	64.8/73.9	70/80	60/68	95/95	67.1/76.3	70/80	62/70	97/97
	208/230—3—60	STD	None	None	19.4	25	19	89	21.3	30	22	91
			3.3/4.4	9.2/10.6	19.4/19.4	25/25	19/19	89/89	21.3/21.8	30/30	22/22	91/91
			4.9/6.5	13.6/15.6	23.1/25.6	25/30	21/24	89/89	25.5/28.0	30/30	23/26	91/91
			6.5/8.7	18.1/20.9	28.8/32.3	30/35	26/30	89/89	31.1/34.6	35/35	29/32	91/91
			7.9/10.5	21.9/25.3	33.5/37.8	35/40	31/35	89/89	35.9/40.1	40/45	33/37	91/91
			12.0/16.0	33.4/38.5	47.9/54.3	50/60	44/50	89/89	50.3/56.6	60/60	46/52	91/91
	208/230—3—60	MED	None	None	19.4	25	19	89	21.3	30	22	91
			3.3/4.4	9.2/10.6	19.4/19.4	25/25	19/19	89/89	21.3/21.8	30/30	22/22	91/91
			4.9/6.5	13.6/15.6	23.1/25.6	25/30	21/24	89/89	25.5/28.0	30/30	23/26	91/91
			6.5/8.7	18.1/20.9	28.8/32.3	30/35	26/30	89/89	31.1/34.6	35/35	29/32	91/91
			7.9/10.5	21.9/25.3	33.5/37.8	35/40	31/35	89/89	35.9/40.1	40/45	33/37	91/91
			12.0/16.0	33.4/38.5	47.9/54.3	50/60	44/50	89/89	50.3/56.6	60/60	46/52	91/91
208/230—3—60	HIGH	None	None	19.7	30	20	107	21.6	30	22	109	
		3.3/4.4	9.2/10.6	19.7/19.8	30/30	20/20	107/107	21.6/22.1	30/30	22/22	109/109	
		4.9/6.5	13.6/15.6	23.5/26.0	30/30	22/24	107/107	25.9/28.4	30/30	24/26	109/109	
		6.5/8.7	18.1/20.9	29.1/32.6	30/35	27/30	107/107	31.5/35.0	35/40	29/32	109/109	
		7.9/10.5	21.9/25.3	33.9/38.1	35/40	31/35	107/107	36.3/40.5	40/45	33/37	109/109	
		12.0/16.0	33.4/38.5	48.3/54.6	50/60	44/50	107/107	50.6/57.0	60/60	47/52	109/109	
460—3—60	STD	None	None	10.2	15	10	46	11.2	15	11	47	
		6.0	7.2	11.6	15	11	46	12.9	15	12	47	
		8.8	10.6	15.9	20	15	46	17.1	20	16	47	
		11.5	13.8	19.9	20	18	46	21.1	25	19	47	
	14.0	16.8	23.6	25	22	46	24.9	25	23	47		
	MED	None	None	10.2	15	10	46	11.2	15	11	47	
6.0		7.2	11.6	15	11	46	12.9	15	12	47		
8.8		10.6	15.9	20	15	46	17.1	20	16	47		
11.5		13.8	19.9	20	18	46	21.1	25	19	47		
14.0	16.8	23.6	25	22	46	24.9	25	23	47			
HIGH	None	None	10.7	15	11	55	11.7	15	12	56		
	6.0	7.2	12.3	15	11	55	13.5	15	12	56		
	8.8	10.6	16.5	20	15	55	17.8	20	16	56		
	11.5	13.8	20.5	25	19	55	21.8	25	20	56		
14.0	16.8	24.3	25	22	55	25.5	30	23	56			
575—3—60	STD	None	None	7.3	15	7	44	9.2	15	9	46	
	MED	None	None	7.3	15	7	44	9.2	15	9	46	
	HIGH	None	None	7.4	15	7	50	9.3	15	10	52	

\* Nominal values, listed as 208/240V, 480V or 600V as appropriate.  
See Legend and calculations on page 85.

**Table 58 (cont.) MCA/MOCP DETERMINATION NO C.O. OR UNPWRD C.O.**

Unit	NOM. V-PH-HZ	IFM TYPE	ELECTRIC HEATER		NO C.O. or UNPWR C.O.							
			Nom* (kW)	FLA	NO P.E.				w/ P.E. (pwrd fr/unit)			
					MCA	MOCP	DISC. SIZE		MCA	MOCP	DISC. SIZE	
							FLA	LRA			FLA	LRA
RAS048	208/230-1-60	STD	None	None	33.7	50	32	133	35.6	50	35	135
			3.3/4.4	15.9/18.3	33.7/33.7	50/50	32/32	133/133	35.6/35.6	50/50	35/35	135/135
			6.5/8.7	31.4/36.3	45.4/51.5	50/60	42/47	133/133	47.8/53.9	50/60	44/50	135/135
			9.8/13.0	46.9/54.2	64.8/73.9	70/80	60/68	133/133	67.1/76.3	70/80	62/70	135/135
			13.1/17.4	62.8/72.5	84.6/96.8	90/100	78/89	133/133	87.0/99.1	90/100	80/91	135/135
			15.8/21.0	75.8/87.5	100.9/115.5	110/125	93/106	133/133	103.3/117.9	110/125	95/108	135/135
	208/230-3-60	MED	None	None	33.7	50	32	133	35.6	50	35	135
			3.3/4.4	15.9/18.3	33.7/33.7	50/50	32/32	133/133	35.6/35.6	50/50	35/35	135/135
			6.5/8.7	31.4/36.3	45.4/51.5	50/60	42/47	133/133	47.8/53.9	50/60	44/50	135/135
			9.8/13.0	46.9/54.2	64.8/73.9	70/80	60/68	133/133	67.1/76.3	70/80	62/70	135/135
			13.1/17.4	62.8/72.5	84.6/96.8	90/100	78/89	133/133	87.0/99.1	90/100	80/91	135/135
			15.8/21.0	75.8/87.5	100.9/115.5	110/125	93/106	133/133	103.3/117.9	110/125	95/108	135/135
	208/230-3-60	STD	None	None	23.5	30	23	99	25.4	30	25	101
			4.9/6.5	13.6/15.6	23.5/25.6	30/30	23/24	99/99	25.5/28.0	30/30	25/26	101/101
			6.5/8.7	18.1/20.9	28.8/32.3	30/35	26/30	99/99	31.1/34.6	35/35	29/32	101/101
			12.0/16.0	33.4/38.5	47.9/54.3	50/60	44/50	99/99	50.3/56.6	60/60	46/52	101/101
			15.8/21.0	43.8/50.5	60.9/69.3	70/70	56/64	99/99	63.3/71.6	70/80	58/66	101/101
			None	None	23.5	30	23	99	25.4	30	25	101
	208/230-3-60	MED	4.9/6.5	13.6/15.6	23.5/25.6	30/30	23/24	99/99	25.5/28.0	30/30	25/26	101/101
			6.5/8.7	18.1/20.9	28.8/32.3	30/35	26/30	99/99	31.1/34.6	35/35	29/32	101/101
			12.0/16.0	33.4/38.5	47.9/54.3	50/60	44/50	99/99	50.3/56.6	60/60	46/52	101/101
			15.8/21.0	43.8/50.5	60.9/69.3	70/70	56/64	99/99	63.3/71.6	70/80	58/66	101/101
			None	None	23.8	30	23	117	25.7	30	26	119
			4.9/6.5	13.6/15.6	23.8/26.0	30/30	23/24	117/117	25.9/28.4	30/30	26/26	119/119
208/230-3-60	HIGH	6.5/8.7	18.1/20.9	29.1/32.6	30/35	27/30	117/117	31.5/35.0	35/40	29/32	119/119	
		12.0/16.0	33.4/38.5	48.3/54.6	50/60	44/50	117/117	50.6/57.0	60/60	47/52	119/119	
		15.8/21.0	43.8/50.5	61.3/69.6	70/70	56/64	117/117	63.6/72.0	70/80	59/66	119/119	
		None	None	10.7	15	10	49	11.7	15	12	50	
		6.0	7.2	11.6	15	11	49	12.9	15	12	50	
		11.5	13.8	19.9	20	18	49	21.1	25	19	50	
460-3-60	STD	14.0	16.8	23.6	25	22	49	24.9	25	23	50	
		23.0	27.7	37.3	40	34	49	38.5	40	35	50	
		None	None	10.7	15	10	49	11.7	15	12	50	
		6.0	7.2	11.6	15	11	49	12.9	15	12	50	
		11.5	13.8	19.9	20	18	49	21.1	25	19	50	
		14.0	16.8	23.6	25	22	49	24.9	25	23	50	
460-3-60	MED	23.0	27.7	37.3	40	34	49	38.5	40	35	50	
		None	None	11.2	15	11	58	12.2	15	12	59	
		6.0	7.2	12.3	15	11	58	13.5	15	12	59	
		11.5	13.8	20.5	25	19	58	21.8	25	20	59	
		14.0	16.8	24.3	25	22	58	25.5	30	23	59	
		23.0	27.7	37.9	40	35	58	39.1	40	36	59	
575-3-60	STD	None	None	8.5	15	8	44	10.4	15	11	46	
		None	None	8.5	15	8	44	10.4	15	11	46	
		None	None	8.6	15	9	50	10.5	15	11	52	

\* Nominal values, listed as 208/240V, 480V or 600V as appropriate. See Legend and calculations on page 85.

