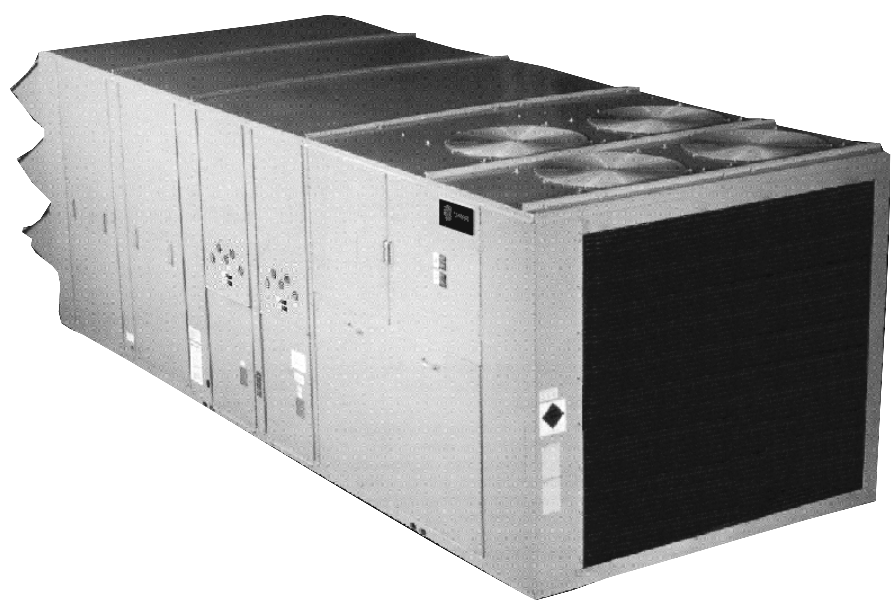
Packaged Rooftop Air Conditioners

27½ to 50 Ton - 60 Hz
23 to 42 Ton (81-148 kW) - 50 Hz
Voyager™ Commercial with ReliaTel™ Controls



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Introduction

Packaged Rooftop Air Conditioners

Through the years, Trane has designed and developed the most complete line of Packaged Rooftop products available in the market today. Trane was the first to introduce the Micro—microelectronic unit controls—and has continued to improve and revolutionalize this design concept.

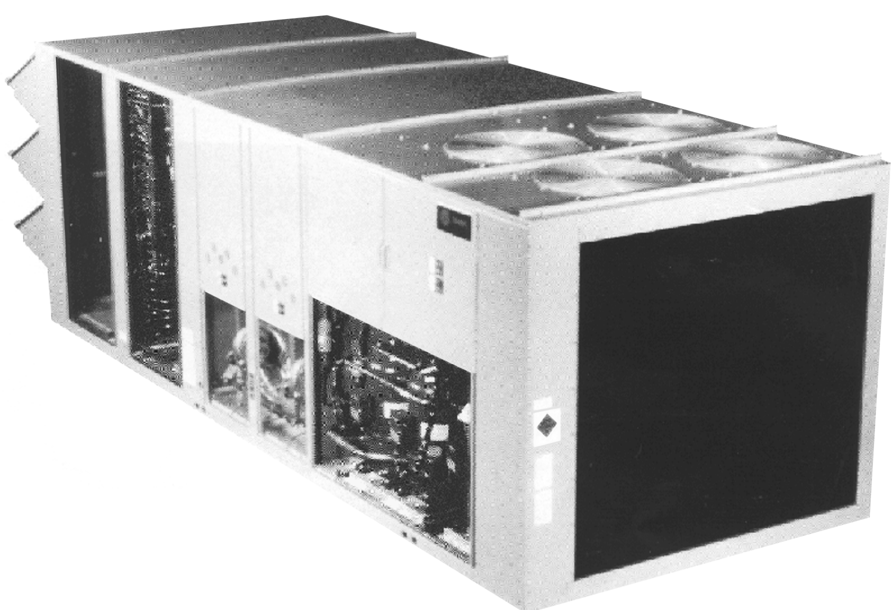
The ReliaTel control platform offers the same great features and functionality as the original Micro, with additional benefits for greater application flexibility.

The Voyager Commercial line offers 27½ to 50 ton 60 Hz and 23 to 42 ton 50 Hz models. Both 50 and 60 Hz models come in a choice of five sizes to meet the changing demands of the commercial rooftop market.

Trane customers demand products that provide exceptional reliability, meet stringent performance requirements, and are competitively priced. Trane delivers with Voyager Commercial.

Voyager Commercial features cutting edge technologies: reliable 3-D™ Scroll compressors, Trane engineered ReliaTel controls, computer-aided run testing, and Integrated Comfort™ Systems. So, whether you're the contractor, the engineer, or the owner you can be certain Voyager Commercial Products are built to meet your needs.

It's Hard To Stop A Trane.®



Contents

Introduction 2

Features and Benefits 4

Application Considerations 10

Selection Procedure 13

Model Number Description 17

General Data 19

Performance Data 26

Performance Adjustment Factors 25

Controls 49

Electric Power 53

Dimension and Weights 56

Mechanical Specifications 65

Features and Benefits

Standard Features

- Factory installed and commissioned ReliaTel™ controls
- Trane 3-D™ Scroll Compressors
- Dedicated downflow or horizontal configuration
- CV or VAV control
- Frostat™ coil frost protection on all units
- Supply air overpressurization protection on VAV units
- Supply airflow proving
- Emergency stop input
- Compressor lead-lag
- Occupied-Unoccupied switching
- Timed override activation
- FC supply fans
- UL and CSA listing on standard options
- Two inch standard efficiency filters
- Finish exceeds salt spray requirements of ASTM B117
- Sloped condensate drain pan
- Cleanable, IAQ-enhancing, foil faced insulation on all interior surfaces exposed to the unit air stream

Optional Features

- Electric heat
- Natural gas heat
- LP gas heat (kit only)
- Power Exhaust
- Barometric Relief
- High Efficiency 2" Throwaway Filters
- High Efficiency 4" Throwaway Filters
- High Efficiency supply fan motors
- Manual fresh air damper
- Economizer with dry bulb control
- Economizer with reference enthalpy control
- Economizer with differential (comparative) enthalpy control
- Inlet guide vanes on VAV units
- Variable frequency drives on VAV units (with or without bypass)
- Service Valves
- Through-the-base electrical provision
- Factory mounted disconnect with external handle (non-fused)
- Factory powered 15A GFI convenience outlet
- Field powered 15A GFI convenience outlet
- Trane Communication Interface (TCI)
- Ventilation Override
- Hinged Service Access
- Factory installed condenser coil guards
- Black epoxy coated condenser coil
- Sloped stainless steel evaporator coil drain pans
- CO_2 sensors for space comfort control (SCC) or discharge air control (DAC)
- LonTalk® Communication Interface (LCI-R)
- Clogged filter switch
- Discharge air temperature sensor (CV only)

Features and Benefits

Trane 3-D™ Scroll Compressor

Simple Design with 70% Fewer Parts

Fewer parts than an equal capacity reciprocating compressor means significant reliability and efficiency benefits. The single orbiting scroll eliminates the need for pistons, connecting rods, wrist pins and valves. Fewer parts lead to increased reliability. Fewer moving parts, less rotating mass and less internal friction means greater efficiency than reciprocating compressors.

The Trane 3-D Scroll provides important reliability and efficiency benefits. The 3-D Scroll allows the orbiting scrolls to touch in all three dimensions, forming a completely enclosed compression chamber which leads to increased efficiency. In addition, the orbiting scrolls only touch with enough force to create a seal; there is no wear between the scroll plates. The fixed and orbiting scrolls are made of high strength cast iron which results in less thermal distortion, less leakage, and higher efficiencies. The most outstanding feature of the 3-D Scroll compressor is that slugging will not cause failure. In a reciprocating compressor, however, the liquid or dirt can cause serious damage.

Low Torque Variation

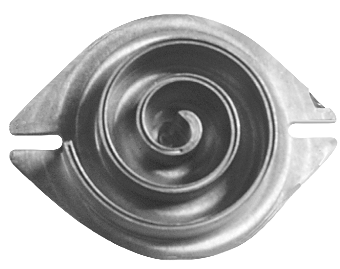
The 3-D Scroll compressor has a very smooth compression cycle; torque variations are only 30 percent of that produced by a reciprocating compressor. This means that the scroll compressor imposes very little stress on the motor resulting in greater reliability. Low torque variation reduces noise and vibration.

Suction Gas Cooled Motor

Compressor motor efficiency and reliability is further optimized with the latest scroll design. Cool suction gas keeps the motor cooler for longer life and better efficiency.

Proven Design Through Testing and Research

With over twenty years of development and testing, Trane 3-D Scroll compressors have undergone more than 400,000 hours of laboratory testing and field operation. This work combined with over 25 patents makes Trane the worldwide leader in air conditioning scroll compressor technology.



One of two matched scroll plates — the distinguishing feature of the scroll compressor.

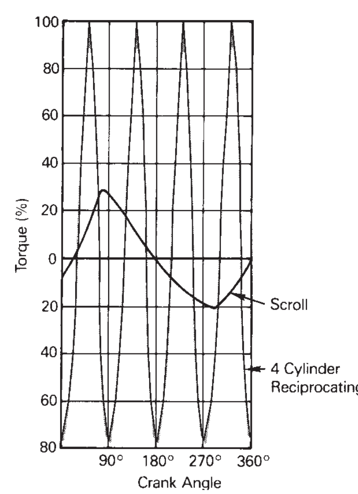
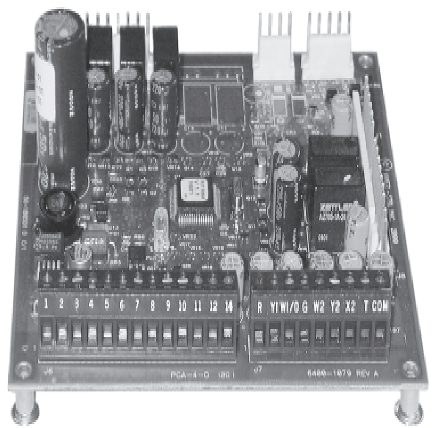


Chart illustrates low torque variation of 3-D Scroll compressor vs reciprocating compressor.

Features and Benefits

Quality and Reliability



Easy to Install, Service and Maintain

Because today's owners are very cost-conscious when it comes to service and maintenance, the Trane Voyager was designed with direct input from service contractors. This valuable information helped to design a product that would get the serviceman off the job quicker and save the owner money. Voyager does this by offering:

ReliaTel™ Controls (LCI-R)

ReliaTel controls provide unit control for heating, cooling and ventilating utilizing input from sensors that measure outdoor and indoor temperature.

Quality and Reliability are enhanced through ReliaTel control and logic:

- prevents the unit from short cycling, considerably improving compressor life.
- ensures that the compressor will run for a specific amount of time which allows oil to return for better lubrication, enhancing the reliability of the commercial compressor.

Voyager with ReliaTel reduces the number of components required to operate the unit, thereby reducing possibilities for component failure.

ReliaTel Makes Installing and Servicing Easy

ReliaTel eliminates the need for field installed anti-shortcycle timer and time delay relays. ReliaTel controls provide these functions as an integral part of the unit. The contractor no longer has to purchase these controls as options and pay to install them.

The wiring of the low voltage connections to the unit and the zone sensors is as easy as 1-1, 2-2, and 3-3. This simplified system makes it easier for the installer to wire.

ReliaTel Makes Testing Easy

Reliael requires no special tools to run the Voyager unit through its paces. Simply place a jumper between Test 1 and Test 2 terminals on the Low Voltage Terminal Board and the unit will walk through its operational steps automatically.

— The unit automatically returns control to the zone sensor after stepping through the test mode a single time, even if the jumper is left on the unit.

As long as the unit has power and the "system on" LED is lit, ReliaTel is operational. The light indicates that the controls are functioning properly.

ReliaTel features expanded diagnostic capabilities when utilized with Trane Integrated Comfort™ Systems.

Some Zone Sensor options have central control panel lights which indicate the mode the unit is in and possible diagnostic information (dirty filters for example).

Other ReliaTel Benefits

The ReliaTel built-in anti-shortcycle timer, time delay relay and minimum "on" time control functions are factory tested to assure proper operation.

ReliaTel softens electrical "spikes" by staging on fans, compressors and heaters.

Intelligent Fallback is a benefit to the building occupant. If a component goes astray, the unit will continue to operate at predetermined temperature setpoint.

Intelligent Anticipation is a standard ReliaTel feature. It functions continuously as ReliaTel and zone sensor(s) work together in harmony to provide much tighter comfort control than conventional electro-mechanical thermostats.

Features and Benefits

Trane Communication Interface (TCI)

The TCI is available factory or field installed. When applied with ReliaTel, this module easily interfaces with the Trane Integrated Comfort™ System.

Interoperability with LonTalk® (LCI-R)

The LonTalk Communication (LCI-R) for Voyager Commercial offers a building automation control system with outstanding interoperability benefits. LonTalk, which is an industry standard, is an open, secure and reliable network communication protocol for controls, created by Echelon Corporation and adopted by the LonMark Interoperability Association. It has been adopted by several standards, such as: EIA-709.1, the Electronic Industries Alliance (EIA) Control Network Protocol Specification and ANSI/ ASHRAE 135, part of the American Society of Heating, Refrigeration, and Air-Conditioning Engineer's BACnet control standard for buildings.

Interoperability allows application or project engineers to specifiy the best products of a given type, rather than one individual supplier's entire system. It reduces product training and installation costs by standardizing communications across products.

Interoperable systems allow building managers to monitor and control Voyager Commercial equipment with a Trane Tracer Summit™ or a 3rd party building automation system.

It enables integration with many different building controls such as access/intrusion monitoring, lighting, fire and smoke devices, energy management, and a wide variety of sensors for temperature, pressure, humidity and occupancy CO_2.

For additional information on LonMark, visit www.lonmark.org or Echelon, www.echelon.com.

Variable Frequency Drives (VFD)

Variable Frequency Drives are factory installed and tested to provide supply fan motor speed modulation. VFD's, as compared to inlet guide vanes or discharge dampers, are quieter, more efficient, and are eligible for utility rebates. The VFD's are available with or without a bypass option. Bypass control will simply provide full nominal airflow in the event of drive failure.

VariTrac™ changeover-bypass VAV

For light commercial applications, Trane offers constant volume (CV) Voyager Commercial models with a changeover-bypass VAV system.

For the most advanced comfort management systems, count on Trane.

Delivered VAV

Trane provides true pressure independent variable air volume with Voyager Commercial delivered VAV. The system is auto-configured to reduce programming and set-up time on the job. Generally available only on sophisticated larger models, this Voyager Commercial system can economically handle comfort requirements for any zone in the facility.

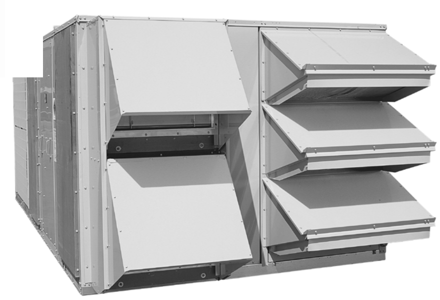
The system consists of:

- Voyager™ Commercial VAV packaged rooftops
- Up to 32 VariTrane™ VAV boxes with DDC (direct digital controls)
- VariTrac™ Central Control Panel (CCP) with Operator Display (OD)

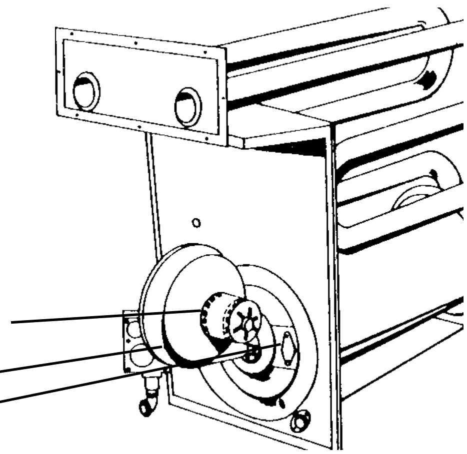
The VariTrac Central Control Panel acts as a communications hub by coordinating the actions of the VAV rooftop and the VAV boxes. Single duct or fan powered VAV boxes are available, along with an option for factory-installed local heat. For more details, see VAV-SLM003-EN.

Downflow and Horizontal Economizers

The economizers come with three control options dry bulb, enthalpy and differential enthalpy. (Photo below shows the three fresh air hoods on the Horizontal Discharge Configuration).



Features and Benefits



Drum and Tube Heat Exchanger

Outstanding Standard and Optional Components

Drum and Tube Heat Exchanger

The drum and tube heat exchanger is designed for increased efficiency and reliability and utilizes the same technology that has been incorporated into large commercial roof top units for over 20 years.

The heat exchanger is manufactured using optional stainless, or standard aluminized, steel with stainless steel components for maximum durability. The requirement for cycle testing of heat exchangers is 10,000 cycles by ANSI Z21.47. This is the standard required by both UL and AGA for cycle test requirements. Trane requires the design to be tested to 2½ times this current standard. The drum and tube design has been tested and passed over 150,000 cycles which is over 15 times the current ANSI cycling requirements.

The negative pressure gas valve will not allow gas flow unless the combustion blower is operating. This is one of the unique safety features of Voyager Commercial.

The forced combustion blower supplies pre-mixed fuel through a single stainless steel burner screen into a sealed drum where ignition takes place. It is more reliable to operate and maintain than a multiple burner system.

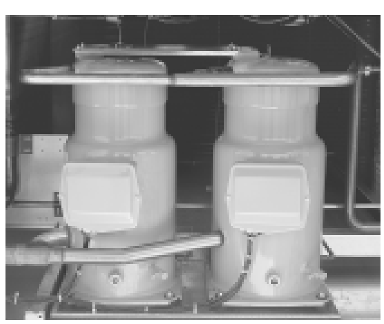
The hot surface ignitor is a gas ignition device which doubles as a safety device utilizing a continuous test to prove the flame. The design is cycle tested at the factory for quality and reliability.

All the gas/electric rooftops exceed all California seasonal efficiency requirements. They also perform better than required to meet the California NOx emission requirements.

Excellent Part-Load Efficiency

The unique design of the scroll compressor allows it to be applied in a passive parallel manifolded piping scheme, something that a "recip" just doesn't do very well.

When the unit begins stage back at part load it still has the full area and circuitry of its evaporator and condenser coils available to transfer heat. In simple terms this means superior part-load efficiencies (IPLV) and lower unit operating costs.



Rigorous Testing

All of Voyager's designs were rigorously rain tested at the factory to ensure water integrity.

Actual shipping tests are performed to determine packaging requirements. Units are test shipped around the country. Factory shake and drop tested as part of the package design process to help assure that the unit will arrive at your job site in top condition.

Rigging tests include lifting a unit into the air and letting it drop one foot, assuring that the lifting lugs and rails hold up under stress.

We perform a 100% coil leak test at the factory. The evaporator and condenser coils are leak tested at 200 psig and pressure tested to 450 psig.

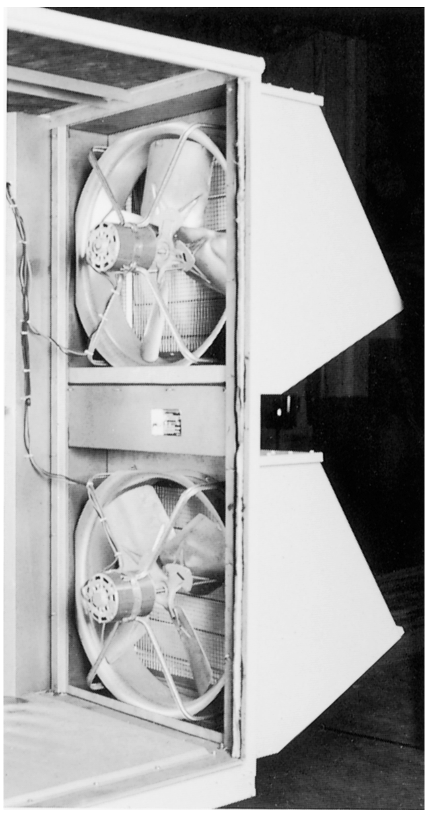
All parts are inspected at the point of final assembly. Sub-standard parts are identified and rejected immediately.

Every unit receives a 100% unit run test before leaving the production line to make sure it lives up to rigorous Trane requirements.

Features and Benefits

Power Exhaust Option

Provides exhaust of the return air when using an economizer to maintain proper building pressurization. Great for relieving most building overpressurization problems.



Horizontal Discharge with Power Exhaust Option

Easy to Install

Contractors look for lower installation (jobsite) costs. Voyager's conversionless units provide many time and money saving features.

Conversionless Units

The dedicated design units (either downflow or horizontal) require no panel removal or alteration time to convert in the field — a major cost savings during installation.

Improved Airflow

U-shaped airflow allows for improved static capabilities. The need for high static motor conversion is minimized and saves the time normally spent changing to high static oversized motors.

Single Point Power

A single electrical connection powers the unit.

Trane factory built roof curbs

Available for all units.

Added Efficiency

Low Ambient Cooling

All Voyager Commercial units have cooling capabilities down to 0 F as standard.

FC Fans with Inlet Guide Vanes

Trane's forward-curved fans with inlet guide vanes pre-rotate the air in the direction of the fan wheel, decreasing static pressure and horsepower, essentially unloading the fan wheel. The unloading characteristics of a Trane FC fan with inlet guide vanes result in superior part load performance.

One of Our Finest Assets

Trane Commercial Sales Engineers are a support group that can assist you with:

— Product

— Application

— Service

— Training

— Special Applications

— Specifications

— Computer Programs and more

Application Considerations 60 Hz

Exhaust Air Options

When is it necessary to provide building exhaust?

Whenever an outdoor air economizer is used, a building generally requires an exhaust system. The purpose of the exhaust system is to exhaust the proper amount of air to prevent over or under-pressurization of the building.

A building may have all or part of its exhaust system in the rooftop unit. Often, a building provides exhaust external to the air conditioning equipment. This external exhaust must be considered when selecting the rooftop exhaust system.

Voyager Commercial rooftop units offer two types of exhaust systems:

1

Power exhaust fan.

2

Barometric relief dampers.

Application Recommendations

Power Exhaust Fan

The exhaust fan option is a dual, nonmodulating exhaust fan with approximately half the air-moving capabilities of the supply fan system. The experience of The Trane Company is that a non-modulating exhaust fan selected for 40 to 50 percent of nominal supply cfm can be applied successfully.

The power exhaust fan generally should not be selected for more than 40 to 50 percent of design supply airflow. Since it is an on/off nonmodulating fan, it does not vary exhaust cfm with the amount of outside air entering the building. Therefore, if selected for more than 40 to 50 percent of supply airflow, the building may become underpressurized when economizer operation is allowing lesser amounts of outdoor air into the building. If, however, building pressure is not of a critical nature, the non-modulating exhaust fan may be sized for more than 50 percent of design supply airflow. Consult Table PD-16 for specific exhaust fan capabilities with Voyager Commercial units.

Barometric Relief Dampers

Barometric relief dampers consist of gravity dampers which open with increased building pressure. As the building pressure increases, the pressure in the unit return section also increases, opening the dampers and relieving air. Barometric relief may be used to provide relief for single story buildings with no return ductwork and exhaust requirements less than 25 percent.

Altitude Corrections

The rooftop performance tables and curves of this catalog are based on standard air (.075 lbs/ft). If the rooftop airflow requirements are at other than standard conditions (sea level), an air density correction is needed to project accurate unit performance.

Figure PD-1 shows the air density ratio at various temperatures and elevations. Trane rooftops are designed to operate between 40 and 90 degrees Fahrenheit leaving air temperature.

The procedure to use when selecting a supply or exhaust fan on a rooftop for elevations and temperatures other than standard is as follows:

1

First, determine the air density ratio using Figure PD-1.

2

Divide the static pressure at the nonstandard condition by the air density ratio to obtain the corrected static pressure.

3

Use the actual cfm and the corrected static pressure to determine the fan rpm and bhp from the rooftop performance tables or curves.

4

The fan rpm is correct as selected.

5

Bhp must be multiplied by the air density ratio to obtain the actual operating bhp.

In order to better illustrate this procedure, the following example is used:

Consider a 30-ton rooftop unit that is to deliver 11,000 actual cfm at 1.50 inches total static pressure (tsp), 55 F leaving air temperature, at an elevation of 5,000 ft.

1

From Figure PD-1, the air density ratio is 0.86.

2

Tsp=1.50 inches/0.86=1.74 inches tsp.

3

From the performance tables: a 30-ton rooftop will deliver 11,000 cfm at 1.74 inches tsp at 668 rpm and 6.93 bhp.

4

The rpm is correct as selected — 668 rpm.

5

Bhp = 6.93 x 0.86 = 5.96 .

Compressor MBh, SHR, and kw should be calculated at standard and then converted to actual using the correction factors in Table PD-2. Apply these factors to the capacities selected at standard cfm so as to correct for the reduced mass flow rate across the condenser.

Heat selections other than gas heat will not be affected by altitude. Nominal gas capacity (output) should be multiplied by the factors given in Table PD-3 before calculating the heating supply air temperature.

Exhaust Air Options

When is it necessary to provide building exhaust?

Whenever an outdoor air economizer is used, a building generally requires an exhaust system. The purpose of the exhaust system is to exhaust the proper amount of air to prevent over or under-pressurization of the building.

A building may have all or part of its exhaust system in the rooftop unit. Often, a building provides exhaust external to the air conditioning equipment. This external exhaust must be considered when selecting the rooftop exhaust system.

Voyager™ Commercial rooftop units offer two types of exhaust systems:

1

Power exhaust fan

2

Barometric relief dampers

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The exhaust fan option is a dual, non-modulating exhaust fan with approximately half the air-moving capabilities of the supply fan system. The experience of Trane is that a non-modulating exhaust fan selected for 40 to 50 percent of nominal supply cfm can be applied successfully.

The power exhaust fan generally should not be selected for more than 40 to 50 percent of design supply airflow. Since it is an on/off non-modulating fan, it does not vary exhaust cfm with the amount of outside air entering the building. Therefore, if selected for more than 40 to 50 percent of supply airflow, the building may become under-pressurized when economizer operation is allowing lesser amounts of outdoor air into the building. If, however, building pressure is not of a critical nature, the non-modulating exhaust fan may be sized for more than 50 percent of design supply airflow.

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Altitude Corrections

The rooftop performance tables and curves of this catalog are based on standard air (.075 lb/ft) (.034 kg/cm). If the rooftop airflow requirements are at other than standard conditions (sea level), an air density correction is needed to project accurate unit performance.

Figure PD-1 shows the air density ratio at various temperatures and elevations. Trane rooftops are designed to operate between 40 and 90°F (4.4 and 32.2°C) leaving air temperature.

The procedure to use when selecting a supply or exhaust fan on a rooftop for elevations and temperatures other than standard is as follows:

1

First, determine the air density ratio using Figure PD-1.

2

Divide the static pressure at the nonstandard condition by the air density ratio to obtain the corrected static pressure.

3

Use the actual cfm and the corrected static pressure to determine the fan rpm and bhp from the rooftop performance tables or curves.

4

The fan rpm is correct as selected.

5

Bhp must be multiplied by the air density ratio to obtain the actual operating bhp.

In order to better illustrate this procedure, the following example is used:

Consider a 29-ton (105 kW) rooftop unit that is to deliver 9,160 actual cfm (4323 L/s) at 1.50 inches total static pressure (tsp) (38 mm, 373 Pa), 55°F (12.8°C) leaving air temperature, at an elevation of 5,000 ft (1524 m).

1

From Figure PD-1, the air density ratio is 0.86.

2

Tsp = 1.50 inches/0.86 = 1.74 inches tsp.
374/.86 = 434 Pa.

3

From the performance tables: a 29-ton (105 kW) rooftop will deliver 9,160 cfm at 1.74 inches tsp 4323 L/s at 434 Pa) at 651 rpm and 5.51 bhp (4.11 kW).

4

The rpm is correct as selected – 651 rpm.

5

Bhp = 5.51 x 0.86 = 4.74 bhp actual.
kW = 4.11 x 0.86 = 3.5 kW

Compressor MBh, SHR, and kW should be calculated at standard and then converted to actual using the correction factors in Table PD-2. Apply these factors to the capacities selected at standard cfm so as to correct for the reduced mass flow rate across the condenser.

Heat selections other than gas heat will not be affected by altitude. Nominal gas capacity (output) should be multiplied by the factors given in Table PD-3 before calculating the heating supply air temperature.

Application Considerations 50/60 Hz

Acoustical Considerations

Proper placement of rooftops is critical to reducing transmitted sound levels to the building. The ideal time to make provisions to reduce sound transmissions is during the design phase. And the most economical means of avoiding an acoustical problem is to place the rooftop(s) away from acoustically critical areas. If possible, rooftops should not be located directly above areas such as: offices, conference rooms, executive office areas and classrooms. Instead, ideal locations might be over corridors, utility rooms, toilets or other areas where higher sound levels directly below the unit(s) are acceptable.

Several basic guidelines for unit placement should be followed to minimize sound transmission through the building structure:

1

Never cantilever the compressor end of the unit. A structural cross member must support this end of the unit.

2

Locate the unit center of gravity which is close to, or over, a column or main support beam.

3

If the roof structure is very light, roof joists must be replaced by a structural shape in the critical areas described above.

4

If several units are to be placed on one span, they should be staggered to reduce deflection over that span.

It is impossible to totally quantify the effect of building structure on sound transmission, since this depends on the response of the roof and building members to the sound and vibration of the unit components. However, the guidelines listed above are experience-proven guidelines which will help reduce sound transmissions.

Clearance Requirements

The recommended clearances identified with unit dimensions should be maintained to assure adequate serviceability, maximum capacity and peak operating efficiency. A reduction in unit clearance could result in condenser coil starvation or warm condenser air recirculation. If the clearances shown are not possible on a particular job, consider the following:

Do the clearances available allow for major service work such as changing compressors or coils?

Do the clearances available allow for proper outside air intake, exhaust air removal and condenser airflow?

If screening around the unit is being used, is there a possibility of air recirculation from the exhaust to the outside air intake or from condenser exhaust to condenser intake?

Actual clearances which appear inadequate should be reviewed with a local Trane sales engineer.

When two or more units are to be placed side by side, the distance between the units should be increased to 150 percent of the recommended single unit clearance. The units should also be staggered for two reasons:

1

To reduce span deflection if more than one unit is placed on a single span. Reducing deflection discourages sound transmission.

2

To assure proper diffusion of exhaust air before contact with the outside air intake of adjacent unit.

Duct Design

It is important to note that the rated capacities of the rooftop can be met only if the rooftop is properly installed in the field. A well designed duct system is essential in meeting these capacities.

The satisfactory distribution of air throughout the system requires that there be an unrestricted and uniform airflow from the rooftop discharge duct. This discharge section should be straight for at least several duct diameters to allow the conversion of fan energy from velocity pressure to static pressure.

However, when job conditions dictate elbows be installed near the rooftop outlet, the loss of capacity and static pressure may be reduced through the use of guide vanes and proper direction of the bend in the elbow. The high velocity side of the rooftop outlet should be directed at the outside radius of the elbow rather than the inside.

Selection Procedure 60 Hz

Selection of Trane commercial air conditioners is divided into five basic areas:

1. Cooling capacity
2. Heating capacity
3. Air delivery
4. Unit electrical requirements
5. Unit designation

Factors Used In Unit Cooling Selection:

1. Summer design conditions — 95 DB/ 76 WB, 95 F entering air to condenser.
2. Summer room design conditions — 76 DB/66 WB.
3. Total peak cooling load — 321 MBh (27.75 tons).
4. Total peak supply cfm — 12,000 cfm.
5. External static pressure — 1.0 inches.
6. Return air temperatures — 80 DB/66 WB.
7. Return air cfm — 4250 cfm.
8. Outside air ventilation cfm and load — 1200 cfm and 18.23 MBh (1.52 tons).
9. Unit accessories include:
   - a. Aluminized heat exchanger — high heat module.
   - b. 2″ Hi-efficiency throwaway filters.
   - c. Exhaust fan.
   - d. Economizer cycle.