**Table 58 (cont.) MCA/MOCP DETERMINATION NO C.O. OR UNPWRD C.O.**

UNIT	NOM. V-PH-HZ	IFM TYPE	ELECTRIC HEATER		NO C.O. or UNPWR C.O.							
			Nom* (kW)	FLA	NO P.E.				w/ P.E. (pwrd fr/unit)			
					MCA	MOCP	DISC. SIZE		MCA	MOCP	DISC. SIZE	
							FLA	LRA			FLA	LRA
RAS060	208/230-1-60	STD	None	None	39.2	60	37	150	41.1	60	40	152
			4.9/6.5	23.5/27.1	39.2/40.0	60/60	37/37	150/150	41.1/42.4	60/60	40/40	152/152
			6.5/8.7	31.4/36.3	45.4/51.5	60/60	42/47	150/150	47.8/53.9	60/60	44/50	152/152
			9.8/13.0	46.9/54.2	64.8/73.9	70/80	60/68	150/150	67.1/76.3	70/80	62/70	152/152
			13.1/17.4	62.8/72.5	84.6/96.8	90/100	78/89	150/150	87.0/99.1	90/100	80/91	152/152
			15.8/21.0	75.8/87.5	100.9/115.5	110/125	93/106	150/150	103.3/117.9	110/125	95/108	152/152
	208/230-3-60	MED	None	None	41.3	60	40	175	43.2	60	42	177
			4.9/6.5	23.5/27.1	41.3/42.6	60/60	40/40	175/175	43.2/45.0	60/60	42/42	177/177
			6.5/8.7	31.4/36.3	48.0/54.1	60/60	44/50	175/175	50.4/56.5	60/60	46/52	177/177
			9.8/13.0	46.9/54.2	67.4/76.5	70/80	62/70	175/175	69.8/78.9	70/80	64/73	177/177
			13.1/17.4	62.8/72.5	87.3/99.4	90/100	80/91	175/175	89.6/101.8	90/110	82/94	177/177
			15.8/21.0	75.8/87.5	103.5/118.1	110/125	95/109	175/175	105.9/120.5	110/125	97/111	177/177
	208/230-3-60	STD	None	None	25.9	30	25	126	27.8	40	27	128
			4.9/6.5	13.6/15.6	25.9/25.9	30/30	25/25	126/126	27.8/28.0	40/40	27/27	128/128
			7.9/10.5	21.9/25.3	33.5/37.8	40/40	31/35	126/126	35.9/40.1	40/45	33/37	128/128
			12.0/16.0	33.4/38.5	47.9/54.3	50/60	44/50	126/126	50.3/56.6	60/60	46/52	128/128
			15.8/21.0	43.8/50.5	60.9/69.3	70/70	56/64	126/126	63.3/71.6	70/80	58/66	128/128
			19.9/26.5	55.2/63.8	75.1/85.9	80/90	69/79	126/126	77.5/88.3	80/90	71/81	128/128
	208/230-3-60	MED	None	None	26.2	40	26	144	28.1	40	28	146
			4.9/6.5	13.6/15.6	26.2/26.2	40/40	26/26	144/144	28.1/28.4	40/40	28/28	146/146
			7.9/10.5	21.9/25.3	33.9/38.1	40/40	31/35	144/144	36.3/40.5	40/45	33/37	146/146
			12.0/16.0	33.4/38.5	48.3/54.6	50/60	44/50	144/144	50.6/57.0	60/60	47/52	146/146
			15.8/21.0	43.8/50.5	61.3/69.6	70/70	56/64	144/144	63.6/72.0	70/80	59/66	146/146
			19.9/26.5	55.2/63.8	75.5/86.3	80/90	69/79	144/144	77.9/88.6	80/90	72/82	146/146
208/230-3-60	HIGH	None	None	28.5	40	28	170	30.4	45	30	172	
		4.9/6.5	13.6/15.6	28.5/28.9	40/40	28/28	170/170	30.4/31.3	45/45	30/30	172/172	
		7.9/10.5	21.9/25.3	36.8/41.0	40/45	34/38	170/170	39.1/43.4	45/45	36/40	172/172	
		12.0/16.0	33.4/38.5	51.1/57.5	60/60	47/53	170/170	53.5/59.9	60/60	49/55	172/172	
		15.8/21.0	43.8/50.5	64.1/72.5	70/80	59/67	170/170	66.5/74.9	70/80	61/69	172/172	
		19.9/26.5	55.2/63.8	78.4/89.1	80/90	72/82	170/170	80.8/91.5	90/100	74/84	172/172	
460-3-60	STD	None	None	12.5	20	12	60	13.5	20	13	61	
		6.0	7.2	12.5	20	12	60	13.5	20	13	61	
		11.5	13.8	19.9	20	18	60	21.1	25	19	61	
		14.0	16.8	23.6	25	22	60	24.9	25	23	61	
		23.0	27.7	37.3	40	34	60	38.5	40	35	61	
		25.5	30.7	41.0	45	38	60	42.3	45	39	61	
	MED	None	None	13	20	13	69	14	20	14	70	
		6.0	7.2	13.0	20	13	69	14.0	20	14	70	
		11.5	13.8	20.5	25	19	69	21.8	25	20	70	
		14.0	16.8	24.3	25	22	69	25.5	30	23	70	
		23.0	27.7	37.9	40	35	69	39.1	40	36	70	
		25.5	30.7	41.6	45	38	69	42.9	45	39	70	
	HIGH	None	None	13.8	20	14	82	14.8	20	15	83	
		6.0	7.2	13.8	20	14	82	14.8	20	15	83	
		11.5	13.8	21.5	25	20	82	22.8	25	21	83	
		14.0	16.8	25.3	30	23	82	26.5	30	24	83	
		23.0	27.7	38.9	40	36	82	40.1	45	37	83	
		25.5	30.7	42.6	45	39	82	43.9	45	40	83	
575-3-60	STD	None	None	9.8	15	10	46	11.7	15	12	48	
	MED	None	None	9.9	15	10	52	11.8	15	12	54	
	HIGH	None	None	10.7	15	11	63	12.6	15	13	65	

\* Nominal values, listed as 208/240V, 480V or 600V as appropriate.  
See Legend and calculations on page 85.

**Table 58 (cont.) MCA/MOCP DETERMINATION NO C.O. OR UNPWRD C.O.**

UNIT	NOM. V—PH—HZ	IFM TYPE	ELECTRIC HEATER		NO C.O. or UNPWR C.O.							
			Nom* (kW)	FLA	NO P.E.				w/ P.E. (pwrd fr/unit)			
					MCA	MOCP	DISC. SIZE		MCA	MOCP	DISC. SIZE	
							FLA	LRA			FLA	LRA
RAS072	208/230—3—60	STD	None	None	30.5	45	30	157	32.4	50	32	159
			4.9/6.5	13.6/15.6	30.5/30.5	45/45	30/30	157/157	32.4/32.4	50/50	32/32	159/159
			7.9/10.5	21.9/25.3	33.9/38.1	45/45	31/35	157/157	36.3/40.5	50/50	33/37	159/159
			12.0/16.0	33.4/38.5	48.3/54.6	50/60	44/50	157/157	50.6/57.0	60/60	47/52	159/159
			15.8/21.0	43.8/50.5	61.3/69.6	70/70	56/64	157/157	63.6/72.0	70/80	59/66	159/159
			19.9/26.5	55.2/63.8	75.5/86.3	80/90	69/79	157/157	77.9/88.6	80/90	72/82	159/159
		MED	None	None	32.8	50	32	183	34.7	50	34	185
			4.9/6.5	13.6/15.6	32.8/32.8	50/50	32/32	183/183	34.7/34.7	50/50	34/34	185/185
			7.9/10.5	21.9/25.3	36.8/41.0	50/50	34/38	183/183	39.1/43.4	50/50	36/40	185/185
	12.0/16.0		33.4/38.5	51.1/57.5	60/60	47/53	183/183	53.5/59.9	60/60	49/55	185/185	
	15.8/21.0		43.8/50.5	64.1/72.5	70/80	59/67	183/183	66.5/74.9	70/80	61/69	185/185	
	19.9/26.5		55.2/63.8	78.4/89.1	80/90	72/82	183/183	80.8/91.5	90/100	74/84	185/185	
	HIGH	None	None	32.8	50	32	183	34.7	50	34	185	
		4.9/6.5	13.6/15.6	32.8/32.8	50/50	32/32	183/183	34.7/34.7	50/50	34/34	185/185	
		7.9/10.5	21.9/25.3	36.8/41.0	50/50	34/38	183/183	39.1/43.4	50/50	36/40	185/185	
		12.0/16.0	33.4/38.5	51.1/57.5	60/60	47/53	183/183	53.5/59.9	60/60	49/55	185/185	
		15.8/21.0	43.8/50.5	64.1/72.5	70/80	59/67	183/183	66.5/74.9	70/80	61/69	185/185	
		19.9/26.5	55.2/63.8	78.4/89.1	80/90	72/82	183/183	80.8/91.5	90/100	74/84	185/185	
	460—3—60	STD	None	None	15.5	25	15	79	16.5	25	16	80
			6.0	7.2	15.5	25	15	79	16.5	25	16	80
			11.5	13.8	20.5	25	19	79	21.8	25	20	80
			14.0	16.8	24.3	25	22	79	25.5	30	23	80
			23.0	27.7	37.9	40	35	79	39.1	40	36	80
			25.5	30.7	41.6	45	38	79	42.9	45	39	80
MED		None	None	16.3	25	16	92	17.3	25	17	93	
		6.0	7.2	16.3	25	16	92	17.3	25	17	93	
		11.5	13.8	21.5	25	20	92	22.8	25	21	93	
		14.0	16.8	25.3	30	23	92	26.5	30	24	93	
		23.0	27.7	38.9	40	36	92	40.1	45	37	93	
		25.5	30.7	42.6	45	39	92	43.9	45	40	93	
HIGH		None	None	17.3	25	17	101	18.3	25	18	102	
		6.0	7.2	17.3	25	17	101	18.3	25	18	102	
		11.5	13.8	22.8	25	21	101	24.0	25	22	102	
		14.0	16.8	26.5	30	24	101	27.8	30	26	102	
		23.0	27.7	40.1	45	37	101	41.4	45	38	102	
		25.5	30.7	43.9	45	40	101	45.1	50	42	102	
575—3—60	STD	None	None	11.9	15	12	63	13.8	20	14	65	
	MED	None	None	12.7	20	12	74	14.6	20	15	76	
	HIGH	None	None	12.7	20	12	74	14.6	20	15	76	

\* Nominal values, listed as 208/240V, 480V or 600V as appropriate. See Legend and calculations on page 85.

**Table 58 (cont.) MCA/MOCP DETERMINATION NO C.O. OR UNPWRD C.O.**

UNIT	NOM. V—PH—HZ	IFM TYPE	ELECTRIC HEATER		NO C.O. or UNPWR C.O.							
			Nom* (kW)	FLA	NO P.E.				w/ P.E. (pwrd fr/unit)			
					MCA	MOCP	DISC. SIZE		MCA	MOCP	DISC. SIZE	
							FLA	LRA			FLA	LRA
RAS091	208/230—3—60	STD	None	None	39.5	60	38	191	43.3	60	43	195
			7.8/10.4	21.7/25.0	39.5/39.5	60/60	38/38	191/191	43.3/43.3	60/60	43/43	195/195
			12.0/16.0	33.4/38.5	48.3/54.6	60/60	44/50	191/191	53.0/59.4	60/60	49/55	195/195
			18.6/24.8	51.7/59.7	71.1/81.1	80/90	65/75	191/191	75.9/85.9	80/90	70/79	195/195
			24.0/32.0	66.7/77.0	89.9/102.8	90/110	83/95	191/191	94.6/107.5	100/110	87/99	195/195
		31.8/42.4	88.4/102.0	117.0/134.0	125/150	108/123	191/191	121.8/138.8	125/150	112/128	195/195	
		MED	None	None	41.8	60	41	228	45.6	60	45	232
			7.8/10.4	21.7/25.0	41.8/41.8	60/60	41/41	228/228	45.6/45.6	60/60	45/45	232/232
			12.0/16.0	33.4/38.5	51.1/57.5	60/60	47/53	228/228	55.9/62.3	60/70	51/57	232/232
	18.6/24.8		51.7/59.7	74.0/84.0	80/90	68/77	228/228	78.8/88.8	80/90	72/82	232/232	
	24.0/32.0		66.7/77.0	92.8/105.6	100/110	85/97	228/228	97.5/110.4	100/125	90/102	232/232	
	31.8/42.4	88.4/102.0	119.9/136.9	125/150	110/126	228/228	124.6/141.6	125/150	115/130	232/232		
	HIGH	None	None	49.3	60	49	254	53.1	60	54	258	
		7.8/10.4	21.7/25.0	49.3/50.0	60/60	49/49	254/254	53.1/54.8	60/60	54/54	258/258	
		12.0/16.0	33.4/38.5	60.5/66.9	70/70	56/62	254/254	65.3/71.6	70/80	60/66	258/258	
		18.6/24.8	51.7/59.7	83.4/93.4	90/100	77/86	254/254	88.1/98.1	90/100	81/90	258/258	
		24.0/32.0	66.7/77.0	102.1/115.0	110/125	94/106	254/254	106.9/119.8	110/125	98/110	258/258	
	31.8/42.4	88.4/102.0	129.3/146.3	150/150	119/135	254/254	134.0/151.0	150/175	123/139	258/258		
	460—3—60	STD	None	None	19.5	30	19	113	21.3	30	21	115
			13.9	16.7	24.1	30	22	113	26.4	30	24	115
			16.5	19.8	28.0	30	26	113	30.3	35	28	115
			27.8	33.4	45.0	50	41	113	47.3	50	43	115
			33.0	39.7	52.9	60	49	113	55.1	60	51	115
		41.7	50.2	66.0	70	61	113	68.3	70	63	115	
MED		None	None	20.3	30	20	132	22.1	30	22	134	
		13.9	16.7	25.1	30	23	132	27.4	30	25	134	
		16.5	19.8	29.0	30	27	132	31.3	35	29	134	
		27.8	33.4	46.0	50	42	132	48.3	50	44	134	
		33.0	39.7	53.9	60	50	132	56.1	60	52	134	
41.7		50.2	67.0	70	62	132	69.3	70	64	134		
HIGH		None	None	24.3	30	24	145	26.1	30	26	147	
		13.9	16.7	30.1	35	28	145	32.4	35	30	147	
		16.5	19.8	34.0	35	31	145	36.3	40	33	147	
	27.8	33.4	51.0	60	47	145	53.3	60	49	147		
	33.0	39.7	58.9	60	54	145	61.1	70	56	147		
41.7	50.2	72.0	80	66	145	74.3	80	68	147			
575—3—60	STD	None	None	14.9	20	14	89	18.7	25	19	93	
		17.0	20.4	28.5	30	26	89	33.3	35	31	93	
		34.0	40.9	54.1	60	50	89	58.9	60	54	93	
	MED	None	None	15.3	20	15	104	19.1	25	19	108	
		17.0	20.4	29.0	30	27	104	33.8	35	31	108	
		34.0	40.9	54.6	60	50	104	59.4	60	55	108	
	HIGH	None	None	18.1	25	18	118	21.9	30	23	122	
		17.0	20.4	32.5	35	30	118	37.3	40	34	122	
		34.0	40.9	58.1	60	53	118	62.9	70	58	122	

\* Nominal values, listed as 208/240V, 480V or 600V as appropriate.  
See Legend and calculations on page 85.