Step 1 — A summation of the peak cooling load and the outside air ventilation load shows: 27.75 tons + 1.52 tons = 29.27 required unit capacity. From Table 18-2, 30-ton unit capacity at 80 DB/ 67 WB, 95 F entering the condenser and 12,000 total peak supply cfm, is 30.0 tons. Thus, a nominal 30-ton unit is selected.

Step 2 — Having selected a nominal 30-ton unit, the supply fan and exhaust fan motor bhp must be determined.

Supply Air Fan:

Determine unit static pressure at design supply cfm:

External static pressure	1.20 inches
Heat exchanger (Table PD-14)	.14 inches
High efficiency filter 2″ (Table PD-14)	.09 inches
Economizer (Table PD-14)	.076 inches
Unit total static pressure	1.50 inches

Using total cfm of 12,000 and total static pressure of 1.50 inches, enter Table PD-12. Table PD-12 shows 7.27 bhp with 652 rpm.

Step 3 — Determine evaporator coil entering air conditions. Mixed air dry bulb temperature determination.

Using the minimum percent of OA (1,200 cfm ÷ 12,000 cfm = 10 percent), determine the mixture dry bulb to the evaporator. RADB + %OA (OADB - RADB) = 80 + (0.10) (95 - 80) = 80 + 1.5 = 81.5F

Approximate wet bulb mixture temperature:

RAWB + OA (OAWB - RAWB) = 66 + (0.10) (76-66) = 68 + 1 = 67 F.

A psychrometric chart can be used to more accurately determine the mixture temperature to the evaporator coil.

Step 4 — Determine total required unit cooling capacity:

Required capacity = total peak load + O.A. load + supply air fan motor heat.

From Figure SP-1, the supply air fan motor heat for 7.27 bhp = 20.6 MBh.

Capacity = 321 + 18.23 + 20.6 = 359.8 MBh (30 tons)

Step 5 — Determine unit capacity:

From Table PD-4 unit capacity at 81.5 DB. 67 WB entering the evaporator, 12000 supply air cfm, 95 F entering the condenser is 361 MBh (30.1 tons) 279 sensible MBh.

Step 6 — Determine leaving air temperature:

Unit sensible heat capacity, corrected for supply air fan motor heat 279 - 20.6 = 258.4 MBh.

Supply air dry bulb temperature difference = 258.4 MBh ÷ (1.085 x 12,000 cfm) = 19.8 F.

Supply air dry bulb: 81.5 - 19.8 = 61.7.

Unit enthalpy difference = 361 ÷ (4.5 x 12,000) = 6.7

Btu/lb leaving enthalpy = h (ent WB) = 31.62

Leaving enthalpy = 31.62 Btu/lb - 6.7 Btu/lb = 24.9 Btu/lb.

From Table PD-1, the leaving air wet bulb temperature corresponding to an enthalpy of 24.9 Btu/lb = 57.5.

Leaving air temperatures = 61.7 DB/57.5 WB

Selection Procedure

Heating capacity selection:

1

Winter outdoor design conditions—5 F.

2

Total return air temperature — 72 F.

3

Winter outside air minimum ventilation load and cfm — 1,200 cfm and 87.2 MBh.

4

Peak heating load 225 MBh.

Utilizing unit selection in the cooling capacity procedure.

Mixed air temperature = RADB + %O.A. (OADB - RADB) = 72 + (0.10) (0-72) = 64.8 F.

Supply air fan motor heat temperature rise = 20,600 BTU ÷ (1.085 x 12,000) cfm = 1.6 F.

Mixed air temperature entering heat module = 64.8 + 1.6 = 66.4 F.

Total winter heating load = peak heating + ventilation load - total fan motor heat = 225 + 87.2 - 20.6 = 291.6 MBh.

Electric Heating System

Unit operating on 480/60/3 power supply. From Table PD-9, kw may be selected for a nominal 30-ton unit operating on 480-volt power. The high heat module — 90 KW or 307 MBh will satisfy the winter heating load of 291.6 MBh.

Table PD-9 also shows an air temperature rise of 23.6 F for 12,000 cfm through the 90 kw heat module.

Unit supply temperature at design heating conditions = mixed air temperature + air temperature rise = 66.4 + 23.6 = 90 F.

Natural Gas Heating System

Assume natural gas supply — 1000 Btu/ft^3. From Table PD-11, select the high heat module (486 MBh output) to satisfy 291.6 at unit cfm.

Table PD-11 also shows air temperature rise of 37.3 F for 12,000 cfm through heating module.

Unit supply temperature design heating conditions = mixed air temperature + air temperature rise = 66.4 + 37.3 = 103.7 F.

Air Delivery Procedure

Supply air fan bhp and rpm selection. Unit supply air fan performance shown in Table PD-12 includes pressure drops for dampers and casing losses. Static pressure drops of accessory components such as heating systems, and filters if used, must be added to external unit static pressure for total static pressure determination.

The supply air fan motor selected in the previous cooling capacity determination example was 7.27 bhp with 652 rpm. Thus, the supply fan motor selected is 7.5 hp.

To select the drive, enter Table PD-15 for a 30-ton unit. Select the appropriate drive for the applicable rpm range. Drive selection letter C with a range of 650 rpm, is required for 652 rpm. Where altitude is significantly above sea level, use Table PD-2 and PD-3, and Figure PD-1 for applicable correction factors.

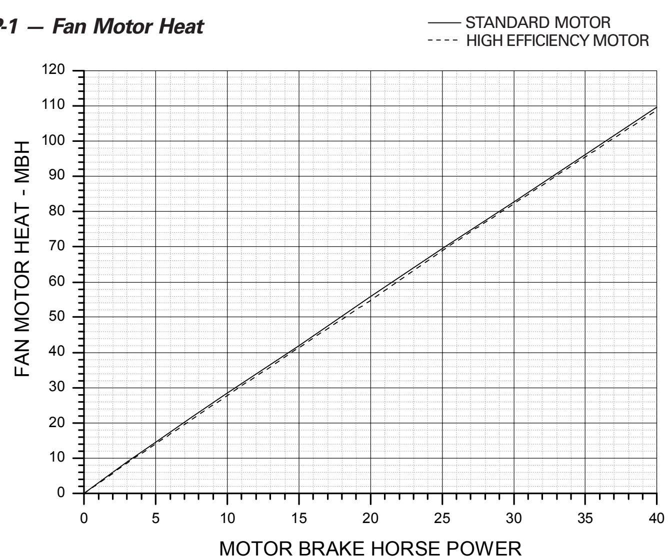
Unit Electrical Requirements

Selection procedures for electrical requirements for wire sizing amps, maximum fuse sizing and dual element fuses are given in the electrical service selection of this catalog.

Unit Designation

After determining specific unit characteristics utilizing the selection procedure and additional job information, the complete unit model number can be developed using the model number nomenclature page.

Figure SP-1 — Fan Motor Heat



Selection Procedure 50 Hz

Selection of Trane commercial air conditioners is divided into five basic areas:

1
Cooling capacity
2
Heating capacity
3
Air delivery
4
Unit electrical requirements
5
Unit designation

Factors Used In Unit Cooling Selection:

1
Summer design conditions – 95 DB/ 76 WB (35/24.4°C), 95°F (35°C) entering air to condenser.
2
Summer room design conditions – 76 DB/66 WB (24.4/18.9°C).
3
Total peak cooling load – 270 MBh (79 kW) (22.5 tons).
4
Total peak supply cfm – 10,000 cfm (4720 L/s).
5
External static pressure – 1.0 inches wc (249 Pa).
6
Return air temperatures – 80 DB/66°F WB (26.7/18.9°C).
7
Return air cfm – 3540 cfm (1671 L/s).
8
Outside air ventilation cfm and load – 1000 cfm and 15.19 MBh (1.27 tons or 4.45 kW) 472 L/s.
9
Unit accessories include:
a
Aluminized heat exchanger – high heat module.
b
2” Hi-efficiency throwaway filters.
c
Exhaust fan.
d
Economizer cycle.

Step 1 – A summation of the peak cooling load and the outside air ventilation load shows: 22.5 tons + 1.27 tons = 23.77 (79 kW + 4.45 kW = 83.45) required unit capacity. From Table PD-18, 25 ton (89 kW) unit capacity at 80 DB/67 WB (27/19°C), 95°F entering the condenser and 10,000 total peak supply cfm (4720 L/s), is YC/TC/TE*305.

Step 2 – Having selected the correct unit, the supply fan and exhaust fan motor bhp must be determined.

Supply Air Fan:
Determine unit static pressure at design supply cfm:

External static pressure	1.24 inches (310 Pa)
Heat exchanger (Table PD-27)	.12 inches (30 Pa)
High efficiency filter 2” (25 mm) (Table PD-27)	.07 inches (17 Pa)
Economizer (Table PD-27)	.07 inches (17 Pa)
Unit total static pressure	1.50 inches (374 Pa)

Using total cfm of 10,000 (4720 L/s) and total static pressure of 1.50 inches (38 mm), enter Table PD-25. Table PD-25 shows 5.35 bhp (4 kW) with 616 rpm.

Step 3 – Determine evaporator coil entering air conditions. Mixed air dry bulb temperature determination.

Using the minimum percent of OA (1,000 cfm ÷ 10,000 cfm = 10 percent), determine the mixture dry bulb to the evaporator. RADB + % OA (OADB - RADB) = 80 + (0.10) (95 - 80) = 80 + 1.5 = 81.5°F [26.7 + 1.5 = 28°C).

Approximate wet bulb mixture temperature:

RAWB + OA (OAWB - RAWB) = 66 + (0.10) (76-66) = 68 + 1 = 67°F.

A psychrometric chart can be used to more accurately determine the mixture temperature to the evaporator coil.

Step 4 – Determine total required unit cooling capacity:
Required capacity = total peak load + O.A. load + supply air fan motor heat.

From Chart SP-1, the supply air fan motor heat for 5.35 bhp = 15 MBh.

Capacity = 270 + 15 + 15 = 300 MBh (89 kW)

Step 5 – Determine unit capacity:
From Table PD-18 unit capacity at 81.5 DB/67 WB entering the evaporator, 10,000 supply air cfm, 95°F (35°C) entering the condenser about 304 MBh (89 kW) with 235 MBh (68.8 kW) sensible.

Step 6 – Determine leaving air temperature:
Unit sensible heat capacity, corrected for supply air fan motor heat 235 - 15 = 220 MBh (64.4 kW).

Supply air dry bulb temperature difference = 220 MBh ÷ (1.085 x 10,000 cfm) = 20.2°F (-6.6°C)

Supply air dry bulb: 81.5-20.2 = 61.3 (16.3°C)

Unit enthalpy difference = 305.6 ÷ (4.5 x 10,000) = 6.76
Btu/lb leaving enthalpy = h (ent WB) = 31.62
Leaving enthalpy = 31.62 Btu/lb - 6.76 Btu/lb = 24.86 Btu/lb.

From Table PD-1, the leaving air wet bulb temperature corresponding to an enthalpy of 24.8 Btu/lb = 57.5.
Leaving air temperatures = 61.3 DB/57.5 WB (16.3/14.2°C).

Selection Procedure

1
Winter outdoor design conditions – 0°F (17.7°C).
2
Total return air temperature – 72°F (22.2°C).
3
Winter outside air minimum ventilation load and cfm – 1,000 cfm and 87.2 MBh.
4
Peak heating load 150 MBh.

Utilizing unit selection in the cooling capacity procedure.
Mixed air temperature = RADB + % O.A. (OADB - RADB) = 72 + (0.10) (0-72) = 64.8°F.
Supply air fan motor heat temperature rise = 20,600 Btu ÷ (1.085 x 10,000) cfm = 1.9°F.
Mixed air temperature entering heat module = 64.8 + 1.9 = 66.7°F.
Total winter heating load = peak heating + ventilation load - total fan motor heat = 150 + 87.2 - 15 = 222.2 MBh.

Electric Heating System
Unit operating on 415 power supply. From Table PD-22, kW may be selected for TC*305 unit to satisfy the winter heating load. The 67 kW module will do the job.

Table PD-22 also shows an air temperature rise of 21.2°F for 10,000 cfm through the 67 kW heat module.

Unit supply temperature at design heating conditions = mixed air temperature + air temperature rise = 66.7 + 21.2 = 87.9°F.

Natural Gas Heating System
Assume natural gas supply – 1000 Btu/ft^3. From Table PD-24, select the low heat module (243 MBh output) to satisfy 222 at unit cfm.

Table PD-25 also shows air temperature rise of 37.3°F for 10,000 cfm through heating module.

Unit supply temperature design heating conditions = mixed air temperature + air temperature rise = 66.7 + 37.3 = 104.0°F.

Air Delivery Procedure
Supply air fan bhp and rpm selection. Unit supply air fan performance shown in Table PD-25 includes pressure drops for dampers and casing losses. Static pressure drops of accessory components such as heating systems, and filters if used, must be added to external unit static pressure for total static pressure determination.

The supply air fan motor selected in the previous cooling capacity determination example was 5.35 bhp with 616 rpm. Thus, the supply fan motor selected is 7.5 hp.

To select the drive, enter Table PD-28 for a 305 unit. Select the appropriate drive for the applicable rpm range. Drive selection letter E with a range of 625 rpm, is required for 616 rpm. Where altitude is significantly above sea level, use Table PD-2 and PD-3, and Figure PD-1 for applicable correction factors.

Unit Electrical Requirements
Selection procedures for electrical requirements for wire sizing amps, maximum fuse sizing and dual element fuses are given in the electrical service selection of this catalog.

Unit Designation
After determining specific unit characteristics utilizing the selection procedure and additional job information, the complete unit model number can be developed using the model number nomenclature page.

Model Number Description

60 Hz

YC	D	480	A	4	H	A	1	A	4	F	D	1	A	0	0	0	0	0	0	0	0	0	0	0	0[5]
12	3	456	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29

Digit 1, 2 — Unit Function
TC = DX Cooling, No Heat
TE = DX Cooling, Electric Heat
YC = DX Cooling, Natural Gas Heat

Digit 3 — Unit Airflow Design
D = Downflow Configuration
H = Horizontal Configuration

Digit 4, 5, 6 — Nominal Cooling Capacity
330 = 27½ Tons
360 = 30 Tons
420 = 35 Tons
480 = 40 Tons
600 = 50 Tons

Digit 7 — Major Development Sequence
A = First

Digit 8 — Power Supply (See Note 1)
E = 208/60/3
F = 230/60/3
4 = 460/60/3
5 = 575/60/3

Digit 9 — Heating Capacity (See Note 4)
0 = No Heat (TC only)
L = Low Heat (YC only)
H = High Heat (YC only)
J = Low Heat-Stainless Steel Gas Heat Exchangers (YC only)
K = High Heat-Stainless Steel Gas Heat Exchanger (YC only)
Note: When second digit is "E" for Electric Heat, the following values apply in the ninth digit.
A = 36 KW
B = 54 KW
C = 72 KW
D = 90 KW
E = 108 KW

Digit 10 Design Sequence
A = First

Digit 11 — Exhaust
0 = None
1 = Barometric Relief (Available w/Economizer only)
2 = Power Exhaust Fan (Available w/Economizer only)

Digit 12 — Filter
A = Standard 2" Throwaway Filters
B = High Efficiency 2" Throwaway Filters
C = High Efficiency 4" Throwaway Filters

Digit 13 — Supply Fan Motor, HP
1 = 7.5 Hp Std. Eff.
2 = 10 Hp Std. Eff.
3 = 15 Hp Std. Eff.
4 = 20 Hp Std. Eff.
5 = 7.5 Hp Hi. Eff.
6 = 10 Hp Hi. Eff.
7 = 15 Hp Hi. Eff.
8 = 20 Hp Hi. Eff.

Digit 14 — Supply Air Fan Drive Selections (See Note 3)
A = 550 RPM
B = 600 RPM
C = 650 RPM
D = 700 RPM
E = 750 RPM
F = 790 RPM
G = 800 RPM
H = 500 RPM
J = 525 RPM
K = 575 RPM
L = 625 RPM
M = 675 RPM
N = 725 RPM

Digit 15 — Fresh Air Selection
A = No Fresh Air
B = 0-25% Manual Damper
C = 0-100% Economizer, Dry Bulb Control
D = 0-100% Economizer, Reference Enthalpy Control
E = 0-100% Economizer, Differential Enthalpy Control
F = "C" Option and Low Leak Fresh Air Damper
G = "D" Option and Low Leak Fresh Air Damper
H = "E" Option and Low Leak Fresh Air Damper

Digit 16 — System Control
1 = Constant Volume
2 = VAV Supply Air Temperature Control w/o Inlet Guide Vanes
3 = VAV Supply Air Temperature Control w/Inlet Guide Vanes
4 = VAV Supply Air Temperature Control w/Variable Frequency Drive w/o Bypass
5 = VAV Supply Air Temperature Control w/Variable Frequency Drive and Bypass
Note: Zone sensors are not included with option and must be ordered as a separate accessory.

Digit 17 - 29 — Miscellaneous
A = Service Valves (See Note 2)
B = Through the Base Electrical Provision
C = Non-Fused Disconnect Switch with External Handle
D = Factory-Powered 15A GFI Convenience Outlet and Non-Fused Disconnect Switch with External Handle
E = Field-Powered 15A GFI Convenience Outlet
F = Trane Communication Interface (TCI)
H = Hinged Service Access
J = Condenser Coil Guards
K = LCI (LonTalk)
L = Special
M = Stainless Steel Drain Pans
N = Black Epoxy Coated Condenser Coil
P = Discharge Temperature Sensor
R = Clogged Filter Switch

Notes:
1. All voltages are across the line starting only.
2. Option includes Liquid, Discharge, Suction Valves.
3. Supply air fan drives A thru G are used with 27½-35 ton units only and drives H thru N are used with 40 & 50 ton units only.
4. Electric Heat KW ratings are based upon voltage ratings of 240/480/600 V. Voltage offerings are as follows (see table PD-9 for additional information):

		KW				
Tons	Voltage	36	54	72	90	108
27½ to 35	240	x	x			
	480	x	x	x	x	
	600		x	x	x	
40 and 50	240		x			
	480		x	x	x	x
	600		x	x	x	x

5. The service digit for each model number contains 29 digits; all 29 digits must be referenced.

Model Number Description 50 Hz

YC	D	500	A	C	H	A	1	A	4	F	D	1	A	0	0	0	0	0	0	0	0	0	0	0	0[5]
12	3	456	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29

Digits 1, 2 – Unit Function
TC = DX Cooling, No Heat
TE = DX Cooling, Electric Heat
YC = DX Cooling, Natural Gas Heat

Digit 3 – Unit Airflow Design
D = Downflow Configuration
H = Horizontal Configuration

Digits 4, 5, 6 – Nominal Cooling Capacity
275 = 22.9 Tons (82 kW)
305 = 25.4 Tons (89 kW)
350 = 29.2 Tons (105 kW)
400 = 33.3 Tons (120 kW)
500 = 41.7 Tons (148 kW)

Digit 7 – Major Development Sequence
A = First
B = Second, Etc.

Digit 8 – Power Supply (See Note 1)
C = 380/50/3
D = 415/50/3

Digit 9 – Heating Capacity (See Note 4)
0 = No Heat (TC only)
L = Low Heat (YC only)
H = High Heat (YC only)
Note: When second digit is "E" for Electric Heat, the following values apply in the ninth digit.

	380V / 415V		
A =	23	27	kW
B =	34	40	kW
C =	45	54	kW
D =	56	67	kW
E =	68	81	kW

Digit 10 – Design Sequence
A = First

Digit 11 – Exhaust
0 = None
1 = Barometric Relief
(Available w/Economizer only)
2 = Power Exhaust Fan
(Available w/Economizer only)

Digit 12 – Filter
A = Standard 2" (51 mm) Throwaway Filters
B = High Efficiency 2" (51 mm) Throwaway Filters
C = High Efficiency 4" (102 mm) Throwaway Filters

Digit 13 – Supply Fan Motor, HP
1 = 7.5 Hp Std. Eff. (5.6 kW)
2 = 10 Hp Std. Eff. (7.5 kW)
3 = 15 Hp Std. Eff. (11.2 kW)
4 = 20 Hp Std. Eff. (14.9 kW)

Digit 14 – Supply Air Fan Drive Selections (See Note 3)

A = 458	H = 417
B = 500	J = 437
C = 541	K = 479
D = 583	L = 521
E = 625	M = 562
F = 658	N = 604
G = 664	

Digit 15 – Fresh Air Selection
A = No Fresh Air
B = 0-25% Manual Damper
C = 0-100% Economizer, Dry Bulb Control
D = 0-100% Economizer, Reference Enthalpy Control
E = 0-100% Economizer, Differential Enthalpy Control
F = "C" Option and Low Leak Fresh Air Damper
G = "D" Option and Low Leak Fresh Air Damper
H = "E" Option and Low Leak Fresh Air Damper

Digit 16 – System Control
1 = Constant Volume
2 = VAV Supply Air Temperature Control w/o Inlet Guide Vanes
3 = VAV Supply Air Temperature Control w/Inlet Guide Vanes
Note: Zone sensors are not included with option and must be ordered as a separate accessory.

Digit 17-29 – Miscellaneous
A = Service Valves (See Note 2)
B = Through the Base Electrical Provision
C = Non-Fused Disconnect Switch with External Handle
D = Factory-Powered 15A GFI Convenience Outlet and Non-Fused Disconnect Switch with External Handle
E = Field-Powered 15A GFI Convenience Outlet
F = Trane Communication Interface (TCI)
G = Ventilation Override
H = Hinged Service Access
J = Condenser Coil Guards
K = Special
L = Special
M = Stainless Steel Drain Pans
N = Black Epoxy Coated Condenser Coil
P = Discharge Temperature Sensor
R = Clogged Filter Switch

Notes:
1. All voltages are across-the-line starting only.
2. Option includes Liquid, Discharge, Suction Valves.
3. Supply air fan drives A thru G are used with 22.9-29.2 ton (82-105 kW) units only and drives H thru N are used with 33.3 and 41.7 ton (120-148 kW) units only.
4. Electric Heat kW ratings are based upon voltage ratings of 380/415 V. Heaters A, B, C, D are used with 22.9-29.2 ton (82-105 kW) units only and heaters B, C, D, E are used with 33.3-41.7 ton (120-148 kW) units only.
5. The service digit for each model number contains 29 digits; all 29 digits must be referenced.

General Data 60 Hz

Table GD-1 — General Data — 27½ - 30 Tons

	27½Ton		30Ton	
Cooling Performance[1]				
Nominal Gross Capacity	329,000		363,000	
Natural Gas Heat[2]	Low	High	Low	High
Heating Input (BTUH)	350,000	600,000	350,000	600,000
First Stage	250,000	425,000	250,000	425,000
Heating Output (BTUH)	283,500	486,000	283,500	486,000
First Stage	202,500	344,500	202,500	344,500
Steady State Efficiency (%)[3]	81.00	81.00	81.00	81.00
No. Burners	1	2	1	2
No. Stages	2	2	2	2
Gas Supply Pressure (in. w.c.)				
Natural or LP (minimum/maximum)	2.5/14.0	2.5/14.0	2.5/14.0	2.5/14.0
Gas Connection Pipe Size (in.)	3/4	1	3/4	1
Electric Heat				
KW Range[5]	27-90[5]		27-90[5]	
Capacity Steps:	2		2	
Compressor				
Number/Type	2/Scroll		2/Scroll	
Size (Nominal)	10/15		15	
Unit Capacity Steps (%)	100/40		100/50	
Motor RPM	3450		3450	
Outdoor Coil — Type	Lanced		Lanced	
Tube Size (in.) OD	3/8		3/8	
Face Area (sq. ft.)	51.33		51.33	
Rows/Fins Per Inch	2/16		2/16	
Indoor Coil — Type	Hi-Performance		Hi-Performance	
Tube Size (in.) OD	1/2		1/2	
Face Area (sq. ft.)	31.67		31.67	
Rows/Fins Per Foot	2/180		2/180	
Refrigerant Control	TXV		TXV	
No. of Circuits	1		1	
Drain Connection No./Size (in)	1/1.25		1/1.25	
Type	PVC		PVC	
Outdoor Fan Type	Propeller		Propeller	
No. Used/Diameter	3/28.00		3/28.00	
Drive Type/No. Speeds	Direct/1		Direct/1	
CFM	24,800		24,800	
No. Motors/HP/RPM	3/1.10/1125		3/1.10/1125	
Indoor Fan Type	FC		FC	
No. Used	1		1	
Diameter/Width (in)	22.38/22.00		22.38/22.00	
Drive Type/No. Speeds	Belt/1		Belt/1	
No. Motors/HP	1/7.50/10.00		1/7.50/10.00	
Motor RPM	1760		1760	
Motor Frame Size	213/215T		213/215T	
Exhaust Fan Type	Propeller		Propeller	
No. Used/Diameter (in)	2/26.00		2/26.00	
Drive Type/No. Speeds/Motors	Direct/2/2		Direct/2/2	
Motor HP/RPM	1.0/1075		1.0/1075	
Motor Frame Size	48		48	
Filters — Type Furnished	Throwaway		Throwaway	
No./ Recommended Size (in)[6]	16/16 x 20 x 2		16/16 x 20 x 2	
Refrigerant Charge (Lbs of R-22)[4]	46.00		46.60	
Minimum Outside Air Temperature For Mechanical Cooling	0 F		0 F	

Notes:
1. Cooling Performance is rated at 95 F ambient, 80 F entering dry bulb, 67 F entering wet bulb. Gross capacity does not include the effect of fan motor heat. Rated and tested in accordance with the Unitary Large Equipment certification program, which is based on ARI Standard 340/360-93.
2. Heating Performance limit settings and rating data were established and approved under laboratory test conditions using American National Standards Institute standards. Ratings shown are for elevations up to 4,500 feet.
3. Steady State Efficiency is rated in accordance with DOE test procedures.
4. Refrigerant charge is an approximate value. For a more precise value, see unit nameplate and service instructions.
5. Maximum KW @ 208V = 41, @ 240V = 54. For Electric heat KW range per specific voltage, see table PD-10.
6. Filter dimensions listed are nominal. For actual filter and rack sizes see the Unit Installation, Operation, Maintenance Guide.

General Data 60 Hz

Table GD-2— General Data — 35-40 Ton

	35Ton		40Ton	
Cooling Performance[1]				
Nominal Gross Capacity	417,000		513,000	
Natural Gas Heat[2]	Low	High	Low	High
Heating Input (BTUH)	350,000	600,000	400,000	800,000
First Stage	250,000	425,000	300,000	600,000
Heating Output (BTUH)	283,500	486,000	324,000	648,000
First Stage	202,500	344,500	243,000	486,000
Steady State Efficiency (%)[3]	81.00	81.00	81.00	81.00
No. Burners	1	2	1	2
No. Stages	2	2	2	2
Gas Supply Pressure (in. w.c.)				
Natural or LP (minimum/maximum)	2.5/14.0	2.5/14.0	2.5/14.0	2.5/14.0
Gas Connection Pipe Size (in.)	3/4	1	3/4	1
Electric Heat				
KW Range[5]	27-90[5]		41-108[5]	
Capacity Steps:	2		2	
Compressor				
Number/Type	2/Scroll		3/Scroll	
Size (nominal)	15		15/15/10	
Unit Capacity Steps (%)	100/50		100/60/40	
Motor RPM	3450		3450	
Outdoor Coil — Type	Lanced		Lanced	
Tube Size (in.) OD	3/8		3/8	
Face Area	51.33		69.79	
Rows/Fins Per Inch	2/16		2/16	
Indoor Coil — Type	Hi-Performance		Hi-Performance	
Tube Size (in.) OD	1/2		1/2	
Face Area (sq. ft.)	31.67		37.50	
Rows/Fins Per Foot	3/180		3/180	
Refrigerant Control	TXV		TXV	
No. of Circuits	1		2	
Drain Connection No./Size (in)	1/1.25		1/1.25	
Type	PVC		PVC	
Outdoor Fan Type	Propeller		Propeller	
No. Used/Diameter	3/28.00		4/28.00	
Drive Type/No. Speeds	Direct/1		Direct/1	
CFM	24,800		31,700	
No. Motors/HP/RPM	3/1.10/1125		4/1.10/1125	
Indoor Fan Type	FC		FC	
No. Used	1		1	
Diameter/Width (in)	22.38/22.00		25.00/25.00	
Drive Type/No. Speeds	Belt/1		Belt/1	
No. Motors/HP	1/7.50/10.00/15.00		1/10.00/15.00	
Motor RPM	1760		1760	
Motor Frame Size	213/215/254T		215/254T	
Exhaust Fan Type	Propeller		Propeller	
No. Used/Diameter (in)	2/26.00		2/26.00	
Drive Type/No. Speeds/Motors	Direct/2/2		Direct/2/2	
Motor HP/RPM	1.0/1075		1.0/1075	
Motor Frame Size	48		48	
Filters — Type Furnished	Throwaway		Throwaway	
No./Recommended Size (in)[6]	16/16 x 20 x 2		17/16 x 20 x 2	
Refrigerant Charge (Lbs of R-22)[4]	51.50		26.00/47.10 per circuit	
Minimum Outside Air Temperature For Mechanical Cooling	0 F		0 F	

Notes:
1. Cooling Performance is rated at 95 F ambient, 80 F entering dry bulb, 67 F entering wet bulb. Gross capacity does not include the effect of fan motor heat. Rated and tested in accordance with the Unitary Large Equipment certification program, which is based on ARI Standard 340/360-93.
2. Heating Performance limit settings and rating data were established and approved under laboratory test conditions using American National Standards Institute standards. Ratings shown are for elevations up to 4,500 feet.
3. Steady State Efficiency is rated in accordance with DOE test procedures.
4. Refrigerant charge is an approximate value. For a more precise value, see unit nameplate and service instructions.
5. Maximum KW @ 208V = 41, @ 240V = 54. For Electric heat KW range per specific voltage, see table PD-10.
6. Filter dimensions listed are nominal. For actual filter and rack sizes see the Unit Installation, Operation, Maintenance Guide.

Table GD-3— General Data — 50 Ton

	50Ton	
Cooling Performance[1]		
Nominal Gross Capacity	616,000	
Natural Gas Heat[2]	Low	High
Heating Input (BTUH)	400,000	800,000
First Stage	300,000	600,000
Heating Output (BTUH)	324,000	648,000
First Stage	243,000	486,000
Steady State Efficiency (%)[3]	81.00	81.00
No. Burners	1	2
No. Stages	2	2
Gas Supply Pressure (in. w.c.) Natural or LP (minimum/maximum)	2.5/14.0	2.5/14.0
Gas Connection Pipe Size (in.)	3/4	1
Electric Heat		
KW Range[5]	41-108[5]	
Capacity Steps:	2	
Compressor		
Number/Type	3/Scroll	
Size (nominal)	14	
Unit Capacity Steps (%)	100/67/33	
Motor RPM	3450	
Outdoor Coil — Type	Lanced	
Tube Size (in.) OD	3/8	
Face Area (sq. ft.)	69.79	
Rows/Fins Per Inch	2/16	
Indoor Coil — Type	Hi-Performance	
Tube Size (in.) OD	1/2	
Face Area (sq. ft.)	37.50	
Rows/Fins Per Foot	4/164	
Refrigerant Control	TXV	
No. of Circuits	2	
Drain Connection No./Size (in)	1/1.25	
Type	PVC	
Outdoor Fan Type	Propeller	
No. Used/Diameter	4/28.00	
Drive Type/No. Speeds	Direct/1	
CFM	31,700	
No. Motors/HP/RPM	4/1.10/1125	
Indoor Fan Type	FC	
No. Used	1	
Diameter/Width (in)	25.00/25.00	
Drive Type/No. Speeds	Belt/1	
No. Motors/HP	1/10.00/15.00/20.00	
Motor RPM	1760	
Motor Frame Size	215/254/256T	
Exhaust Fan Type	Propeller	
No. Used/Diameter (in)	2/26.00	
Drive Type/No. Speeds/Motors	Direct/2/2	
Motor HP/RPM	1.0/1075	
Motor Frame Size	48	
Filters — Type Furnished	Throwaway	
No./Recommended Size (in)[6]	17/16 x 20 x 2	
Refrigerant Charge (Lbs of R-22)[4]	25.70/54.30 per circuit	
Minimum Outside Air Temperature For Mechanical Cooling	0 F	

Table GD-4 — Economizer Outdoor Air Damper Leakage (Of Rated Airflow)

	ΔP Across Dampers (In. WC)	
	0.5 (In.)	1.0 (In.)
Standard	1.5 %	2.5 %
Optional "Low Leak"	0.5 %	1.0 %

Note: Above data based on tests completed in accordance with AMCA Standard 575.