**Table 58 (cont.) MCA/MOCP DETERMINATION NO C.O. OR UNPWRD C.O.**

UNIT	NOM. V—PH—HZ	IFM TYPE	ELECTRIC HEATER		NO C.O. or UNPWR C.O.							
			Nom* (kW)	FLA	NO P.E.		w/ P.E. (pwrd fr/unit)					
					MCA	MOCP	DISC. SIZE		MCA	MOCP	DISC. SIZE	
							FLA	LRA			FLA	LRA
RAS090	208/230—3—60	STD	—	—	38.8	50	41	193	42.6	50	45	197
			7.8/10.4	21.7/25.0	38.8/38.8	50/50	41/41	193/193	42.6/42.6	50/50	45/45	197/197
			12.0/16.0	33.4/38.5	48.3/54.6	50/60	44/50	193/193	53.0/59.4	60/60	49/55	197/197
			18.6/24.8	51.7/59.7	71.1/81.1	80/90	65/75	193/193	75.9/85.9	80/90	70/79	197/197
			24.0/32.0	66.7/77.0	89.9/102.8	90/110	83/95	193/193	94.6/107.5	100/110	87/99	197/197
		31.8/42.4	88.4/102.0	117.0/134.0	125/150	108/123	193/193	121.8/138.8	125/150	112/128	197/197	
		MED	—	—	41.1	50	43	230	44.9	50	48	234
			7.8/10.4	21.7/25.0	41.1/41.1	50/50	43/43	230/230	44.9/45.4	50/50	48/48	234/234
			12.0/16.0	33.4/38.5	51.1/57.5	60/60	47/53	230/230	55.9/62.3	60/70	51/57	234/234
	18.6/24.8		51.7/59.7	74.0/84.0	80/90	68/77	230/230	78.8/88.8	80/90	72/82	234/234	
	24.0/32.0		66.7/77.0	92.8/105.6	100/110	85/97	230/230	97.5/110.4	100/125	90/102	234/234	
	31.8/42.4	88.4/102.0	119.9/136.9	125/150	110/126	230/230	124.6/141.6	125/150	115/130	234/234		
	HIGH	—	—	49.0	60	52	256	52.8	60	56	260	
		7.8/10.4	21.7/25.0	49.0/50.0	60/60	52/52	256/256	52.8/54.8	60/60	56/56	260/260	
		12.0/16.0	33.4/38.5	60.5/66.9	70/70	56/62	256/256	65.3/71.6	70/80	60/66	260/260	
		18.6/24.8	51.7/59.7	83.4/93.4	90/100	77/86	256/256	88.1/98.1	90/100	81/90	260/260	
		24.0/32.0	66.7/77.0	102.1/115.0	110/125	94/106	256/256	106.9/119.8	110/125	98/110	260/260	
	31.8/42.4	88.4/102.0	129.3/146.3	150/150	119/135	256/256	134.0/151.0	150/175	123/139	260/260		
	460—3—60	STD	—	—	17.9	20	19	95	19.7	25	21	97
			13.9	16.7	24.1	25	22	95	26.4	30	24	97
			16.5	19.8	28.0	30	26	95	30.3	35	28	97
			27.8	33.4	45.0	50	41	95	47.3	50	43	97
			33.0	39.7	52.9	60	49	95	55.1	60	51	97
		41.7	50.2	66.0	70	61	95	68.3	70	63	97	
		MED	—	—	18.7	25	20	114	20.5	25	22	116
			13.9	16.7	25.1	30	23	114	27.4	30	25	116
			16.5	19.8	29.0	30	27	114	31.3	35	29	116
27.8			33.4	46.0	50	42	114	48.3	50	44	116	
33.0			39.7	53.9	60	50	114	56.1	60	52	116	
41.7		50.2	67.0	70	62	114	69.3	70	64	116		
HIGH		—	—	23.1	30	24	127	24.9	30	26	129	
		13.9	16.7	30.1	35	28	127	32.4	35	30	129	
		16.5	19.8	34.0	35	31	127	36.3	40	33	129	
	27.8	33.4	51.0	60	47	127	53.3	60	49	129		
	33.0	39.7	58.9	60	54	127	61.1	70	56	129		
41.7	50.2	72.0	80	66	127	74.3	80	68	129			
575—3—60	STD	—	—	13.1	15	14	77	16.9	20	18	81	
		17.0	20.4	28.5	30	26	77	33.3	35	31	81	
		34.0	40.9	54.1	60	50	77	58.9	60	54	81	
	MED	—	—	13.5	15	14	92	17.3	20	19	96	
		17.0	20.4	29.0	30	27	92	33.8	35	31	96	
		34.0	40.9	54.6	60	50	92	59.4	60	55	96	
	HIGH	—	—	16.6	20	17	106	20.4	25	22	110	
		17.0	20.4	32.5	35	30	106	37.3	40	34	110	
		34.0	40.9	58.1	60	53	106	62.9	70	58	110	

\* Nominal values, listed as 208/240V, 480V or 600V as appropriate.  
See Legend and calculations on page 85.

**Table 58 (cont.) MCA/MOCP DETERMINATION NO C.O. OR UNPWRD C.O.**

UNIT	NOM. V-PH-HZ	IFM TYPE	ELECTRIC HEATER		NO C.O. or UNPWR C.O.							
			Nom* (kW)	FLA	NO P.E.				w/ P.E. (pwrd fr/unit)			
					MCA	MOCP	DISC. SIZE		MCA	MOCP	DISC. SIZE	
							FLA	LRA			FLA	LRA
RAS101	208/230-3-60	STD	None	None	45.1	60	43	222	48.9	60	48	226
			7.8/10.4	21.7/25.0	45.1/45.1	60/60	43/43	222/222	48.9/48.9	60/60	48/48	226/226
			12.0/16.0	33.4/38.5	48.3/54.6	60/60	44/50	222/222	53.0/59.4	60/60	49/55	226/226
			18.6/24.8	51.7/59.7	71.1/81.1	80/90	65/75	222/222	75.9/85.9	80/90	70/79	226/226
			24.0/32.0	66.7/77.0	89.9/102.8	90/110	83/95	222/222	94.6/107.5	100/110	87/99	226/226
			31.8/42.4	88.4/102.0	117.0/134.0	125/150	108/123	222/222	121.8/138.8	125/150	112/128	226/226
		MED	None	None	45.1	60	43	233	48.9	60	48	237
			7.8/10.4	21.7/25.0	45.1/45.1	60/60	43/43	233/233	48.9/48.9	60/60	48/48	237/237
			12.0/16.0	33.4/38.5	48.3/54.6	60/60	44/50	233/233	53.0/59.4	60/60	49/55	237/237
	18.6/24.8		51.7/59.7	71.1/81.1	80/90	65/75	233/233	75.9/85.9	80/90	70/79	237/237	
	24.0/32.0		66.7/77.0	89.9/102.8	90/110	83/95	233/233	94.6/107.5	100/110	87/99	237/237	
	31.8/42.4		88.4/102.0	117.0/134.0	125/150	108/123	233/233	121.8/138.8	125/150	112/128	237/237	
	HIGH	None	None	49.9	60	49	276	53.7	80	53	280	
		7.8/10.4	21.7/25.0	49.9/49.9	60/60	49/49	276/276	53.7/53.7	80/80	53/53	280/280	
		12.0/16.0	33.4/38.5	54.3/60.6	60/70	50/56	276/276	59.0/65.4	80/80	54/60	280/280	
		18.6/24.8	51.7/59.7	77.1/87.1	80/90	71/80	276/276	81.9/91.9	90/100	75/85	280/280	
		24.0/32.0	66.7/77.0	95.9/108.8	100/110	88/100	276/276	100.6/113.5	110/125	93/104	280/280	
		31.8/42.4	88.4/102.0	123.0/140.0	125/150	113/129	276/276	127.8/144.8	150/150	118/133	280/280	
	460-3-60	STD	None	None	22.6	30	22	108	24.4	30	24	110
			13.9	16.7	24.1	30	22	108	26.4	30	24	110
			16.5	19.8	28.0	30	26	108	30.3	35	28	110
			27.8	33.4	45.0	50	41	108	47.3	50	43	110
			33.0	39.7	52.9	60	49	108	55.1	60	51	110
			41.7	50.2	66.0	70	61	108	68.3	70	63	110
MED		None	None	22.6	30	22	114	24.4	30	24	116	
		13.9	16.7	24.1	30	22	114	26.4	30	24	116	
		16.5	19.8	28.0	30	26	114	30.3	35	28	116	
		27.8	33.4	45.0	50	41	114	47.3	50	43	116	
		33.0	39.7	52.9	60	49	114	55.1	60	51	116	
		41.7	50.2	66.0	70	61	114	68.3	70	63	116	
HIGH		None	None	24.4	30	24	136	26.2	30	26	138	
		13.9	16.7	26.4	30	24	136	28.6	30	26	138	
		16.5	19.8	30.3	35	28	136	32.5	40	30	138	
		27.8	33.4	47.3	50	43	136	49.5	50	46	138	
		33.0	39.7	55.1	60	51	136	57.4	60	53	138	
		41.7	50.2	68.3	70	63	136	70.5	80	65	138	
575-3-60	STD	None	None	18.9	30	18	91	22.7	30	23	95	
		17.0	20.4	28.5	30	26	91	33.3	35	31	95	
		34.0	40.9	54.1	60	50	91	58.9	60	54	95	
	MED	None	None	18.5	30	18	95	22.3	30	22	99	
		17.0	20.4	28.0	30	26	95	32.8	35	30	99	
		34.0	40.9	53.6	60	49	95	58.4	60	54	99	
	HIGH	None	None	19.3	30	19	106	23.1	30	23	110	
		17.0	20.4	29.0	30	27	106	33.8	35	31	110	
		34.0	40.9	54.6	60	50	106	59.4	60	55	110	

\* Nominal values, listed as 208/240V, 480V or 600V as appropriate.  
See Legend and calculations on page 85.