Notes:
1. Cooling Performance is rated at 95 F ambient, 80 F entering dry bulb, 67 F entering wet bulb. Gross capacity does not include the effect of fan motor heat. Rated and tested in accordance with the Unitary Large Equipment certification program, which is based on ARI Standard 340/360-93.
2. Heating Performance limit settings and rating data were established and approved under laboratory test conditions using American National Standards Institute standards. Ratings shown are for elevations up to 4,500 feet.
3. Steady State Efficiency is rated in accordance with DOE test procedures.
4. Refrigerant charge is an approximate value. For a more precise value, see unit nameplate and service instructions.
5. Maximum KW @ 208V = 41, @ 240V = 54. For Electric heat KW range per specific voltage, see table PD-10.
6. Filter dimensions listed are nominal. For actual filter and rack sizes see the Unit Installation, Operation, Maintenance Guide.

General Data 50 Hz

Table GD-5 – General Data – 23-25 Tons

	TC/YC/TE*275 (23Tons)		TC/YC/TE*305 (25Tons)	
Cooling Performance[1]				
Nominal Gross Capacity - Btu (kW)	277,000 (81.1)		303,000 (88.7)	
System Power - kW	24.9		28.6 kW	
Compressor				
Number/Type	2/Scroll		2/Scroll	
Size (Nominal Tons)	10/15		15/15	
Unit Capacity Steps (%)	100/40		100/50	
Motor rpm	2875		2875	
Natural Gas Heat[2]	Low	High	Low	High
Heating Input - Btu (kW)	290,000 (85.0)	500,000 (147)	290,000 (85.0)	500,000 (147)
First Stage	250,000 (73.3 kW)	425,000 (125 kW)	250,000 (73.3 kW)	425,000 (125 kW)
Heating Output - Btu (kW)	243,000 (69.0)	405,000 (119)	243,000 (69.0)	405,000 (119)
First Stage	202,500 (59.4 kW)	344,250 (101 kW)	202,500 (59.4 kW)	344,250 (101 kW)
Steady State Efficiency(%) [3]	81		81	
No. Burners/No. Stages	1/2		1/2	
Gas Connect Pipe Size - in. (mm)	0.75 (19)		0.75 (19)	
Outdoor Coil - Type	Lanced		Lanced	
Tube Size OD - in. (mm)	0.375 (10)		0.375 (10)	
Face Area - sq ft (sq m)	51.3 (4.8)		51.3 (4.8)	
Rows/Fins Per Inch	2/16		2/16	
Indoor Coil - Type-Performance	Hi Performance		Hi Performance	
Tube Size OD - in. (mm)	0.500 (13)		0.500 (13)	
Face Area - sq ft (sq m)	31.7 (2.9)		31.7 (2.9)	
Rows/Fins Per Foot	2/180		2/180	
Refrigerant Control	TXV		TXV	
PVC Drain Connect No./Size - in. (mm)	1/1.25 (1/32)		1/1.25 (1/32)	
Outdoor Fan Type	Propeller		Propeller	
No. Used	3		3	
Diameter - in. (mm)	28.0 (711)		28.0 (711)	
DriveType/No. Speeds	Direct/1		Direct/1	
cfm (L/s)	20,450 (9650)		20,450 (9650)	
No. Motors (rpm)	3 (940)		3 (940)	
Motor- hp (kW)	0.75 (0.56)		0.75 (0.56)	
Indoor Fan Type/No. Used	FC/1		FC/1	
Diameter - in. (mm)	22.4 (568)		22.4 (568)	
Width - in. (mm)	22.0 (559)		22.0 (559)	
DriveType	Belt		Belt	
No. Speeds/No. Motors	1/1		1/1	
Motor - hp (kW)	7.5 (5.6)		7.5 (5.6)	
Motor rpm/Frame Size	1460/213T		1460/213T	
Filters - Type	Throwaway		Throwaway	
Furnished/No.	Yes/16		Yes/16	
Recommended Size - in. (mm)	16X 20 X2 (406X 508 X51)		16x20x2 (406X 508x51)	
Refrigerant Type	R-22		R-22	
Factory Charge - lb (kg) [4]	44.5 (20.2)		45 (20.4)	

Notes:
1. Cooling Performance is rated at 95°F (35°C) ambient, 80°F (27°C) entering dry bulb, 67°F (19°C) entering wet bulb. Gross capacity does not include the effect of fan motor heat.
2. Heating Performance Limit settings and ratings data were established and approved under laboratory test conditions using American National Standards.
3. Steady State Efficiency is rated in accordance with DOE test procedures.
4. Refrigerant charge is an approximate value. For a more precise value, see unit nameplate and service instructions.

General Data 50 Hz

Table GD-6 – General Data – 29-33 Tons

	TC/YC/TE*350 (29Tons)		TC/YC/TE*400 (33Tons)	
Cooling Performance[1]				
Nominal Gross Capacity(Btu)	353,000 (103.4 kW)		435,000 (127.4 kW)	
System Power - kW	32.55		42.6	
Compressor				
Number/Type	2/Scroll		3/Scroll	
Size (Nominal Tons)	15/15		15/15/10	
Unit Capacity Steps (%)	100/50		100/60/40	
Motor rpm	2875		2875	
Natural Gas Heat[2]	Low	High	Low	High
Heating Input - Btu (kW)	290,000 (85.0)	500,000 (147)	335,000 (98.2)	670,000 (196)
First Stage	250,000 (73.3 kW)	425,000 (125 kW)	300,000 (87.9 kW)	600,000 (176 kW)
Heating Output - Btu (kW)	243,000 (69.0)	405,000 (119)	271,350 (80.0)	542,700 (159)
First Stage	202,500 (59.4 kW)	344,250 (101 kW)	243,500 (71.4 kW)	486,000 (166 kW)
Steady State Efficiency(%)[3]	81		81	
No. Burners/No. Stages	1/2		1/2	
Gas Connect Pipe Size - in. (mm)	0.75 (19)		0.75 (19)	
Outdoor Coil - Type	Lanced		Lanced	
Tube Size OD - in. (mm)	0.375 (10)		0.375 (10)	
Face Area - sq ft (sq m)	51.3 (4.8)		69.8 (6.5)	
Rows/Fins Per Inch	2/16		2/16	
Indoor Coil - Type	Hi-Performance		Hi-Performance	
Tube Size - in. (mm) OD	0.500 (13)		0.500 (13)	
Face Area - sq ft (sq m)	31.7 (2.9)		37.5 (3.5)	
Rows/Fins Per Foot	2/180		3/180	
Refrigerant Control	TXV		TXV	
PVC Drain Connect No./Size - in. (mm)	1/1.25 (1/32)		1/1.25 (1/32)	
Outdoor Fan Type	Propeller		Propeller	
No. Used	3		4	
Diameter - in. (mm)	28.0 (711)		28.0 (711)	
Drive Type/No. Speeds	Direct/1		Direct/1	
cfm (L/s)	20,400 (9650)		26,200 (12,400)	
No. Motors (rpm)	3 (940)		4 (940)	
Motor - hp (kW)	0.75 (0.56)		0.75 (0.56)	
Indoor Fan Type/No. Used	FC/1		FC/1	
Diameter - in. (mm)	22.4 (568)		25.0 (635)	
Width - in. (mm)	22.0 (559)		25.0 (635)	
Drive Type	Belt		Belt	
No. Speeds/No. Motors	1/1		1/1	
Motor - hp (kW)	7.5 (5.6)		10.0 (7.5)	
Motor rpm/Frame Size	1460/213T		1460/215T	
Filters - Type	Throwaway		Throwaway	
Furnished/No.	Yes/16		Yes/17	
Recommended Size - in. (mm)	16x20x2 (406x508x51)		16X 20 X2 (406X 508 X51)	
Refrigerant Type	R-22		R-22	
Factory Charge Ciruit 1 - lb (kg) [4]	50 (22.7)		26.4 (12)	
Factory Charge Circuit 2 - lb (kg)	–		47.8 (21.7)	

Notes:
1. Cooling Performance is rated at 95°F (35°C) ambient, 80°F (27°C) entering dry bulb, 67°F (19°C) entering wet bulb. Gross capacity does not include the effect of fan motor heat.
2. Heating Performance Limit settings and ratings data were established and approved under laboratory test conditions using American National Standards.
3. Steady State Efficiency is rated in accordance with DOE test procedures.
4. Refrigerant charge is an approximate value. For a more precise value, see unit nameplate and service instructions.

General Data 50 Hz

Table GD-7 – General Data – 43 Tons

	TC/YC/TE*500 (42Tons)	
Cooling Performance [1]		
Nominal Gross Capacity - Btu (kW)	520,000 (152)	
System Power - kW	50.9	
Compressor		
Number/Type	3/Scroll	
Size (Nominal Tons)	14/14/14	
Unit Capacity Steps (%)	100/67/33	
Motor rpm	2875	
Natural Gas Heat[2]	Low	High
Heating Input - Btu (kW)	335,000 (98.2)	670,000 (196)
First Stage	300,000 (87.9 kW)	600,000 (176 kW)
Heating Output - Btu (kW)	271,350 (79.5)	542,700 (159)
First Stage	243,500 (71.4 kW)	486,000 (166 kW)
Steady State Efficiency(%)[3]	81	
No. Burners/No. Stages	1/2	
Gas Connect Pipe Size - in. (mm)	0.75 (19)	
Outdoor Coil - Type	Lanced	
Tube Size OD - in. (mm)	0.375 (10)	
Face Area - sq ft (sq m)	69.8 (6.5)	
Rows/Fins Per Inch	2/16	
Indoor Coil - Type	Hi-Performance	
Tube Size OD - in. (mm)	0.500 (13)	
Face Area - sq ft (sq m)	37.5 (3.5)	
Rows/Fins Per Foot	4/164	
Refrigerant Control	TXV	
PVC Drain Connect No./Size - in. (mm)	1/1.25 (1/32)	
Outdoor Fan Type	Propeller	
No. Used	4	
Diameter - in. (mm)	28.0 (711)	
Drive Type/No. Speeds	Direct/1	
cfm (L/s)	26,200 (12,400)	
No. Motors (rpm)	4 (940)	
Motor - hp (kW)	0.75 (0.56)	
Indoor Fan Type/No. Used	FC/1	
Diameter - in. (mm)	25.0 (635)	
Width - in. (mm)	25.0 (635)	
Drive Type	Belt	
No. Speeds/No. Motors	1/1	
Motor hp	10.0 (7.5 kW)	
Motor rpm/Frame Size	1460/215T	
Filters - Type	Throwaway	
Furnished/No.	Yes/17	
Recommended Size - in. (mm)	16x20x2 (406x508x51)	
Refrigerant Type	R-22	
Factory Charge Circuit 1 - lb (kg) [4]	26.0 (11.8)	
Factory Charge Circuit 1 - (kg)	53.2 (24.1)	

Notes:
1. Cooling Performance is rated at 95°F (35°C) ambient, 80°F (27°C) entering dry bulb, 67°F (19°C) entering wet bulb. Gross capacity does not include the effect of fan motor heat.
2. Heating Performance Limit settings and ratings data were established and approved under laboratory test conditions using American National Standards.
3. Steady State Efficiency is rated in accordance with DOE test procedures.
4. Refrigerant charge is an approximate value. For a more precise value, see unit nameplate and service instructions.

Table GD-8 – Economizer Outdoor Air Damper Leakage (Of Rated Airflow)

	∆P Across Dampers (In. wc) (Pa)	
	0.5 In. (124.5 Pa)	1.0 In. (249 Pa)
Standard	1.5%	2.5%
Optional "Low Leak"	0.5%	1.0%

Note: Above data based on tests completed in accordance with AMCA Standard 575.

Performance Adjustment Factors

Table PD-1 – Enthalpy of Saturated Air

Wet Bulb Temperature °F	°C	Btu Per lb
40	4.4	15.23
41	5.0	15.70
42	5.5	16.17
43	6.1	16.66
44	6.7	17.15
45	7.2	17.65
46	7.8	18.16
47	8.3	18.68
48	8.9	19.21
49	9.4	19.75
50	10.0	20.30
51	10.6	20.86
52	11.1	21.44
53	11.7	22.02
54	12.2	22.62
55	12.8	23.22
56	13.3	23.84
57	13.9	24.48
58	14.4	25.12
59	15.0	25.78
60	15.6	26.46
61	16.1	27.15
62	16.7	27.85
63	17.2	28.57
64	17.8	29.31
65	18.3	30.06
66	18.9	30.83
67	19.4	31.62
68	20.0	32.42
69	20.6	33.25
70	21.1	34.09
71	21.7	34.95
72	22.2	35.83
73	22.8	36.74
74	23.3	37.66
75	23.9	38.61

Figure PD-1 – Air Density Ratios

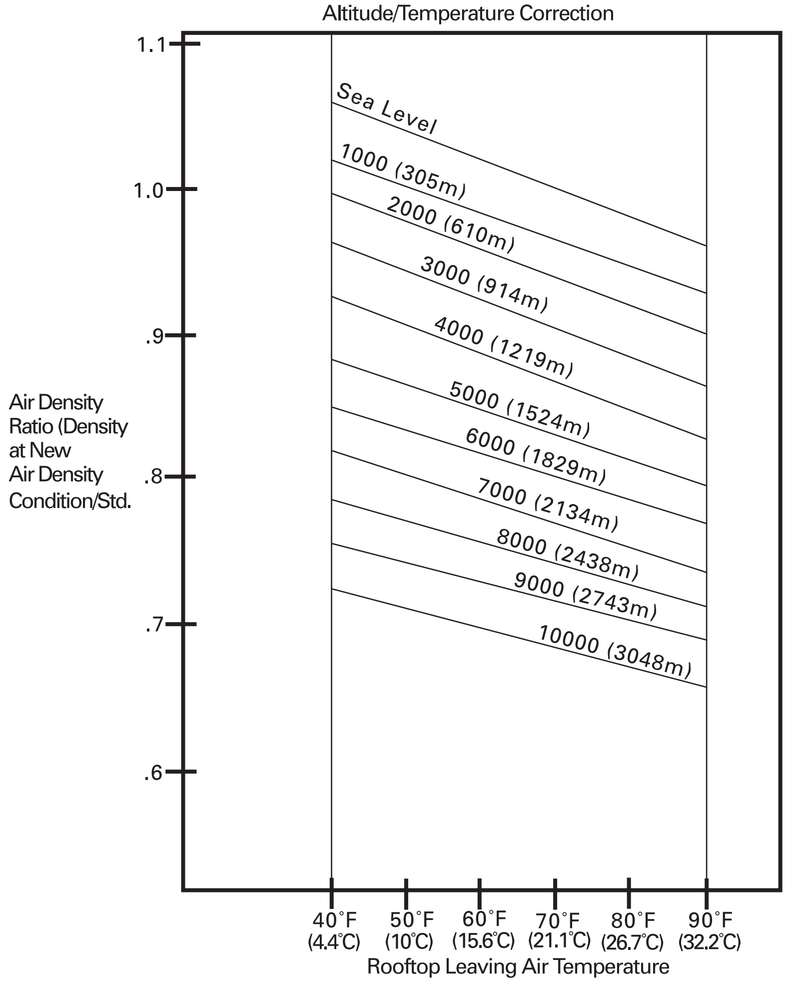


Table PD-2 – Cooling Capacity Altitude Correction Factors

	Altitude ft. (m)							
	Sea Level	1000 (304.8)	2000 (609.6)	3000 (914.4)	4000 (1219.2)	5000 (1524.0)	6000 (1828.8)	7000 (2133.6)
Cooling Capacity Multiplier	1.00	0.99	0.99	0.98	0.97	0.96	0.95	0.94
KW Correction Multiplier (Compressors)	1.00	1.01	1.02	1.03	1.04	1.05	1.06	1.07
SHR Correction Multiplier	1.00	.98	.95	.93	.91	.89	.87	.85
Maximum Condenser Ambient	115°F (46.1°C)	114°F (45.6°C)	113°F (45.0°C)	112°F (44.4°C)	111°F (43.9°C)	110°F (43.3°C)	109°F (42.8°C)	108°F (42.2°C)

Note:
SHR = Sensible Heat Ratio

Table PD-3 – Gas Heating Capacity Altitude Correction Factors

	Altitude ft. (m)						
	Sea Level To 2000 (Sea Level To 609.6)	2000 To 2500 (609.9 To 762.0)	2501 To 3500 (762.3 To 1066.8)	3501 To 4500 (1067.1 To 1674.4)	4501 To 5500 (1371.9 To 1675.4)	5501 To 6500 (1676.7 To 1981.2)	6501 To 7500 (1981.5 To 2286.0)
Capacity Multiplier	1.00	.92	.88	.84	.80	.76	.72

Note:
Correction factors are per AGA Std 221.30 – 1964, Part VI, 6.12. Local codes may supersede.

Table PD-4 — 27½ Ton Gross Cooling Capacities (MBh)

		Ambient Temperature — Deg F																							
		85						95						105						115					
	Ent DB	Entering Wet Bulb Temperature — Deg F																							
		61		67		73		61		67		73		61		67		73		61		67		73	
CFM	(F)	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC
	75	291	228	323	185	358	130	278	221	309	174	343	123	265	213	295	167	327	116	251	206	279	159	310	109
8000	80	294	268	324	220	359	171	281	261	310	212	343	164	268	253	296	205	327	157	255	246	280	197	311	149
	85	301	301	325	258	360	210	290	290	311	251	344	203	278	278	297	243	329	196	266	266	282	236	312	188
	90	317	317	328	297	361	248	306	306	315	290	345	241	294	294	301	283	330	234	282	282	286	275	313	226
	75	299	242	331	189	367	133	285	235	316	182	351	126	272	227	301	175	334	119	257	219	286	168	316	112
9000	80	302	286	332	232	367	178	290	279	318	225	351	171	276	272	303	217	335	164	261	261	287	209	317	157
	85	314	314	334	275	368	221	302	302	319	268	352	215	290	290	305	260	336	208	277	277	289	252	319	201
	90	331	331	338	319	369	264	319	319	324	312	354	256	306	306	310	304	337	249	293	293	293	293	320	241
	75	305	255	337	197	373	136	292	248	322	190	357	129	277	240	307	183	339	122	263	232	291	176	322	115
10000	80	310	304	339	244	374	185	297	297	324	237	358	178	283	283	308	229	341	171	270	270	292	221	323	164
	85	325	325	341	291	375	233	313	313	326	284	359	226	300	300	311	276	342	219	287	287	295	268	324	212
	90	343	343	346	340	376	279	330	330	332	332	360	271	317	317	317	317	343	264	304	304	303	303	326	256
	75	311	268	343	205	379	139	297	260	327	198	362	132	282	253	311	191	344	125	268	245	295	183	326	117
11000	80	316	316	344	255	380	192	304	304	329	248	363	185	291	291	313	240	345	178	278	278	297	232	327	170
	85	335	335	347	307	381	245	322	322	332	300	364	237	309	309	317	292	347	230	295	295	301	284	329	220
	90	353	353	353	353	383	293	340	340	340	340	366	286	327	327	327	327	349	278	313	313	312	312	331	270
	75	316	281	348	223	384	142	302	274	332	216	366	135	287	266	316	208	348	128	272	258	299	200	330	121
12100	80	325	325	349	268	385	199	312	312	334	260	368	192	299	299	318	252	350	185	285	285	301	244	331	176
	85	344	344	353	324	387	254	331	331	338	317	369	246	317	317	322	309	352	239	303	303	306	301	333	231
	90	364	364	363	363	388	309	350	350	350	350	372	301	336	336	336	336	354	294	321	321	321	321	336	286

Notes:
1. All capacities shown are gross and have not considered indoor fan heat. To obtain net cooling, subtract indoor fan heat.
2. TGC = Total gross capacity.
3. SHC = Sensible heat capacity.

Table PD-5— 30 Ton Gross Cooling Capacities (Mbh)

		Ambient Temperature — Deg F																							
		85						95						105						115					
	Ent DB	Entering Wet Bulb Temperature — Deg F																							
		61		67		73		61		67		73		61		67		73		61		67		73	
CFM	(F)	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC
	75	323	255	358	207	397	144	309	247	343	194	380	137	295	239	327	186	362	129	279	230	310	178	344	122
9000	80	326	299	359	245	398	190	313	291	344	237	381	182	298	283	328	229	363	175	284	275	311	221	345	167
	85	335	335	361	288	399	234	323	323	346	280	382	227	310	310	330	272	364	219	297	297	313	264	345	210
	90	352	352	364	332	400	276	340	340	349	324	383	269	327	327	334	316	365	261	313	313	318	308	347	252
	75	331	268	366	210	405	147	316	260	350	202	387	140	301	252	333	194	369	132	286	243	316	186	350	125
10000	80	335	317	367	257	406	197	321	309	351	249	388	189	306	301	335	241	370	182	290	290	318	232	351	174
	85	347	347	369	304	407	246	334	334	353	296	389	238	321	321	337	288	371	230	307	307	320	280	352	222
	90	366	366	374	353	408	292	353	353	358	345	391	284	339	339	342	337	372	276	325	325	324	324	353	267
	75	337	281	372	218	411	150	322	273	356	210	393	143	307	265	339	202	374	135	291	256	321	194	355	127
11000	80	343	335	374	269	412	204	328	327	357	261	394	196	312	312	340	252	375	188	298	298	323	244	356	180
	85	358	358	376	321	413	257	345	345	360	312	395	249	331	331	343	304	377	241	316	316	326	296	357	233
	90	378	378	382	374	415	306	364	364	367	366	397	298	350	350	349	349	378	290	335	335	334	334	359	282
	75	343	294	378	225	417	153	328	285	361	218	398	145	312	277	343	210	379	138	295	268	325	201	359	129
12000	80	348	348	379	280	418	210	334	334	362	272	399	203	321	321	345	263	380	195	306	306	327	255	360	187
	85	368	368	382	336	419	268	354	354	366	328	401	260	340	340	349	320	382	252	325	325	331	311	362	244
	90	388	388	388	388	421	321	374	374	374	374	402	313	359	359	359	359	383	304	343	343	343	343	364	296
	75	349	308	383	246	422	156	333	300	366	238	403	149	317	291	348	229	383	141	300	283	329	221	363	133
13200	80	357	357	385	293	423	218	343	343	368	285	405	210	329	329	350	276	385	202	314	314	332	268	365	194
	85	378	378	389	354	425	278	364	364	372	346	406	270	349	349	355	338	387	261	333	333	337	329	366	253
	90	399	399	399	399	427	337	384	384	384	384	408	329	369	369	369	369	389	321	353	353	352	352	369	312

Notes:
1. All capacities shown are gross and have not considered indoor fan heat. To obtain net cooling, subtract indoor fan heat.
2. TGC = Total gross capacity.
3. SHC = Sensible heat capacity.

Performance Data 60 Hz

Table PD-6 — 35 Ton Gross Cooling Capacities (Mbh)

		Ambient Temperature — Deg F																							
		85						95						105						115					
	Ent	Entering Wet Bulb Temperature — Deg F																							
	DB	61		67		73		61		67		73		61		67		73		61		67		73	
CFM	(F)	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC
	75	377	310	416	240	459	166	361	301	398	231	438	158	343	291	379	223	417	150	325	282	359	214	396	141
10500	80	383	367	417	296	460	224	366	359	399	287	439	216	350	349	380	278	418	207	332	332	360	268	397	198
	85	398	398	420	351	461	281	383	383	402	343	440	272	368	368	383	333	419	263	352	352	364	324	397	254
	90	419	419	426	409	462	336	404	404	408	400	442	327	388	388	388	388	421	317	371	371	371	371	399	308
	75	387	332	425	258	468	171	370	322	406	249	447	162	352	313	387	240	425	154	334	303	366	231	403	145
12000	80	393	393	427	315	469	236	378	378	408	306	448	227	362	362	388	297	426	218	346	346	368	288	404	209
	85	415	415	431	379	470	300	399	399	412	370	449	290	383	383	393	361	427	281	366	366	373	351	405	271
	90	437	437	437	437	472	361	421	421	421	421	451	352	404	404	404	404	430	342	386	386	386	386	408	333
	75	393	346	430	261	473	173	375	337	411	253	452	165	357	327	391	244	429	156	339	317	370	234	406	147
13000	80	402	402	432	328	475	243	387	387	413	319	453	234	370	370	393	310	430	225	353	353	372	300	408	216
	85	425	425	437	397	476	312	409	409	418	388	454	303	392	392	399	378	432	294	374	374	379	369	409	285
	90	448	448	448	448	478	377	431	431	431	431	457	368	413	413	413	413	435	359	395	395	395	395	412	349
	75	398	360	435	270	478	176	380	351	415	261	456	167	362	341	395	252	433	159	343	331	373	243	410	150
14000	80	410	410	437	341	479	250	394	394	417	332	457	241	378	378	397	322	434	232	360	360	376	312	411	223
	85	434	434	443	414	480	324	417	417	423	405	458	315	400	400	404	396	436	306	381	381	381	381	413	297
	90	458	458	457	457	484	393	440	440	440	440	462	384	422	422	422	422	440	375	403	403	403	403	417	365
	75	400	365	436	272	479	177	382	356	416	263	457	168	364	346	396	254	434	160	345	337	375	244	411	151
14400	80	413	413	439	346	481	253	397	397	419	336	459	244	380	380	399	327	436	235	363	363	378	317	412	226
	85	437	437	445	421	482	326	420	420	426	412	460	317	402	402	406	402	437	308	384	384	384	384	414	298
	90	461	461	461	461	486	400	443	443	443	443	464	390	425	425	425	425	442	381	406	406	406	406	419	371

Notes:
1. All capacities shown are gross and have not considered indoor fan heat. To obtain net cooling, subtract indoor fan heat.
2. TGC = Total gross capacity.
3. SHC = Sensible heat capacity.

Table PD-7 — 40 Ton Gross Cooling Capacities (Mbh)

		Ambient Temperature — Deg F																							
		85						95						105						115					
	Ent	Entering Wet Bulb Temperature — Deg F																							
	DB	61		67		73		61		67		73		61		67		73		61		67		73	
CFM	(F)	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC
	75	460	365	510	288	565	202	439	353	486	276	539	190	416	340	462	263	512	178	393	327	436	250	484	166
12000	80	466	432	511	351	566	269	445	419	487	338	540	257	423	406	463	325	513	244	401	393	438	312	486	232
	85	480	480	515	415	567	333	461	461	491	402	541	322	441	441	467	390	515	309	421	421	442	376	487	297
	90	506	506	521	480	568	398	487	487	498	468	543	385	467	467	475	455	517	373	445	445	450	442	489	360
	75	476	396	525	304	580	208	453	383	500	291	553	196	430	370	474	279	525	184	406	357	448	266	496	172
14000	80	484	473	526	378	581	284	463	461	502	365	554	272	438	438	477	352	526	260	417	417	450	339	497	248
	85	506	506	532	453	582	359	486	486	508	440	556	347	465	465	482	427	528	335	443	443	457	414	499	321
	90	535	535	541	529	585	432	514	514	518	517	559	420	492	492	492	492	531	407	470	470	469	469		
	75	482	411	530	317	586	211	459	398	505	305	558	199	436	385	479	292	530	187	411	371	452	279		
15000	80	489	489	533	391	587	292	469	469	508	379	560	280	448	448	482	366	531	268	426	426	456	352		
	85	518	518	539	471	588	372	497	497	514	458	561	360	475	475	489	445	533	346	453	453	463	432		
	90	547	547	546	546	591	449	525	525	525	525	565	437	503	503	503	503	537	424	480	480	480	480		
	75	488	425	536	321	591	213	465	412	510	309	563	202	441	399	484	296	534	189	416	385	456	282		
16000	80	499	499	539	405	592	299	478	478	513	392	565	287	457	457	487	379	536	275	434	434	460	365		
	85	528	528	546	489	593	383	507	507	521	477	566	371	485	485	495	463	538	358	461	461	469	450		
	90	558	558	558	558	597	466	536	536	536	536	571	453	513	513	513	513	543	440	489	489	489	489		
	75	497	448	543	335	598	217	473	435	517	322	570	206	449	422	490	308	541	193	424	408	462	295		
17600	80	513	513	547	425	599	311	491	491	521	412	572	299	469	469	495	399	543	286	446	446	467	385		
	85	543	543	555	518	601	401	521	521	530	505	574	389	498	498	504	492	545	376	474	474	474	474		
	90	574	574	574	574	606	492	551	551	551	551	579	479	527	527	527	527	551	466						

Notes:
1. All capacities shown are gross and have not considered indoor fan heat. To obtain net cooling, subtract indoor fan heat.
2. TGC = Total gross capacity.
3. SHC = Sensible heat capacity.

Performance Data 60 Hz

Table PD-8 — 50 Ton Gross Cooling Capacities (MBh)

		Ambient Temperature — Deg F																							
		85						95						105						115					
	Ent	Entering Wet Bulb Temperature — Deg F																							
	DB	61		67		73		61		67		73		61		67		73		61		67		73	
CFM	(F)	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC
	75	556	459	614	356	679	244	529	444	585	342	647	230	502	429	555	327	614	216	475	414	524	312		
15000	80	565	547	616	439	680	331	539	533	588	424	649	318	511	511	558	409	616	303	487	487	527	394		
	85	590	590	622	524	682	417	567	567	593	509	651	403	542	542	564	494	618	389	517	517	534	479		
	90	623	623	631	611	684	500	599	599	604	597	654	486	574	574	574	574	622	471	547	547	547	547		
	75	570	491	627	373	691	250	543	476	597	359	659	236	515	460	566	344	625	222	486	445	533	328		
17000	80	581	581	630	468	693	348	557	557	601	453	661	334	532	532	570	437	627	320	506	506	538	422		
	85	615	615	637	564	694	443	590	590	608	549	662	429	565	565	578	534	629	414	538	538	547	518		
	90	650	650	649	649	698	536	624	624	624	624	667	522	597	597	597	597	634	507						
	75	576	506	633	386	696	252	548	491	602	371	663	239	520	476	570	356	629	224	491	460	538	340		
18000	80	591	591	636	482	698	355	566	566	606	467	666	342	541	541	575	451	632	327	514	514	543	436		
	85	626	626	644	583	699	455	601	601	615	568	668	441	574	574	584	553	634	426	547	547	553	537		
	90	661	661	661	661	703	554	635	635	635	635	673	540	608	608	607	607	640	525						
	75	581	522	638	391	701	255	554	507	607	377	668	241	525	491	575	362	633	227	496	475	542	345		
19000	80	600	600	642	495	702	363	575	575	611	480	670	350	549	549	580	465	636	335	522	522	547	449		
	85	636	636	651	602	704	467	610	610	621	587	673	453	583	583	590	572	639	438	555	555	559	556		
	90	671	671	671	671	709	571	645	645	645	645	678	557	617	617	617	617	645	543						
	75	587	537	642	400	705	257	559	522	611	386	672	244	530	506	579	371	637	230	501	490	545	353		
20000	80	609	609	647	509	707	371	583	583	616	494	674	357	557	557	584	478	640	343	529	529	551	463		
	85	645	645	657	621	708	479	619	619	627	606	677	465	591	591	596	591	643	450	563	563	562	562		
	90	681	681	681	681	714	589	654	654	654	654	683	575	626	626	626	626	650	560						

Notes:
1. All capacities shown are gross and have not considered indoor fan heat. To obtain net cooling, subtract indoor fan heat.
2. TGC = Total gross capacity.
3. SHC = Sensible heat capacity.