**Table 58 (cont.) MCA/MOCP DETERMINATION NO C.O. OR UNPWRD C.O.**

UNIT	NOM. V—PH—HZ	IFM TYPE	ELECTRIC HEATER		NO C.O. or UNPWR C.O.							
			Nom (kW)	FLA	NO P.E.				w/ P.E. (pwrd fr/unit)			
					MCA	MOCP	DISC. SIZE		MCA	MOCP	DISC. SIZE	
							FLA	LRA			FLA	LRA
RAS102	208/230—3—60	STD	—	—	40.0	50	42	208	43.8	50	46	212
			7.8/10.4	21.7/25.0	40.0/40.0	50/50	42/42	208/208	43.8/43.8	50/50	46/46	212/212
			12.0/16.0	33.4/38.5	48.3/54.6	50/60	44/50	208/208	53.0/59.4	60/60	49/55	212/212
			18.6/24.8	51.7/59.7	71.1/81.1	80/90	65/75	208/208	75.9/85.9	80/90	70/79	212/212
			24.0/32.0	66.7/77.0	89.9/102.8	90/110	83/95	208/208	94.6/107.5	100/110	87/99	212/212
		31.8/42.4	88.4/102.0	117.0/134.0	125/150	108/123	208/208	121.8/138.8	125/150	112/128	212/212	
		MED	—	—	40.0	50	42	219	43.8	50	46	223
			7.8/10.4	21.7/25.0	40.0/40.0	50/50	42/42	219/219	43.8/43.8	50/50	46/46	223/223
			12.0/16.0	33.4/38.5	48.3/54.6	50/60	44/50	219/219	53.0/59.4	60/60	49/55	223/223
	18.6/24.8		51.7/59.7	71.1/81.1	80/90	65/75	219/219	75.9/85.9	80/90	70/79	223/223	
	24.0/32.0		66.7/77.0	89.9/102.8	90/110	83/95	219/219	94.6/107.5	100/110	87/99	223/223	
	31.8/42.4	88.4/102.0	117.0/134.0	125/150	108/123	219/219	121.8/138.8	125/150	112/128	223/223		
	HIGH	—	—	44.8	50	47	262	48.6	60	52	266	
		7.8/10.4	21.7/25.0	44.8/44.8	50/50	47/47	262/262	48.6/48.6	60/60	52/52	266/266	
		12.0/16.0	33.4/38.5	54.3/60.6	60/70	50/56	262/262	59.0/65.4	60/70	54/60	266/266	
		18.6/24.8	51.7/59.7	77.1/87.1	80/90	71/80	262/262	81.9/91.9	90/100	75/85	266/266	
		24.0/32.0	66.7/77.0	95.9/108.8	100/110	88/100	262/262	100.6/113.5	110/125	93/104	266/266	
	31.8/42.4	88.4/102.0	123.0/140.0	125/150	113/129	262/262	127.8/144.8	150/150	118/133	266/266		
	460—3—60	STD	—	—	18.3	20	19	109	20.1	25	21	111
			13.9	16.7	24.1	25	22	109	26.4	30	24	111
			16.5	19.8	28.0	30	26	109	30.3	35	28	111
			27.8	33.4	45.0	50	41	109	47.3	50	43	111
			33.0	39.7	52.9	60	49	109	55.1	60	51	111
		41.7	50.2	66.0	70	61	109	68.3	70	63	111	
MED		—	—	18.3	20	19	115	20.1	25	21	117	
		13.9	16.7	24.1	25	22	115	26.4	30	24	117	
		16.5	19.8	28.0	30	26	115	30.3	35	28	117	
		27.8	33.4	45.0	50	41	115	47.3	50	43	117	
		33.0	39.7	52.9	60	49	115	55.1	60	51	117	
41.7		50.2	66.0	70	61	115	68.3	70	63	117		
HIGH		—	—	20.1	25	21	137	21.9	25	23	139	
		13.9	16.7	26.4	30	24	137	28.6	30	26	139	
		16.5	19.8	30.3	35	28	137	32.5	35	30	139	
	27.8	33.4	47.3	50	43	137	49.5	50	46	139		
	33.0	39.7	55.1	60	51	137	57.4	60	53	139		
41.7	50.2	68.3	70	63	137	70.5	80	65	139			
575—3—60	STD	—	—	15.9	20	17	85	19.7	25	21	89	
		17.0	20.4	28.5	30	26	85	33.3	35	31	89	
		34.0	40.9	54.1	60	50	85	58.9	60	54	89	
	MED	—	—	15.5	20	16	89	19.3	25	20	93	
		17.0	20.4	28.0	30	26	89	32.8	35	30	93	
		34.0	40.9	53.6	60	49	89	58.4	60	54	93	
	HIGH	—	—	16.3	20	17	100	20.1	25	21	104	
		17.0	20.4	29.0	30	27	100	33.8	35	31	104	
		34.0	40.9	54.6	60	50	100	59.4	60	55	104	

\* Nominal values, listed as 208/240V, 480V or 600V as appropriate.  
See Legend and calculations on page 85.



**Table 58 (cont.) MCA/MOCP DETERMINATION NO C.O. OR UNPWRD C.O.**

UNIT	NOM. V-PH-HZ	IFM TYPE	ELECTRIC HEATER		NO C.O. or UNPWR C.O.							
			Nom* (kW)	FLA	NO P.E.				w/ P.E. (pwrd fr/unit)			
					MCA	MOCP	DISC. SIZE		MCA	MOCP	DISC. SIZE	
							FLA	LRA			FLA	LRA
RAS121	208/230-3-60	STD	None	None	45.8	60	44	263	49.6	60	48	267
			7.8/10.4	21.7/25.0	45.8/45.8	60/60	44/44	263/263	49.6/49.6	60/60	48/48	267/267
			12.0/16.0	33.4/38.5	48.3/54.6	60/60	44/50	263/263	53.0/59.4	60/60	49/55	267/267
			24.0/32.0	66.7/77.0	89.9/102.8	90/110	83/95	263/263	94.6/107.5	100/110	87/99	267/267
			31.8/42.4	88.4/102.0	117.0/134.0	125/150	108/123	263/263	121.8/138.8	125/150	112/128	267/267
		37.6/50.0	104.2/120.3	136.8/126.8	150/150	126/144	263/263	141.5/131.6	150/150	130/149	267/267	
		MED	None	None	50.6	60	50	306	54.4	80	54	310
			7.8/10.4	21.7/25.0	50.6/50.6	60/60	50/50	306/306	54.4/54.4	80/80	54/54	310/310
			12.0/16.0	33.4/38.5	54.3/60.6	60/80	50/56	306/306	59.0/65.4	80/80	54/60	310/310
	24.0/32.0		66.7/77.0	95.9/108.8	100/110	88/100	306/306	100.6/113.5	110/125	93/104	310/310	
	31.8/42.4		88.4/102.0	123.0/140.0	125/150	113/129	306/306	127.8/144.8	150/150	118/133	310/310	
	37.6/50.0	104.2/120.3	142.8/132.8	150/150	131/150	306/306	147.5/137.6	150/150	136/154	310/310		
	HIGH	None	None	55.6	80	55	315	59.4	80	60	319	
		7.8/10.4	21.7/25.0	55.6/55.6	80/80	55/55	315/315	59.4/59.4	80/80	60/60	319/319	
		12.0/16.0	33.4/38.5	60.5/66.9	80/80	56/62	315/315	65.3/71.6	80/80	60/66	319/319	
		24.0/32.0	66.7/77.0	102.1/115.0	110/125	94/106	315/315	106.9/119.8	110/125	98/110	319/319	
		31.8/42.4	88.4/102.0	129.3/146.3	150/150	119/135	315/315	134.0/151.0	150/175	123/139	319/319	
	37.6/50.0	104.2/120.3	149.0/139.1	150/175	137/156	315/315	153.8/143.8	175/175	141/160	319/319		
	460-3-60	STD	None	None	25.1	30	24	133	26.9	40	26	135
			13.9	16.7	25.1	30	24	133	26.9	40	26	135
			16.5	19.8	28.0	30	26	133	30.3	40	28	135
			33.0	39.7	52.9	60	49	133	55.1	60	51	135
			41.7	50.2	66.0	70	61	133	68.3	70	63	135
		50.0	60.1	63.4	70	72	133	65.6	70	74	135	
MED		None	None	26.9	40	26	155	28.7	45	28	157	
		13.9	16.7	26.9	40	26	155	28.7	45	28	157	
		16.5	19.8	30.3	40	28	155	32.5	45	30	157	
		33.0	39.7	55.1	60	51	155	57.4	60	53	157	
		41.7	50.2	68.3	70	63	155	70.5	80	65	157	
50.0		60.1	65.6	80	74	155	67.9	80	76	157		
HIGH		None	None	29.9	45	30	159	31.7	45	32	161	
		13.9	16.7	30.1	45	30	159	32.4	45	32	161	
		16.5	19.8	34.0	45	31	159	36.3	45	33	161	
	33.0	39.7	58.9	60	54	159	61.1	70	56	161		
	41.7	50.2	72.0	80	66	159	74.3	80	68	161		
50.0	60.1	69.4	80	78	159	71.6	80	80	161			
575-3-60	STD	None	None	18.5	30	18	95	22.3	30	22	99	
		17.0	20.4	28.0	30	26	95	32.8	35	30	99	
		34.0	40.9	53.6	60	49	95	58.4	60	54	99	
	MED	None	None	19.3	30	19	106	23.1	30	23	110	
		17.0	20.4	29.0	30	27	106	33.8	35	31	110	
		34.0	40.9	54.6	60	50	106	59.4	60	55	110	
	HIGH	None	None	22.1	30	22	120	25.9	30	26	124	
		17.0	20.4	32.5	35	30	120	37.3	40	34	124	
		34.0	40.9	58.1	60	53	120	62.9	70	58	124	
51.0	61.3	68.3	80	77	120	73.1	80	81	124			

\* Nominal values, listed as 208/240V, 480V or 600V as appropriate. See Legend and calculations on page 85.