Performance Data 60 Hz

Table PD-9 — Electric Heat Air Temperature Rise

KW Input	Total MBH	Cfm												
		8000	9000	10000	11000	12000	13000	14000	15000	16000	17000	18000	19000	20000
36	123	14.2	12.6	11.3	10.3	9.4	8.7	8.1	7.6	—	—	—	—	—
54	184	21.2	18.9	17.0	15.4	14.2	13.1	12.1	11.3	10.6	10.0	9.4	8.9	8.5
72	246	28.3	25.2	22.6	20.6	18.9	17.4	16.2	15.1	14.2	13.3	12.6	11.9	11.3
90	307	35.4	31.5	28.3	25.7	23.6	21.8	20.2	18.9	17.7	16.7	15.7	14.9	14.2
108	369	—	—	—	—	28.3	26.1	24.3	22.6	21.2	20.0	18.9	17.9	17.0

Notes:
1. Air temperature rise = (KW x 3413)/(scfm x 1.085).
2. All heaters on constant volume units provide 2 increments of capacity. All VAV units provide 1 step of heating capacity.
3. Air temperature rise in this table are based on heater operating at 240, 480 or 600 volts.

Table PD-10 — Available Electric Heat KW Ranges

Nominal Unit Size Tons	Nominal Voltage			
	208	240	480	600
27½	27-41	36-54	36-90	54-90
30.0	27-41	36-54	36-90	54-90
35.0	27-41	36-54	36-90	54-90
40.0	41	54	54-108	54-108
50.0	41	54	54-108	54-108

Notes:
1. KW ranges in this table are based on heater operating at 208, 240, 480, and 600 volts.
2. For other than rated voltage, $KW = \left(\frac{\text{Applied Voltage}}{\text{Rated Voltage}}\right)^2 \times \text{Rated KW}$.
3. Electric heaters up to 54 KW are single element heaters, those above 54 KW are dual element heaters.

Table PD-11 — Natural Gas Heating Capacities

Tons	Unit Model No.	Heat Input MBH (See Note 1)	Heating Output MBH (See Note 1)	Air Temp. Rise, F
27½-35	YCD/YCH330**L YCD/YCH360**L YCD/YCH420**L	350,000/250,000	283,500/202,500	10-40
27½-35	YCD/YCH330**H YCD/YCH360**H YCD/YCH420**H	600,000/425,000	486,000/344,500	25-55
40-50	YCD/YCH480**L YCD/YCH600**L	400,000/300,000	324,000/243,000	5-35
40-50	YCD/YCH480**H YCD/YCH600**H	800,000/600,000	648,000/486,000	20-50

Note:
1. Second stage is total heating capacity. Second Stage/First Stage.

Performance Data

60 Hz

Table PD-12 — Supply Fan Performance — 27½ - 35 Ton

	Static Pressure (in. wg)[1]																	
	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00		2.25	
SCFM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
8000	308	1.17	372	1.62	427	2.09	475	2.55	525	3.11	574	3.75	620	4.42	661	5.09	701	5.77
8500	317	1.33	381	1.82	436	2.33	480	2.77	528	3.34	574	3.97	620	4.66	662	5.36	702	6.08
9000	326	1.51	391	2.04	443	2.55	489	3.08	532	3.58	577	4.22	620	4.91	663	5.64	703	6.40
9500	337	1.72	401	2.28	451	2.80	498	3.39	537	3.87	580	4.50	621	5.18	663	5.93	703	6.70
10000	349	1.96	411	2.54	459	3.09	506	3.69	545	4.25	584	4.81	624	5.48	664	6.23	703	7.02
10500	363	2.22	421	2.82	468	3.40	513	3.98	555	4.65	589	5.17	628	5.84	666	6.56	703	7.34
11000	376	2.52	430	3.11	479	3.74	521	4.33	563	5.03	598	5.63	633	6.22	670	6.95	706	7.73
11500	390	2.83	438	3.41	489	4.10	530	4.72	570	5.38	607	6.11	639	6.68	674	7.37	709	8.14
12000	404	3.18	447	3.74	499	4.48	538	5.13	578	5.79	615	6.56	648	7.22	679	7.83	713	8.59
12500	417	3.55	457	4.10	509	4.88	549	5.58	586	6.24	623	7.00	657	7.78	687	8.42	718	9.10
13000	431	3.95	468	4.50	518	5.30	559	6.04	594	6.73	630	7.45	665	8.30	696	9.04	724	9.69
13500	445	4.39	479	4.92	526	5.73	569	6.53	604	7.26	638	7.98	673	8.82	705	9.68	733	10.38
14000	459	4.85	490	5.39	535	6.19	579	7.04	614	7.81	647	8.56	680	9.35	713	10.26	742	11.09
14500	473	5.35	503	5.90	544	6.68	588	7.59	624	8.40	656	9.18	688	9.96	720	10.86	751	11.78

Table PD-12 — Supply Fan Performance — 27½ - 35 Ton Continued

	Static Pressure (in. wg)[1]					
	2.50		2.75		3.00	
SCFM	RPM	BHP	RPM	BHP	RPM	BHP
8000	738	6.48	773	7.18	805	7.88
8500	739	6.82	774	7.54	807	8.28
9000	740	7.16	775	7.92	809	8.70
9500	740	7.48	776	8.30	810	9.12
10000	742	7.86	777	8.68	812	9.54
10500	742	8.20	777	9.05	812	9.94
11000	741	8.56	777	9.43	812	10.35
11500	743	8.95	777	9.83	812	10.78
12000	747	9.43	780	10.30	812	11.21
12500	750	9.90	783	10.79	814	11.70
13000	755	10.45	786	11.30	817	12.22
13500	760	11.04	790	11.88	821	12.81
14000	768	11.79	795	12.52	824	13.39
14500	778	12.59	803	13.30	829	14.10

Notes:
1. Supply fan performance table includes internal resistance of rooftop. For total static pressure determination, system external static must be added to appropriate component static pressure drops, (evaporator coil, filters, optional economizer, optional heating system, optional roof curb).
2. The pressure drop from the supply fan to the space cannot exceed 2.25”.
3. Maximum air flow for 27½ ton — 12,100 cfm, 30 ton — 13,200 cfm, 35 ton — 14,400 cfm.
4. Maximum motor horsepower for 27½ ton — 10 hp, 30 ton — 10 hp, 35 ton — 15 hp.

Table PD-13 — Supply Fan Performance — 40 and 50 Ton

	Static Pressure (in. wg)[1]																	
	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00		2.25	
SCFM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
12000	307	2.29	353	2.86	394	3.45	436	4.11	471	4.75	509	5.43	543	6.14	575	6.89	606	7.63
13000	324	2.79	368	3.40	407	4.06	446	4.73	482	5.43	515	6.13	550	6.87	582	7.65	612	8.44
14000	341	3.35	384	4.03	422	4.74	457	5.42	494	6.19	525	6.93	556	7.69	589	8.49	619	9.32
15000	359	3.99	401	4.77	437	5.48	471	6.24	504	6.99	537	7.82	566	8.62	595	9.42	625	10.27
16000	376	4.72	418	5.60	452	6.32	485	7.14	515	7.92	548	8.77	578	9.65	604	10.49	632	11.36
17000	394	5.53	434	6.50	468	7.26	500	8.12	529	8.97	558	9.79	589	10.73	616	11.65	641	12.54
18000	413	6.42	451	7.48	485	8.34	515	9.18	544	10.11	571	10.99	598	11.89	628	12.88	654	13.87
19000	431	7.42	469	8.55	501	9.53	530	10.37	559	11.34	585	12.29	611	13.22	637	14.17	665	15.24
20000	449	8.52	486	9.72	518	10.83	547	11.69	573	12.66	600	13.69	625	14.70	648	15.64	675	16.71

Table PD-13 — Supply Fan Performance — 40 and 50 Ton Continued

	Static Pressure (in. wg)[1]									
	2.50		2.75		3.00		3.25		3.50	
SCFM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
12000	640	8.45	670	9.25	700	10.03	727	10.81	755	11.61
13000	640	9.23	671	10.12	701	10.98	729	11.85	756	12.69
14000	647	10.16	674	11.04	700	11.89	729	12.85	757	13.79
15000	653	11.14	680	12.05	706	12.97	731	13.89	757	14.86
16000	659	12.23	687	13.16	713	14.14	738	15.10	762	16.10
17000	666	13.45	694	14.42	719	15.37	744	16.39	768	17.39
18000	677	14.81	700	15.76	726	16.78	751	17.77	774	18.81
19000	690	16.29	711	17.27	734	18.29	758	19.34	782	20.41
20000	701	17.83	724	18.91	745	19.94	765	20.99	788	22.12

Notes:

1. Supply fan performance table includes internal resistance of rooftop. For total static pressure determination, system external static must be added to appropriate component static pressure drops, (evaporator coil, filters, optional economizer, optional heating system, optional roof curb).
2. The pressure drop from the supply fan to the space cannot exceed 2.50”.
3. Maximum air flow for 40 ton — 17,600 cfm, 50 ton — 20,000 cfm.
4. Maximum motor horsepower for 40 ton — 15 hp, 50 ton — 20 hp.

Figure PD-2 — Supply Fan Performance — 27½ - 35 Ton

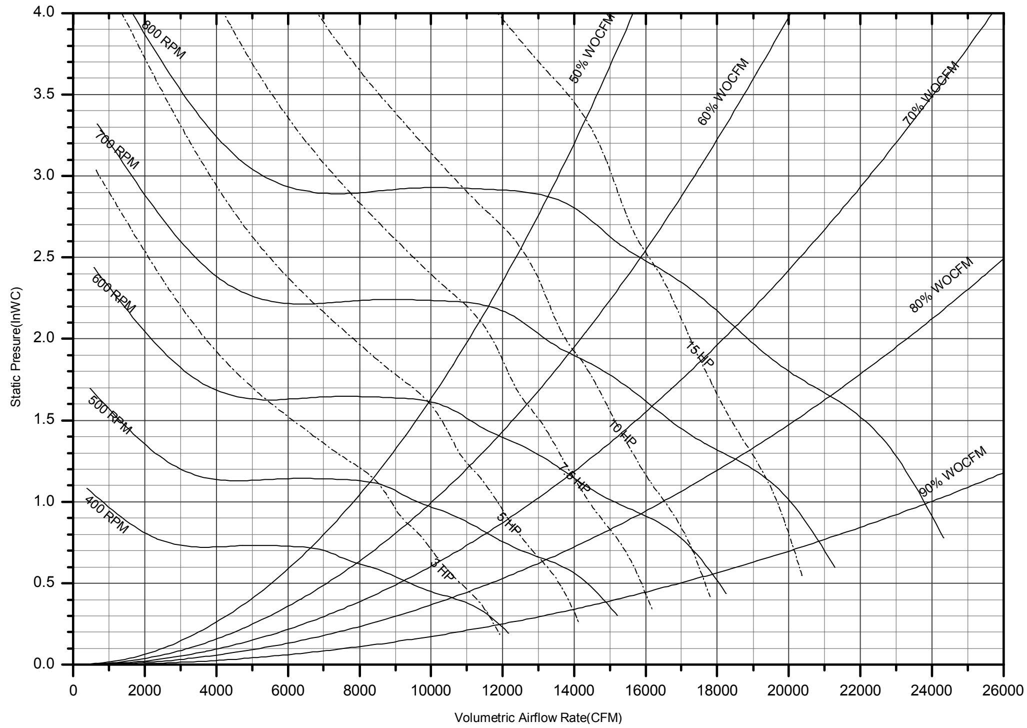


Figure PD-3 — Supply Fan Performance — 40 and 50 Ton

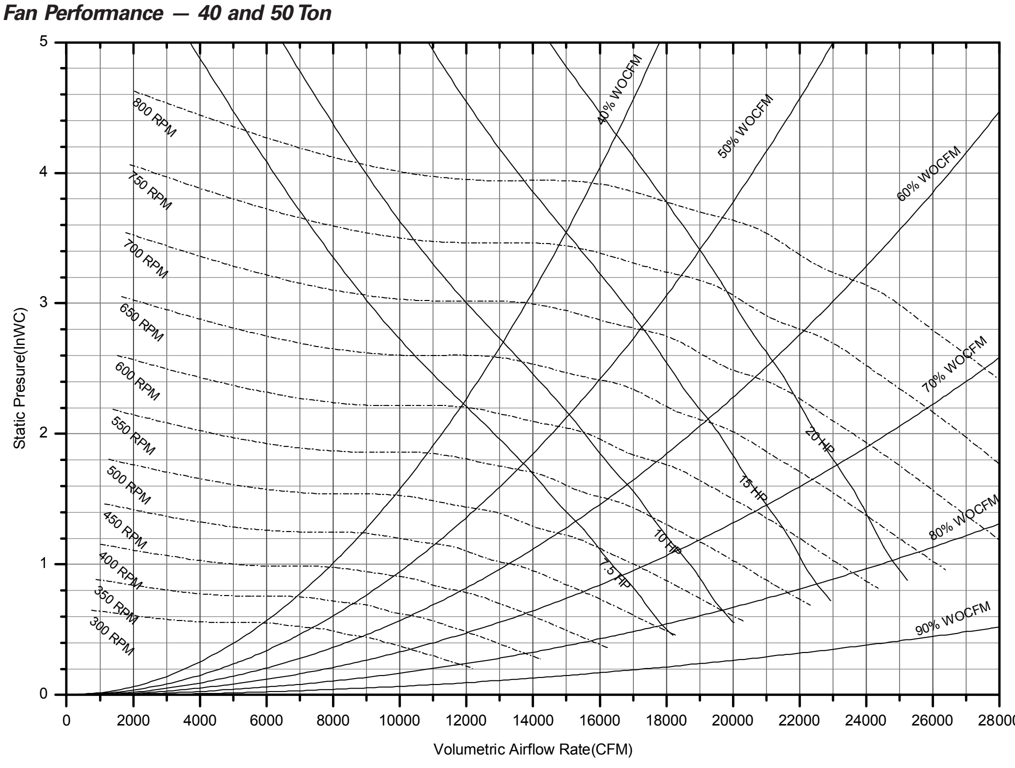


Table PD-14 — Component Static Pressure Drops (in. W.G.)[1]

Nominal	CFM	Heating System				ID Coil		Filters[2]			Inlet Guide	
		Gas Heat		Electric Heat[3]				Throwaway	High Eff. Filters			
Tons	Std Air	Low	High	1 Element	2 Element	Dry	Wet	2"	2"	4"	Vanes	Economizer
27½	8000	0.08	0.06	0.05	0.06	0.09	0.11	0.08	0.12	0.11	0.05	0.04
	9000	0.1	0.08	0.07	0.07	0.11	0.14	0.09	0.14	0.13	0.07	0.04
	10000	0.13	0.1	0.08	0.09	0.13	0.17	0.1	0.16	0.15	0.08	0.05
	11000	0.15	0.12	0.1	0.11	0.16	0.19	0.12	0.2	0.17	0.1	0.06
	12000	0.18	0.14	0.12	0.13	0.18	0.22	0.13	0.21	0.2	0.12	0.07
30	9000	0.1	0.08	0.07	0.07	0.11	0.14	0.09	0.14	0.13	0.07	0.04
	10000	0.13	0.1	0.08	0.09	0.13	0.17	0.1	0.16	0.15	0.08	0.05
	11000	0.15	0.12	0.1	0.11	0.16	0.19	0.12	0.2	0.17	0.1	0.06
	12000	0.18	0.14	0.12	0.13	0.18	0.22	0.14	0.23	0.21	0.12	0.07
	13000	0.21	0.16	0.14	0.15	0.2	0.25	0.15	0.26	0.23	0.14	0.09
35	10500	0.14	0.11	0.09	0.1	0.22	0.27	0.11	0.18	0.16	0.09	0.06
	11500	0.17	0.13	0.11	0.12	0.25	0.31	0.13	0.21	0.19	0.11	0.07
	12500	0.2	0.15	0.13	0.14	0.29	0.35	0.14	0.24	0.21	0.13	0.08
	13500	0.23	0.18	0.15	0.16	0.32	0.4	0.15	0.26	0.23	0.15	0.1
	14500	0.26	0.2	0.18	0.19	0.36	0.45	0.17	0.3	0.27	0.18	0.11
40	12000	0.01	0.03	0.08	0.13	0.2	0.25	0.1	0.19	0.17	0.04	0.07
	13000	0.01	0.04	0.1	0.15	0.23	0.29	0.12	0.23	0.2	0.05	0.08
	14000	0.02	0.05	0.11	0.18	0.26	0.33	0.13	0.25	0.22	0.05	0.09
	15000	0.02	0.05	0.13	0.2	0.29	0.36	0.14	0.28	0.24	0.06	0.1
	16000	0.02	0.06	0.15	0.23	0.32	0.4	0.15	0.31	0.27	0.07	0.11
	17000	0.02	0.07	0.17	0.26	0.36	0.44	0.17	0.35	0.3	0.08	0.12
50	15000	0.02	0.05	0.13	0.2	0.39	0.48	0.14	0.28	0.24	0.06	0.1
	16000	0.02	0.06	0.15	0.23	0.43	0.54	0.15	0.31	0.27	0.07	0.11
	17000	0.02	0.07	0.17	0.26	0.48	0.59	0.17	0.35	0.3	0.08	0.12
	18000	0.03	0.08	0.19	0.29	0.52	0.65	0.18	0.38	0.33	0.09	0.14
	19000	0.03	0.08	0.21	0.32	0.57	0.74	0.19	0.42	0.35	0.1	0.16
	20000	0.03	0.09	0.23	0.36	0.62	0.77	0.2	0.45	0.38	0.11	0.18

Notes:
1. Static pressure drops of accessory components must be added to external static pressure to enter fan selection tables.
2. Throwaway filter option limited to 300 ft/min face velocity.
3. Electric Heaters 36-54 KW contain 1 element; 72-108 KW 2 elements.