**Table 58 (cont.) MCA/MOCP DETERMINATION NO C.O. OR UNPWRD C.O.**

UNIT	NOM. V-PH-HZ	IFM TYPE	ELECTRIC HEATER		NO C.O. or UNPWR C.O.							
			Nom* (kW)	FLA	NO P.E.		w/ P.E. (pwrd fr/unit)					
					MCA	MOCP	DISC. SIZE		MCA	MOCP	DISC. SIZE	
							FLA	LRA			FLA	LRA
RAS120	208/230-3-60	STD	-	-	43.7	50	46	258	47.5	60	50	262
			7.8/10.4	21.7/25.0	43.7/43.7	50/50	46/46	258/258	47.5/47.5	60/60	50/50	262/262
			12.0/16.0	33.4/38.5	48.3/54.6	50/60	46/50	258/258	53.0/59.4	60/60	50/55	262/262
			24.0/32.0	66.7/77.0	89.9/102.8	90/110	83/95	258/258	94.6/107.5	100/110	87/99	262/262
			31.8/42.4	88.4/102.0	117.0/134.0	125/150	108/123	258/258	121.8/138.8	125/150	112/128	262/262
		37.6/50.0	104.2/120.3	136.8/126.8	150/150	126/144	258/258	141.5/131.6	150/150	130/149	262/262	
		MED	-	-	48.5	60	51	301	52.3	60	56	305
			7.8/10.4	21.7/25.0	48.5/48.5	60/60	51/51	301/301	52.3/52.3	60/60	56/56	305/305
			12.0/16.0	33.4/38.5	54.3/60.6	60/70	51/56	301/301	59.0/65.4	60/70	56/60	305/305
	24.0/32.0		66.7/77.0	95.9/108.8	100/110	88/100	301/301	100.6/113.5	110/125	93/104	305/305	
	31.8/42.4		88.4/102.0	123.0/140.0	125/150	113/129	301/301	127.8/144.8	150/150	118/133	305/305	
	37.6/50.0	104.2/120.3	142.8/132.8	150/150	131/150	301/301	147.5/137.6	150/150	136/154	305/305		
	HIGH	-	-	53.5	60	57	310	57.3	70	61	314	
		7.8/10.4	21.7/25.0	53.5/53.5	60/60	57/57	310/310	57.3/57.3	70/70	61/61	314/314	
		12.0/16.0	33.4/38.5	60.5/66.9	70/70	57/62	310/310	65.3/71.6	70/80	61/66	314/314	
		24.0/32.0	66.7/77.0	102.1/115.0	110/125	94/106	310/310	106.9/119.8	110/125	98/110	314/314	
		31.8/42.4	88.4/102.0	129.3/146.3	150/150	119/135	310/310	134.0/151.0	150/175	123/139	314/314	
	37.6/50.0	104.2/120.3	149.0/139.1	150/175	137/156	310/310	153.8/143.8	175/175	141/160	314/314		
	460-3-60	STD	-	-	21.5	25	23	123	23.3	30	25	125
			13.9	16.7	24.1	25	23	123	26.4	30	25	125
			16.5	19.8	28.0	30	26	123	30.3	35	28	125
			33.0	39.7	52.9	60	49	123	55.1	60	51	125
			41.7	50.2	66.0	70	61	123	68.3	70	63	125
		50.0	60.1	63.4	70	72	123	65.6	70	74	125	
MED		-	-	23.3	30	25	145	25.1	30	27	147	
		13.9	16.7	26.4	30	25	145	28.6	30	27	147	
		16.5	19.8	30.3	35	28	145	32.5	35	30	147	
		33.0	39.7	55.1	60	51	145	57.4	60	53	147	
		41.7	50.2	68.3	70	63	145	70.5	80	65	147	
50.0		60.1	65.6	80	74	145	67.9	80	76	147		
HIGH		-	-	26.3	30	28	149	28.1	35	30	151	
		13.9	16.7	30.1	35	28	149	32.4	35	30	151	
		16.5	19.8	34.0	35	31	149	36.3	40	33	151	
	33.0	39.7	58.9	60	54	149	61.1	70	56	151		
	41.7	50.2	72.0	80	66	149	74.3	80	68	151		
50.0	60.1	69.4	80	78	149	71.6	80	80	151			
575-3-60	STD	-	-	16.2	20	17	93	20.0	25	21	97	
		17.0	20.4	28.0	30	26	93	32.8	35	30	97	
		34.0	40.9	53.6	60	49	93	58.4	60	54	97	
	51.0	61.3	63.8	70	73	93	68.6	80	77	97		
	MED	-	-	17.0	20	18	104	20.8	25	22	108	
		17.0	20.4	29.0	30	27	104	33.8	35	31	108	
		34.0	40.9	54.6	60	50	104	59.4	60	55	108	
	51.0	61.3	64.8	70	74	104	69.6	80	78	108		
	HIGH	-	-	19.8	25	21	118	23.6	30	25	122	
17.0		20.4	32.5	35	30	118	37.3	40	34	122		
34.0		40.9	58.1	60	53	118	62.9	70	58	122		
51.0	61.3	68.3	80	77	118	73.1	80	81	122			

\* Nominal values, listed as 208/240V, 480V or 600V as appropriate. See Legend and calculations on page 85.

**Table 58 (cont.) MCA/MOCP DETERMINATION NO C.O. OR UNPWRD C.O.**

UNIT	NOM. V-PH-HZ	IFM TYPE	ELECTRIC HEATER		NO C.O. or UNPWR C.O.							
			Nom* (kW)	FLA	NO P.E.		w/ P.E. (pwrd fr/unit)					
					MCA	MOCP	DISC. SIZE		MCA	MOCP	DISC. SIZE	
							FLA	LRA			FLA	LRA
RAS150	208/230-3-60	STD	-	-	60.7	80	63	360	64.5	80	68	364
			7.8/10.4	21.7/25.0	60.7/60.7	80/80	63/63	360/360	64.5/64.5	80/80	68/68	364/364
			12.0/16.0	33.4/38.5	60.7/60.7	80/80	63/63	360/360	64.5/64.5	80/80	68/68	364/364
			24.0/32.0	66.7/77.0	92.8/105.6	100/110	85/97	360/360	97.5/110.4	100/125	90/102	364/364
			31.8/42.4	88.4/102.0	119.9/136.9	125/150	110/126	360/360	124.6/141.6	125/150	115/130	364/364
		37.6/50.0	104.2/120.3	139.6/129.7	150/150	128/147	360/360	144.4/134.4	150/150	133/151	364/364	
		MED	-	-	63.2	80	66	377	67.0	80	71	381
			7.8/10.4	21.7/25.0	63.2/63.2	80/80	66/66	377/377	67.0/67.0	80/80	71/71	381/381
			12.0/16.0	33.4/38.5	63.2/63.2	80/80	66/66	377/377	67.0/67.0	80/80	71/71	381/381
	24.0/32.0		66.7/77.0	95.9/108.8	100/110	88/100	377/377	100.6/113.5	110/125	93/104	381/381	
	31.8/42.4		88.4/102.0	123.0/140.0	125/150	113/129	377/377	127.8/144.8	150/150	118/133	381/381	
	37.6/50.0	104.2/120.3	142.8/132.8	150/150	131/150	377/377	147.5/137.6	150/150	136/154	381/381		
	HIGH	-	-	68.2	80	72	386	72.0	80	76	390	
		7.8/10.4	21.7/25.0	68.2/68.2	80/80	72/72	386/386	72.0/72.0	80/80	76/76	390/390	
		12.0/16.0	33.4/38.5	68.2/68.2	80/80	72/72	386/386	72.0/72.0	80/80	76/76	390/390	
		24.0/32.0	66.7/77.0	102.1/115.0	110/125	94/106	386/386	106.9/119.8	110/125	98/110	390/390	
		31.8/42.4	88.4/102.0	129.3/146.3	150/150	119/135	386/386	134.0/151.0	150/175	123/139	390/390	
	37.6/50.0	104.2/120.3	149.0/139.1	150/175	137/156	386/386	153.8/143.8	175/175	141/160	390/390		
	460-3-60	STD	-	-	29.5	40	31	181	31.3	40	33	183
			13.9	16.7	29.5	40	31	181	31.3	40	33	183
			16.5	19.8	29.5	40	31	181	31.3	40	33	183
			33.0	39.7	53.9	60	50	181	56.1	60	52	183
			41.7	50.2	67.0	70	62	181	69.3	70	64	183
		50.0	60.1	64.4	70	73	181	66.6	70	75	183	
MED		-	-	30.5	40	32	190	32.3	40	34	192	
		13.9	16.7	30.5	40	32	190	32.3	40	34	192	
		16.5	19.8	30.5	40	32	190	32.5	40	34	192	
		33.0	39.7	55.1	60	51	190	57.4	60	53	192	
		41.7	50.2	68.3	70	63	190	70.5	80	65	192	
50.0		60.1	65.6	80	74	190	67.9	80	76	192		
HIGH		-	-	33.5	40	35	194	35.3	45	37	196	
		13.9	16.7	33.5	40	35	194	35.3	45	37	196	
		16.5	19.8	34.0	40	35	194	36.3	45	37	196	
	33.0	39.7	58.9	60	54	194	61.1	70	56	196		
	41.7	50.2	72.0	80	66	194	74.3	80	68	196		
50.0	60.1	69.4	80	78	194	71.6	80	80	196			
575-3-60	STD	-	-	22.3	30	23	142	26.1	30	28	146	
		17.0	20.4	29.0	30	27	142	33.8	35	31	146	
		34.0	40.9	54.6	60	50	142	59.4	60	55	146	
	51.0	61.3	64.8	70	74	142	69.6	80	78	146		
	MED	-	-	22.3	30	23	142	26.1	30	28	146	
		17.0	20.4	29.0	30	27	142	33.8	35	31	146	
		34.0	40.9	54.6	60	50	142	59.4	60	55	146	
	51.0	61.3	64.8	70	74	142	69.6	80	78	146		
	HIGH	-	-	25.1	30	27	156	28.9	35	31	160	
17.0		20.4	32.5	35	30	156	37.3	40	34	160		
34.0		40.9	58.1	60	53	156	62.9	70	58	160		
51.0	61.3	68.3	80	77	156	73.1	80	81	160			

\* Nominal values, listed as 208/240V, 480V or 600V as appropriate. See Legend and calculations on page 85.

**Table 58 (cont.) MCA/MOCP DETERMINATION NO C.O. OR UNPWRD C.O.**

Unit	NOM. V—PH—HZ	IFM TYPE	ELECTRIC HEATER		NO C.O. or UNPWR C.O.							
			Nom* (kW)	FLA	NO P.E.				w/ P.E. (pwrd fr/unit)			
					MCA	MOCP	DISC. SIZE		MCA	MOCP	DISC. SIZE	
							FLA	LRA			FLA	LRA
RAS180	208/230-3-60	STD	-	-	68.3	80	71	396	72.1	80	76	400
			12.4/16.5	34.4/39.7	68.3/68.3	80/80	71/71	396/396	72.1/72.1	80/80	76/76	400/400
			25.2/33.5	69.9/80.6	96.8/110.1	100/125	89/101	396/396	101.5/114.9	110/125	93/106	400/400
			32.7/43.5	90.7/104.7	122.8/140.3	125/150	113/129	396/396	127.5/145.0	150/150	117/133	400/400
			37.6/50.0	104.3/120.3	139.8/129.7	150/150	129/147	396/396	144.5/134.4	150/150	133/151	400/400
			50.3/67.0	139.7/161.2	149.1/170.6	175/200	169/194	396/396	153.8/175.3	175/200	174/198	400/400
		MED	-	-	70.8	80	74	413	74.6	90	79	417
			12.4/16.5	34.4/39.7	70.8/70.8	80/80	74/74	413/413	74.6/74.6	90/90	79/79	417/417
			25.2/33.5	69.9/80.6	99.9/113.3	100/125	92/104	413/413	104.6/118.0	110/125	96/109	417/417
			32.7/43.5	90.7/104.7	125.9/143.4	150/150	116/132	413/413	130.6/148.1	150/150	120/136	417/417
			37.6/50.0	104.3/120.3	142.9/132.8	150/150	131/150	413/413	147.6/137.6	150/150	136/154	417/417
			50.3/67.0	139.7/161.2	152.2/173.7	175/200	172/197	413/413	157.0/178.5	175/200	177/201	417/417
	HIGH High Efficiency	-	-	81.2	100	86	432	85.0	100	91	436	
		12.4/16.5	34.4/39.7	81.2/81.2	100/100	86/86	432/432	85.0/85.0	100/100	91/91	436/436	
		25.2/33.5	69.9/80.6	112.9/126.3	125/150	104/116	432/432	117.6/131.0	125/150	108/121	436/436	
		32.7/43.5	90.7/104.7	138.9/156.4	150/175	128/144	432/432	143.6/161.1	150/175	132/148	436/436	
		37.6/50.0	104.3/120.3	155.9/145.8	175/175	143/162	432/432	160.6/150.6	175/175	148/166	436/436	
		50.3/67.0	139.7/161.2	165.2/186.7	175/225	184/209	432/432	170.0/191.5	175/225	188/213	436/436	
	460-3-60	STD	-	-	34.0	45	35	234	35.8	45	37	236
			16.5	19.9	34.0	45	35	234	35.8	45	37	236
			33.5	40.3	54.6	60	50	234	56.9	60	52	236
			43.5	52.3	69.6	70	64	234	71.9	80	66	236
			50.0	60.2	64.5	70	73	234	66.7	70	75	236
			67.0	80.6	84.9	90	97	234	87.1	100	99	236
MED		-	-	35.0	45	37	243	36.8	45	39	245	
		16.5	19.9	35.0	45	37	243	36.8	45	39	245	
		33.5	40.3	55.9	60	51	243	58.1	60	53	245	
		43.5	52.3	70.9	80	65	243	73.1	80	67	245	
		50.0	60.2	65.7	80	74	243	68.0	80	76	245	
		67.0	80.6	86.1	100	98	243	88.4	100	100	245	
HIGH High Efficiency	-	-	40.8	50	43	252	42.6	50	45	254		
	16.5	19.9	40.8	50	43	252	42.6	50	45	254		
	33.5	40.3	63.1	70	58	252	65.4	70	60	254		
	43.5	52.3	78.1	80	72	252	80.4	90	74	254		
	50.0	60.2	73.0	80	81	252	75.2	80	83	254		
	67.0	80.6	93.4	100	104	252	95.6	100	106	254		
575-3-60	STD	-	-	26.5	30	28	184	30.3	40	32	188	
		16.5	15.9	26.5	30	28	184	30.3	40	32	188	
		33.5	32.2	43.8	45	40	184	48.5	50	45	188	
		43.5	41.8	55.8	60	51	184	60.5	70	56	188	
		50.0	48.1	51.6	60	59	184	56.4	60	63	188	
		67.0	64.4	67.9	80	77	184	72.7	80	82	188	
	MED	-	-	26.5	30	28	184	30.3	40	32	188	
		16.5	15.9	26.5	30	28	184	30.3	40	32	188	
		33.5	32.2	43.8	45	40	184	48.5	50	45	188	
		43.5	41.8	55.8	60	51	184	60.5	70	56	188	
		50.0	48.1	51.6	60	59	184	56.4	60	63	188	
		67.0	64.4	67.9	80	77	184	72.7	80	82	188	
HIGH High Efficiency	-	-	32.7	40	35	196	36.5	45	39	200		
	16.5	15.9	32.7	40	35	196	36.5	45	39	200		
	33.5	32.2	51.5	60	47	196	56.3	60	52	200		
	43.5	41.8	63.5	70	58	196	68.3	70	63	200		
	50.0	48.1	59.4	70	66	196	64.1	70	70	200		
	67.0	64.4	75.7	80	84	196	80.4	90	89	200		

\* Nominal values, listed as 208/240V, 480V or 600V as appropriate.  
See Legend and calculations on page 85.

**Table 58 (cont.) MCA/MOCP DETERMINATION NO C.O. OR UNPWRD C.O.**

**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

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

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.

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

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

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

**NOTES:**

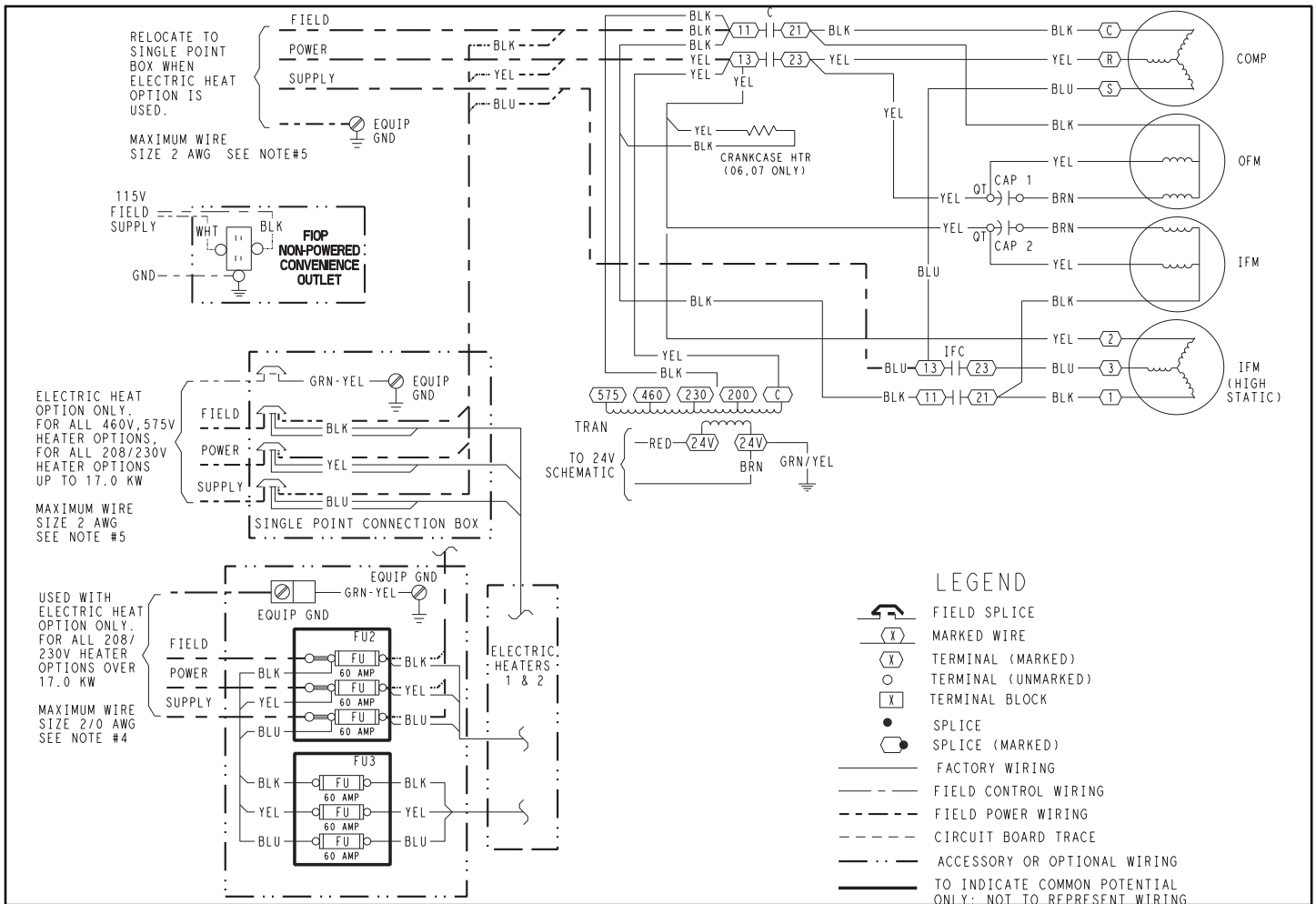
1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. Canadian units may be fuse or circuit breaker.

**2. Unbalanced 3-Phase Supply Voltage**

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

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

## Typical Power Diagram – 1 Stage Cooling



C07466

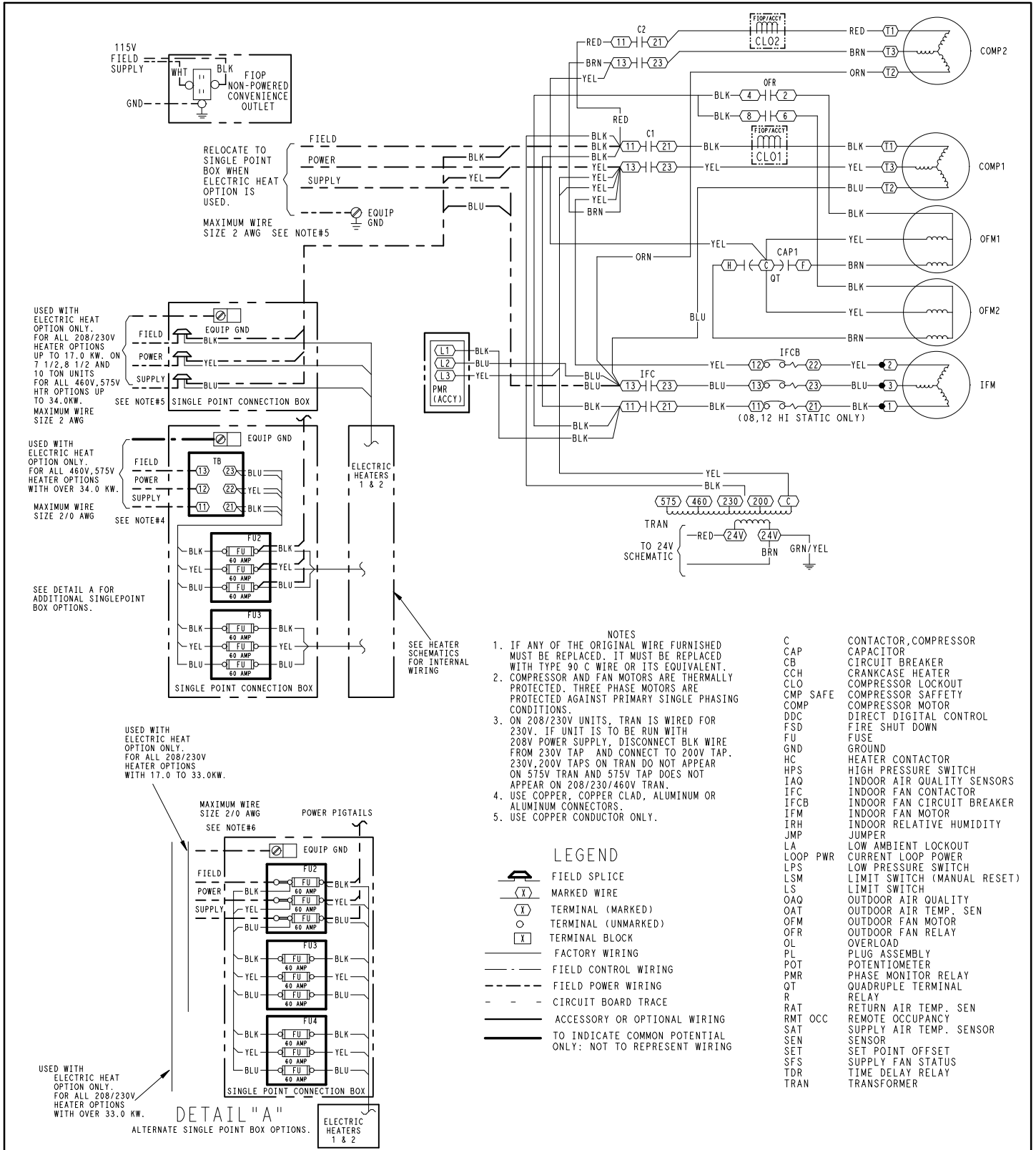
### LEGEND

C	– Contactor, compressor	OAT	– Outdoor air temp sensor
CAP	– Capacitor	OFM	– Outdoor fan motor
CB	– Circuit breaker	OLR	– Overload relay
COMP	– Compressor motor	PL	– Plug assembly
DDC	– Direct digital control	POT	– Potentiometer
FU	– Fuse	PMR	– Phase monitor relay
GND	– Ground	QT	– Quadruple terminal
HPS	– High pressure switch	R	– Relay
IAQ	– Indoor air quality sensors	RAT	– Return air temp sensor
IFC	– Indoor fan contactor	SAT	– Supply air temp sensor
IFM	– Indoor fan motor	TDR	– Time delay relay
LA	– Low ambient lockout	TRAN	– Transformer
LPS	– Low pressure switch		

### NOTES:

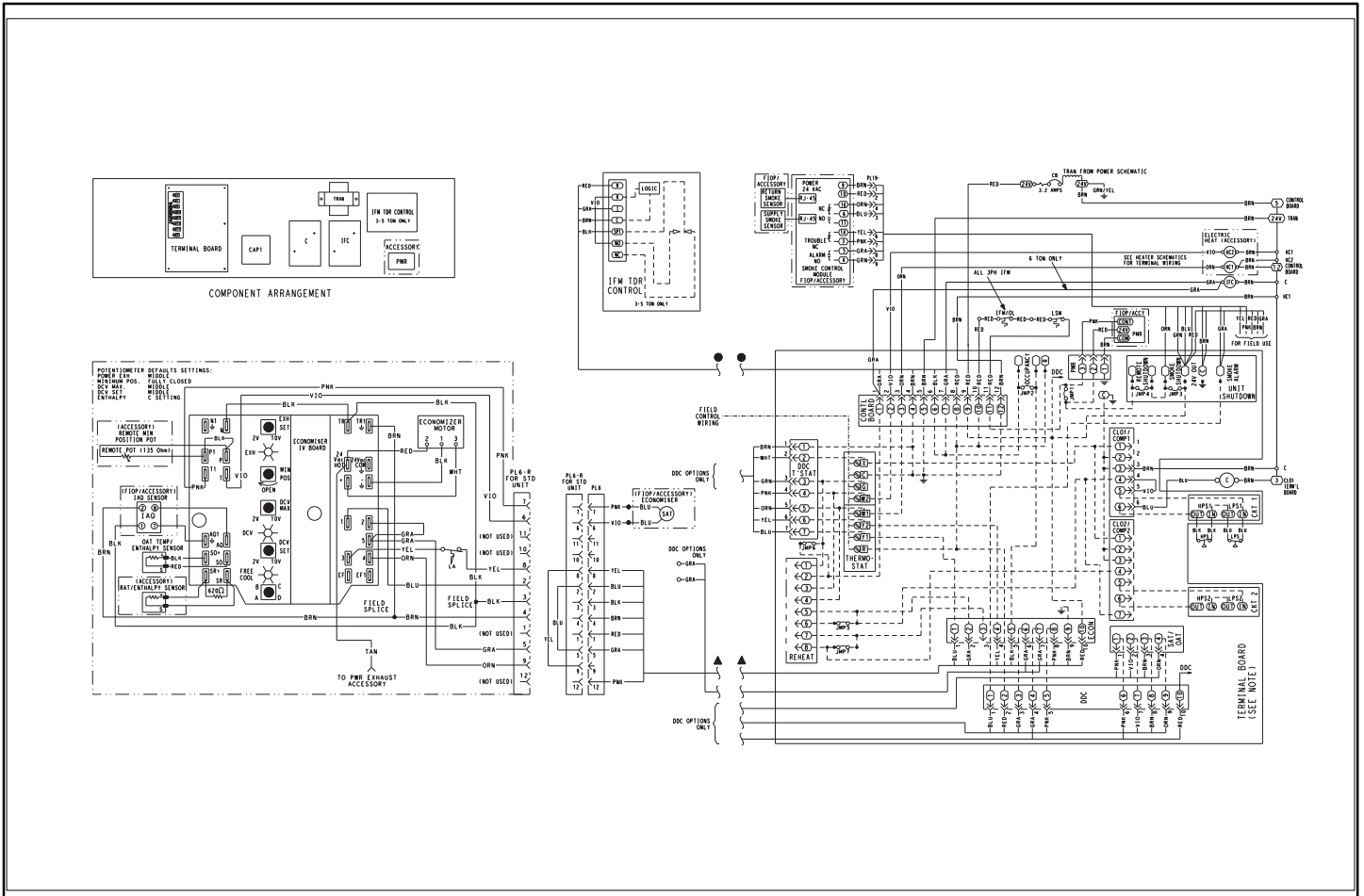
1. If any of the original wire furnished must be replaced, it must be replaced with type 90 C wire or its equivalent.
2. Compressor and fan motors are thermally protected. Three phase motors are protected against primary single phasing conditions.
3. On 208/230V units, transformer is wired for 230V. If unit is to be run with 208V power supply, disconnect black wire from 230V tap and connect to 200V tap. 230V, 200V taps on transformer do not appear on 575V transformer and 575V tap does not appear on 208/23/460V transformer.
4. Use copper, copper clad, aluminum or aluminum connectors.
5. Use copper conductor only.

# Typical Power Diagram – 2 Stage Cooling



C08536

# Typical Wiring Diagram –1 Stage Cooling



C08002

## NOTES:

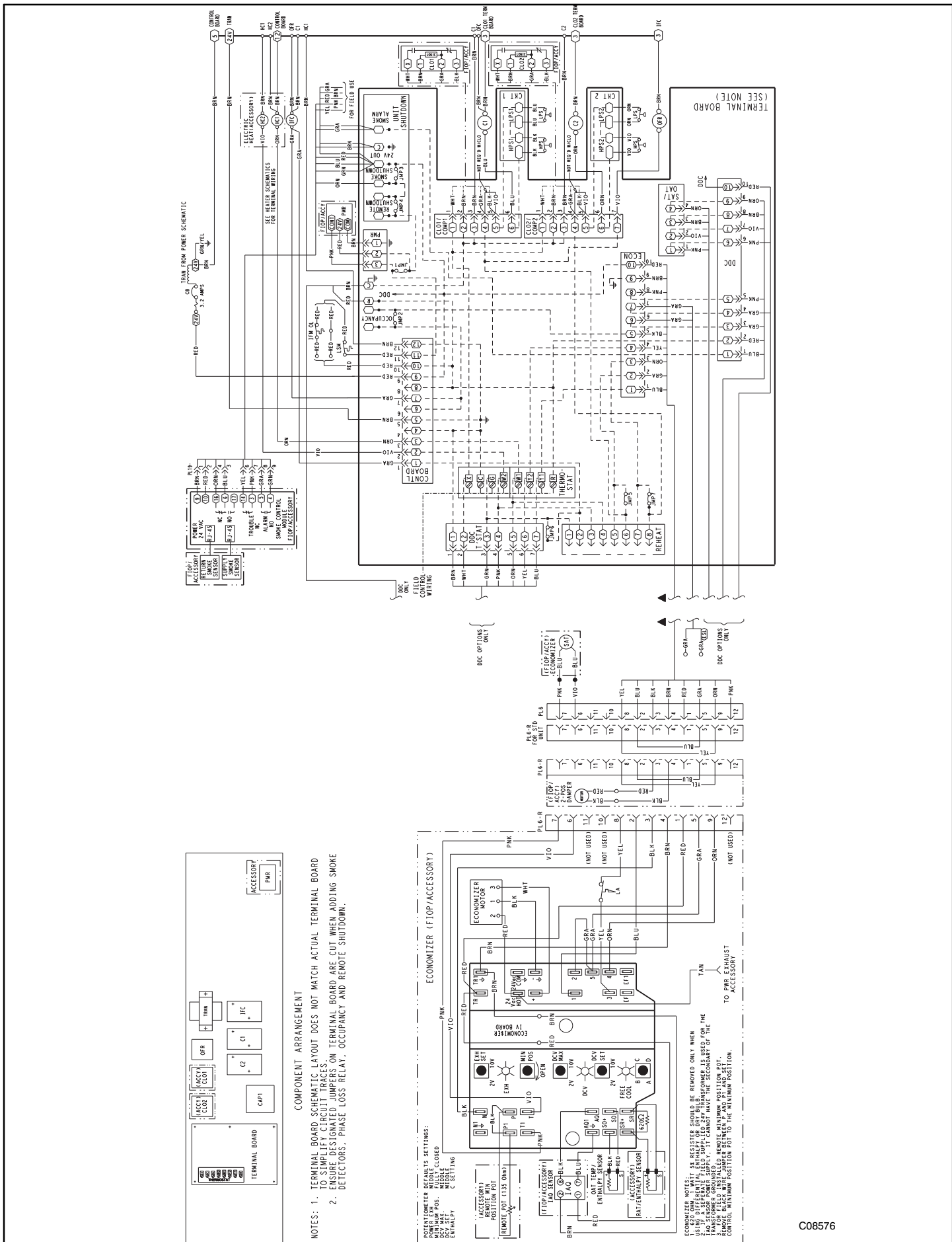
Terminal board schematic layout does not match actual terminal board to simplify circuit traces. Ensure designated jumpers on terminal board are cut when adding smoke detectors, phase loss relay and remote shutdown.

## ECONOMIZER NOTES:

1. 620 ohm, 1 watt, 5% resistor should be removed only when using differential enthalpy or dry bulb.
2. If a separate field-supplied 24V transformer is used for the IAQ sensor power supply, it cannot have the secondary of the transformer grounded.
3. For field-installed remote minimum position POT, remove black wire jumper between P and P1 and set control minimum position POT to the minimum position.



## Typical Wiring Diagram - 2 Stage Cooling



C08576

# 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-fan 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-fan motor runs continuously while unit is cooling.

### Heating

**NOTE:** The RAS is sold as cooling only. If electric heaters are required, use only factory-approved electric heaters. They will operate as described below.

Units have either 1 or 2 stages of electric heat. When the thermostat calls for heating, power is applied to the W1 terminal at the unit. The unit control will energize the indoor fan contactor and the first stage of electric heat. On units with two-stage heating, when additional heating is required, the second stage of electric heat (if equipped) will be energized when power is applied at the W2 terminal on the unit.

## 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 (9°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 accessory CO<sub>2</sub> sensors are connected to the EconoMi\$er IV control, a demand controlled ventilation strategy will begin to operate. As the CO<sub>2</sub> level in the zone increases above the CO<sub>2</sub> setpoint, the minimum position of the damper will be increased proportionally. As the CO<sub>2</sub> level decreases because of the increase in fresh air, the outdoor-air damper will be proportionally closed. 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 setpoint 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 setpoint. The EconoMi\$er IV damper will be open at maximum position. EconoMi\$er 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 – RAS036–180

Note about this specification:

## COOLING ONLY/ELECTRIC HEAT PACKAGED ROOFTOP

### HVAC Guide Specifications

Size Range: 3 to 15 Nominal Tons



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

<b>23 07 16</b>	<b>HVAC Equipment Insulation</b>
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23 07 16.13	Decentralized, Rooftop Units:
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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.	Electric 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.

<b>23 09 13</b>	<b>Instrumentation and Control Devices for HVAC</b>
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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. include capability for occupancy scheduling.

<b>23 09 33</b>	<b>Electric and Electronic Control System for HVAC</b>
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23 09 33.13	Decentralized, Rooftop Units:
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23 09 33.13.A.	General:
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1. Shall be complete with self-contained low-voltage control circuit protected by a resettable circuit breaker on the 24-v transformer side. Transformer shall have 75VA capability.
2. Shall utilize color-coded wiring.
3. Shall include a central control terminal board to conveniently and safely provide connection points for vital control functions such as: smoke detectors, phase monitor, economizer, thermostat, DDC control options, and low and high pressure switches.
4. Unit shall include a minimum of one 8-pin screw terminal connection board for connection of control wiring.

23 09 33.23.B.	Safeties:
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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 technician to correctly wire and or troubleshoot the rooftop unit.
3. High-pressure switch.
  - a. Units with 2 compressors shall have different sized connectors for the circuit 1 and circuit 2 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 technician to correctly wire and or troubleshoot the rooftop unit.

4. Automatic reset, motor thermal overload protector.

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

23 09 93.13 Decentralized, Rooftop Units:

23 09 93.13 INSERT SEQUENCE OF OPERATION

### **23 40 13 Panel Air Filters**

23 40 13.13 Decentralized, Rooftop Units:

23 40 13.13.A. Standard filter section

1. Shall consist of factory-installed, low velocity, throwaway 2-in. thick fiberglass filters of commercially available sizes.
2. Unit shall use only one filter size. Multiple sizes are not acceptable.
3. Filters shall be accessible through 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

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, R-410A 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 AHRI Standards 210/240 and 340/360.
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.D. Project Conditions

1. As specified in the contract.

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 AHRI Standard 210/240 or 340/360 at ± 10% voltage.
2. Compressor with standard controls shall be capable of operation from 40°F (4°C) , ambient outdoor temperatures. Accessory winter start kit is necessary if mechanically cooling at ambient temperatures below 25°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): 60, Hardness: H-2H Pencil hardness.
3. Evaporator fan compartment interior cabinet insulation shall conform to AHRI Standards 210/240 or 340/360 minimum exterior sweat criteria. Interior surfaces shall be insulated with a minimum 1/2-in. thick, 1 lb density, flexible fiberglass insulation, neoprene coated on the air side. Aluminum foil-faced fiberglass insulation shall be used in the heat compartment.
4. Base of unit shall have a minimum of four locations for 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 end of the drain pan. Connection shall be made per manufacturer's recommendations.

7. Top panel:

- a. Shall be a single piece top panel on 036 thru 121 sizes, two piece on 150 – 180 size.

8. Electrical Connections

- a. All unit power wiring shall enter unit cabinet at a single, factory-prepared, knockout location.
- b. Thru-the-base capability
  - (1.) Standard unit shall have a thru-the-base electrical location(s) using a raised, embossed portion of the unit basepan.
  - (2.) Optional, factory-approved, water-tight connection method must be used for thru-the-base electrical connections.
  - (3.) No basepan penetration, other than those authorized by the manufacturer, is permitted.

9. Component access panels (standard)

- a. Cabinet panels shall be easily removable for servicing.
- b. Unit shall have one factory installed, tool-less, removable, filter access panel.
- c. Panels covering control box, indoor fan, indoor fan motor, gas components (where applicable), and compressors shall have molded composite handles.
- d. Handles shall be UV modified, composite. permanently attached, and recessed into the panel.
- e. Screws on the vertical portion of all removable access panel shall engage into heat resistant, molded composite collars.
- f. Collars shall be removable and easily replaceable using manufacturer recommended parts.

23 81 19.13.I. N/A

23 81 19.13.J. Coils

1. Standard Aluminum/Copper Coils: (036 – 121 single compressor/single stage cooling models only)

- a. Standard evaporator and condenser coils shall have aluminum lanced plate fins mechanically bonded to seamless internally grooved copper tubes with all joints brazed.
  - b. Evaporator coils shall be leak tested to 150 psig, pressure tested to 450 psig, and qualified to UL 1995 burst test at 1775 psig.
  - c. Condenser coils shall be leak tested to 150 psig, pressure tested to 650 psig, and qualified to UL 1995 burst test at 1980 psig.
2. Optional Pre-coated aluminum-fin condenser coils: (036 – 121 single compressor/single stage cooling models only)
    - 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 condenser coils: (036 – 121 single compressor/single stage cooling models only)
    - a. Shall be constructed of copper fins mechanically bonded to copper tubes and copper tube sheets.
    - b. Galvanized steel tube sheets shall not be acceptable.
    - c. A polymer strip shall prevent coil assembly from contacting the sheet metal coil pan to minimize potential for galvanic corrosion between coil and pan.
  4. Optional E-coated aluminum-fin evaporator and condenser coils: (036 – 121 single compressor/single stage cooling models only)
    - a. Shall have a flexible epoxy polymer coating uniformly applied to all coil surface areas without material bridging between fins.
    - b. Coating process shall ensure complete coil encapsulation of tubes, fins and headers.
    - c. Color shall be high gloss black with gloss per ASTM D523-89.
    - d. Uniform dry film thickness from 0.8 to 1.2 mil on all surface areas including fin edges.
    - e. Superior hardness characteristics of 2H per ASTM D3363-92A and cross-hatch adhesion of 4B-5B per ASTM D3359-93.
    - f. Impact resistance shall be up to 160 in.-lb (ASTM D2794-93).
    - g. Humidity and water immersion resistance shall be up to minimum 1000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92).
    - h. Corrosion durability shall be confirmed through testing to be no less than 1000 hours salt spray per ASTM B117-90.
  5. Standard Coils: (090 – 180 two compressor models/two stage cooling models only)
    - a. Standard evaporator coils shall have aluminum lanced plate fins mechanically bonded to seamless internally grooved copper tubes with all joints brazed.
    - b. Evaporator coils shall be leak tested to 150 psig, pressure tested to 450 psig, and qualified to UL 1995 burst test at 1775 psig.
    - c. Standard condenser coils shall have all aluminum RTPF Heat Exchanger Technology design consisting of aluminum multi port flat tube design and aluminum fin. Coils shall be a furnace brazed design and contain epoxy lined shrink wrap on all aluminum to copper connections.
    - d. Condenser coils shall be leak tested to 150 psig, pressure tested to 650 psig, and qualified to UL 1995 burst test at 1980 psig.
  6. Optional E-coated aluminum-fin, aluminum tube condenser coils:
    - a. Shall have a flexible epoxy polymer coating uniformly applied to all coil external surface areas without material bridging between fins or louvers.
    - b. Coating process shall ensure complete coil encapsulation, including all exposed fin edges.
    - c. E-coat thickness of 0.8 to 1.2 mil with top coat having a uniform dry film thickness from 1.0 to 2.0 mil on all external coil surface areas, including fin edges, shall be provided.
    - d. Shall have superior hardness characteristics of 2H per ASTM D3363-00 and cross-hatch adhesion of 4B-5B per ASTM D3359-02.
    - e. Shall have superior impact resistance with no cracking, chipping or peeling per NSF/ANSI 51-2002 Method 10.2.

#### 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. Models shall be available with single compressor designs on 036 – 121 models, plus additional 2 compressor (stage) models from 090 – 180 sizes.
  - c. Compressor motors shall be cooled by refrigerant gas passing through motor windings.
  - d. Compressors shall be internally protected from high discharge temperature conditions.
  - e. Compressors shall be protected from an over-temperature and over-ampereage conditions by an internal, motor overload device.
  - f. Compressor shall be factory mounted on rubber grommets.
  - g. Compressor motors shall have internal line break thermal, current overload and high pressure differential protection.
  - h. Crankcase heaters shall not be required for normal operating range, unless provided by the factory.

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. Filters shall be standard, commercially available sizes.
- 5. 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 or circuit breaker.
  - 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 on 036 – 121 models and shaft-up design on 150 – 180 size with rain shield.
- 2. Condenser Fans:
  - a. Shall be a direct-driven propeller type fan.
  - b. Shall have aluminum blades riveted to corrosion-resistant steel spiders and shall be dynamically balanced.

23 81 19.13.O. Special Features, Options and Accessories

- 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 setpoint 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 setpoint.
  - m. Dampers shall be completely closed when the unit is in the unoccupied mode.
  - n. Economizer controller shall accept a 2-10Vdc CO<sub>2</sub> sensor input for IAQ/DCV control. In this mode, dampers shall modulate the outdoor-air damper to provide ventilation based on the sensor input.
  - 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 damper gear. No linkage arms or control rods shall be acceptable.
  - e. Damper will admit up to 100% outdoor air for applicable rooftop units.
  - f. Damper shall close upon indoor (evaporator) fan shutoff and/or loss of power.
  - g. The damper actuator shall plug into the rooftop unit's wiring harness plug. No hard wiring shall be required.
  - h. Outside air hood shall include aluminum water entrainment filter
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. Condenser Coil Hail Guard Assembly
- a. Shall protect against damage from hail.
  - b. Shall be louvered design.
6. 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.
7. Convenience Outlet:
- e. Non-Powered convenience outlet.
    - (1.) Outlet shall be powered from a separate 115/120v power source.
    - (2.) A transformer shall not be included.
    - (3.) Outlet shall be factory-installed and internally mounted with easily accessible 115-v female receptacle.



- (4.) Outlet shall include 15 amp GFI receptacles with independent fuse protection.
  - (5.) Outlet shall be accessible from outside the unit.
  - (6.) Outlet shall include a field-installed "Wet in Use" cover.
8. Thru-the-Base Connectors:
    - a. Kits shall provide connectors to permit electrical connections to be brought to the unit through the unit basepan.
    - b. Minimum of four connection locations per unit.
  9. Supply Duct Cover (180 size only):
    - a. Required when field converting the factory standard vertical duct supply to horizontal duct supply configuration. One required per unit.
  10. 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.
  11. Roof Curbs (Vertical):
    - a. Full perimeter roof curb with exhaust capability providing separate air streams for energy recovery from the exhaust air without supply air contamination.
    - b. Formed galvanized steel with wood nailer strip and shall be capable of supporting entire unit weight.
    - c. Permits installation and securing of ductwork to curb prior to mounting unit on the curb.
  12. High-Static Indoor Fan Motor(s) and Drive(s) (036-180 ):
    - a. High-static motor(s) and drive(s) shall be factory-installed to provide additional performance range.
  13. Condenser Coil Grille:
    - a. The grille protects the condenser coil from damage by large objects without increasing unit clearances.
  14. Thru-the-Bottom Utility Connectors:
    - a. Kit shall provide connectors to permit electrical connections to be brought to the unit through the basepan.
  15. Outdoor Air Enthalpy Sensor:
    - a. The outdoor air enthalpy sensor shall be used to provide single enthalpy control. When used in conjunction with a return air enthalpy sensor, the unit will provide differential enthalpy control. The sensor allows the unit to determine if outside air is suitable for free cooling.
  16. Return Air Enthalpy Sensor:
    - a. The return air enthalpy sensor shall be used in conjunction with an outdoor air enthalpy sensor to provide differential enthalpy control.
  17. Indoor Air Quality (CO<sub>2</sub>) Sensor:
    - a. Shall be able to provide demand ventilation indoor air quality (IAQ) control.
    - b. The IAQ sensor shall be available in duct mount, wall mount, or wall mount with LED display. The setpoint shall have adjustment capability.
  18. Smoke detectors (factory-installed only):
    - a. Shall be a Four-Wire Controller and Detector.
    - b. Shall be environmental compensated with differential sensing for reliable, stable, and drift-free sensitivity.
    - c. Shall use magnet-activated test/reset sensor switches.
    - d. Shall have tool-less connection terminal access.
    - e. Shall have a recessed momentary switch for testing and resetting the detector.
    - f. Controller shall include:
      - (1.) One set of normally open alarm initiation contacts for connection to an initiating device circuit on a fire alarm control panel.
      - (2.) Two Form-C auxiliary alarm relays for interface with rooftop unit or other equipment.
      - (3.) One Form-C supervision (trouble) relay to control the operation of the Trouble LED on a remote test/reset station.
      - (4.) Capable of direct connection to two individual detector modules.
      - (5.) Can be wired to up to 14 other duct smoke detectors for multiple fan shutdown applications.
  19. Winter start kit
    - a. Shall contain a bypass device around the low pressure switch.

- b. Shall be required when mechanical cooling is required down to 25°F (-4°C).
- c. Shall not be required to operate on an economizer when below an outdoor ambient of 40°F (4°C).

20. Time Guard

- a. Shall prevent compressor short cycling by providing a 5-minute delay ( $\pm 2$  minutes) before restarting a compressor after shutdown for any reason.
- b. One device shall be required per compressor.

21. Electric Heat:

a. Heating Section

- (1.) Heater element open coil resistance wire, nickel-chrome alloy, 0.29 inches inside diameter, strung through ceramic insulators mounted on metal frame. Coil ends are staked and welded to terminal screw slots.
- (2.) Heater assemblies are provided with integral fusing for protection of internal heater circuits not exceeding 48 amps each. Auto reset thermo limit controls, magnetic heater contactors (24 v coil) and terminal block all mounted in electric heater control box (minimum 18 ga galvanized steel) attached to end of heater assembly.