Performance Data 60 Hz

Table PD-15 — Supply Air Fan Drive Selections

	7.5 HP		10 HP		15 HP		20 HP	
Nominal Tons	RPM	Drive No	RPM	Drive No	RPM	Drive No	RPM	Drive No
	550	A						
	600	B						
27½T	650	C						
	700		700	D				
	750		750*	E				
	550	A						
	600	B						
30T	650	C						
	700		700	D				
	750		750	E				
	600	B						
	650		650	C				
35T	700		700	D				
	790				790**	F		
	800				800*	G		
	500		500	H				
	525		525	J				
	575		575	K				
40T	625				625	L		
	675				675	M		
	725				725	N		
	525		525	J				
	575		575	K				
50T	625				625	L		
	675				675	M		
	725						725	N

Note:
*For YC gas/electrics only.
**For TC and TE Cooling only and with electric heat units only.

Performance Data 60 Hz

Table PD-16— Power Exhaust Fan Performance

Exhaust Airflow (Cfm)	External Static Pressure — Inches of Water		
	High Speed ESP	Med Speed ESP	Low Speed ESP
3500	0.900	—	—
4000	0.860	—	—
4500	0.820	—	—
5000	0.780	—	0.400
5500	0.745	—	0.380
6000	0.700	—	0.360
6500	0.660	—	0.330
7000	0.610	0.400	0.300
7500	0.560	0.365	0.260
8000	0.505	0.330	0.215
8500	0.445	0.300	0.170
9000	0.385	0.255	0.120
9500	0.320	0.210	0.070
10000	0.255	0.165	0.020
10500	0.190	0.125	—
11000	0.125	0.060	—
11500	0.065	0.000	—
12000	0.005	—	—

Notes:
1. Performance in table is with both motors operating.
2. High speed = both motors on high speed. Medium speed is one motor on high speed and one on low speed. Low speed is both motors on low speed.
3. Power Exhaust option is not to be applied on systems that have more return air static pressure drop than the maximum shown in the table for each motor speed tap.

Performance Data

50 Hz

Table PD-17 – 23 Ton Gross Cooling Capacities (MBh) (I-P)

		Ambient Temperature – °F																							
		85						95						105						115					
	Ent	Entering Wet Bulb Temperature – °F																							
	DB	61		67		73		61		67		73		61		67		73		61		67		73	
cfm	(°F)	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC
	75	247	195	274	158	304	110	235	188	262	152	290	104	224	182	249	146	276	98	211	175	235	139	261	91
6900	80	249	229	275	187	304	145	238	223	263	181	291	139	227	216	250	174	277	133	214	209	236	167	262	126
	85	256	256	276	221	305	179	247	247	264	215	292	173	236	236	251	208	278	167	225	225	237	201	263	160
	90	270	270	279	255	306	212	260	260	267	249	293	206	250	250	254	242	279	199	239	239	241	235	264	193
	75	251	203	279	164	309	112	240	197	266	158	295	106	228	190	253	152	280	100	215	183	239	145	265	93
7500	80	254	241	280	195	310	150	243	235	267	189	296	144	232	228	254	182	281	137	218	218	240	175	266	131
	85	264	264	281	231	310	186	254	254	269	225	297	180	243	243	256	218	282	173	232	232	242	211	267	166
	90	279	279	284	269	311	222	268	268	272	262	298	216	257	257	260	255	283	209	246	246	246	246	268	202
	75	255	210	282	168	313	113	243	204	269	162	298	107	231	197	256	155	283	101	218	190	241	149	267	95
8000	80	259	250	283	201	313	153	247	244	271	195	299	147	235	235	257	188	284	141	223	223	243	181	269	134
	85	270	270	285	240	314	192	260	260	272	233	300	186	249	249	259	227	285	179	237	237	245	219	270	172
	90	285	285	289	279	315	230	274	274	277	273	301	223	263	263	263	263	287	217	251	251	251	251	271	210
	75	261	224	288	171	319	116	249	217	275	165	304	110	236	210	261	159	289	104	223	203	246	152	272	97
9000	80	265	265	289	213	320	161	255	255	276	207	305	154	243	243	262	200	290	148	231	231	247	193	274	141
	85	281	281	292	257	321	203	270	270	279	250	306	198	258	258	265	243	291	192	246	246	251	236	275	182
	90	297	297	296	296	322	245	285	285	285	285	308	238	274	274	0	0	293	232	261	261	261	261	277	225
	75	266	236	293	179	324	119	254	230	280	173	309	113	241	223	265	166	293	106	227	215	250	159	276	99
10000	80	274	274	295	225	325	167	263	263	281	218	310	161	251	251	267	211	294	155	239	239	252	204	278	148
	85	290	290	298	273	326	216	279	279	285	266	311	207	267	267	271	259	296	200	254	254	256	252	279	193
	90	307	307	306	306	328	260	295	295	295	295	313	253	282	282	282	282	298	246	269	269	269	269	281	239

Notes:
1.ll capacities shown are gross and have not considered indoor fan heat. To obtain net cooling, subtract indoor fan heat.
2. TGC = Total gross capacity.
3. SHC = Sensible heat capacity.

Table PD-17a – 82 kW (23 Tons) Gross Cooling Capacity (kW) (SI)

		Ambient Temperature – °C																							
		29.4						35.0						40.6						46.1					
	Ent	Entering Wet Bulb Temperature – °C																							
	DB	16.1		19.4		22.8		16.1		19.4		22.8		16.1		19.4		22.8		16.1		19.4		22.8	
L/s	(°C)	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC
	23.9	72.4	57.1	80.3	46.3	89.1	32.2	68.9	55.1	76.8	44.5	85.0	30.5	65.6	53.3	73.0	42.8	80.9	28.6	61.8	51.3	68.9	40.7	76.5	26.8
3260	26.7	73.0	67.1	80.6	54.8	89.1	42.5	69.8	65.4	77.1	53.0	85.3	40.7	66.5	63.3	73.3	51.0	81.2	39.0	62.7	61.3	69.2	48.9	76.8	36.9
	29.4	75.0	75.0	80.9	64.8	89.4	52.5	72.4	72.4	77.4	63.0	85.6	50.7	69.2	69.2	73.6	61.0	81.5	48.9	65.9	65.9	69.5	58.9	77.1	46.9
	32.2	79.1	79.1	81.8	74.7	89.7	62.1	76.2	76.2	78.2	73.0	85.9	60.4	73.3	73.3	74.4	70.9	81.8	58.3	70.0	70.0	70.6	68.9	77.4	56.6
	23.9	73.6	59.5	81.8	48.1	90.6	32.8	70.3	57.7	78.0	46.3	86.5	31.1	66.8	55.7	74.1	44.5	82.1	29.2	63.0	53.6	70.0	42.5	77.7	27.3
3540	26.7	74.4	70.6	82.1	57.1	90.9	44.0	71.2	68.9	78.2	55.4	86.7	42.2	68.0	66.8	74.4	53.3	82.4	40.2	63.9	63.9	70.3	51.3	78.0	38.4
	29.4	77.4	77.4	82.4	67.7	90.9	54.5	74.4	74.4	78.8	65.9	87.0	52.8	71.2	71.2	75.0	63.9	82.6	50.7	68.0	68.0	70.9	61.8	78.2	48.6
	32.2	81.8	81.8	83.2	78.8	91.1	65.1	78.5	78.5	79.7	76.8	87.3	63.3	75.3	75.3	76.2	74.7	82.9	61.3	72.1	72.1	72.1	72.1	78.5	59.2
	23.9	74.7	61.5	82.6	49.2	91.7	33.1	71.2	59.8	78.8	47.5	87.3	31.4	67.7	57.7	75.0	45.4	82.9	29.6	63.9	55.7	70.6	43.7	78.2	27.7
3780	26.7	75.9	73.3	82.9	58.9	91.7	44.8	72.4	71.5	79.4	57.1	87.6	43.1	68.9	68.9	75.3	55.1	83.2	41.3	65.4	65.4	71.2	53.0	78.8	39.3
	29.4	79.1	79.1	83.5	70.3	92.0	56.3	76.2	76.2	79.7	68.3	87.9	54.5	73.0	73.0	75.9	66.5	83.5	52.5	69.5	69.5	71.8	64.2	79.1	50.4
	32.2	83.5	83.5	84.7	81.8	92.3	67.4	80.3	80.3	81.2	80.0	88.2	65.4	77.1	77.1	77.1	77.1	84.1	63.6	73.6	73.6	73.6	73.6	79.4	61.5
	23.9	76.5	65.6	84.4	50.1	93.5	34.0	73.0	63.6	80.6	48.4	89.1	32.2	69.2	61.5	76.5	46.6	84.7	30.5	65.4	59.5	72.1	44.5	79.7	28.5
4250	26.7	77.7	77.7	84.7	62.4	93.8	47.2	74.7	74.7	80.9	60.7	89.4	45.1	71.2	71.2	76.8	58.6	85.0	43.4	67.7	67.7	72.4	56.6	80.3	41.3
	29.4	82.4	82.4	85.6	75.3	94.1	59.5	79.1	79.1	81.8	73.3	89.7	58.0	75.6	75.6	77.7	71.2	85.3	56.3	72.1	72.1	73.6	69.2	80.6	53.3
	32.2	87.0	87.0	86.7	86.7	94.4	71.8	83.5	83.5	83.5	83.5	90.3	69.8	80.3	80.3	0.0	0.0	85.9	68.0	76.5	76.5	76.5	76.5	81.2	65.9
	23.9	78.0	69.2	85.9	52.5	95.0	34.9	74.4	67.4	82.1	50.7	90.6	33.1	70.6	65.4	77.7	48.6	85.9	31.1	66.5	63.0	73.3	46.6	80.9	29.1
4720	26.7	80.3	80.3	86.5	65.9	95.2	48.9	77.1	77.1	82.4	63.9	90.9	47.2	73.6	73.6	78.2	61.8	86.2	45.4	70.0	70.0	73.9	59.8	81.5	43.4
	29.4	85.0	85.0	87.3	80.0	95.5	63.3	81.8	81.8	83.5	78.0	91.1	60.7	78.2	78.2	79.4	75.9	86.7	58.6	74.4	74.4	75.0	73.9	81.8	56.6
	32.2	90.0	90.0	89.7	89.7	96.1	76.2	86.5	86.5	86.5	86.5	91.7	74.1	82.6	82.6	82.6	82.6	87.3	72.1	78.8	78.8	78.8	78.8	82.4	70.0

Notes:
1. All capacities shown are gross and have not considered indoor fan heat. To obtain net cooling, subtract indoor fan heat.
2. TGC = Total gross capacity.
3. SHC = Sensible heat capacity.

Table PD-18 – 25 Ton Gross Cooling Capacities (MBh) (I-P)

		Ambient Temperature – °F																							
		85						95						105						115					
	Ent	Entering Wet Bulb Temperature – °F																							
	DB	61		67		73		61		67		73		61		67		73		61		67		73	
cfm	(°F)	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC
	75	270	212	300	172	332	120	258	205	286	166	318	114	245	198	272	159	302	107	231	190	257	152	285	100
7500	80	273	249	301	204	333	158	261	243	287	197	318	152	248	235	273	190	303	145	235	228	258	183	286	138
	85	280	280	302	240	334	195	269	269	289	233	319	189	258	258	275	226	304	182	246	246	260	218	287	174
	90	295	295	304	277	335	231	284	284	292	270	320	224	272	272	278	263	305	217	260	260	264	255	288	209
	75	274	219	304	177	336	122	262	212	290	171	321	115	248	205	276	164	305	109	234	197	260	157	289	102
8000	80	277	259	305	210	337	162	265	252	291	203	322	155	252	245	277	196	306	149	239	237	261	189	289	141
	85	286	286	306	249	338	201	275	275	293	242	323	194	264	264	278	234	307	187	251	251	263	227	290	179
	90	302	302	309	288	339	239	291	291	296	281	324	232	279	279	282	274	308	224	266	266	268	266	292	217
	75	281	233	311	187	344	125	268	226	297	181	328	118	254	218	281	174	311	112	240	210	266	167	294	105
9000	80	285	277	312	223	344	169	273	270	298	216	329	163	259	259	283	208	312	156	246	246	267	200	295	148
	85	298	298	314	265	345	212	287	287	300	258	330	205	274	274	285	251	314	198	261	261	270	243	296	190
	90	314	314	318	309	347	254	303	303	305	302	331	247	290	290	290	290	315	240	277	277	277	277	298	232
	75	287	246	316	197	349	128	274	238	302	189	333	121	260	231	286	181	316	114	245	223	270	174	298	107
10000	80	291	291	318	234	350	176	280	280	303	227	334	169	267	267	288	220	318	162	254	254	272	212	300	155
	85	308	308	320	281	351	223	296	296	306	274	336	216	283	283	291	267	319	208	270	270	275	259	301	200
	90	325	325	325	325	353	269	313	313	313	313	337	262	300	300	300	300	321	254	286	286	286	286	303	246
	75	292	258	321	204	354	130	279	251	306	197	338	124	264	243	290	190	320	117	249	235	274	182	302	110
11000	80	300	300	323	246	355	183	288	288	308	238	339	176	275	275	292	231	322	169	261	261	276	223	303	161
	85	317	317	326	297	357	233	305	305	312	290	340	226	291	291	296	282	323	218	277	277	280	275	305	210
	90	335	335	335	335	358	283	322	322	322	322	342	276	309	309	308	308	325	268	294	294	294	294	308	261

Notes:
1. All capacities shown are gross and have not considered indoor fan heat. To obtain net cooling, subtract indoor fan heat.
2. TGC = Total gross capacity.
3. SHC = Sensible heat capacity.

Table PD-18a – 89 kW (25 Tons) Gross Cooling Capacity (kW) (SI)

		Ambient Temperature – °C																							
		29.4						35.0						40.6						46.1					
	Ent	Entering Wet Bulb Temperature – °C																							
	DB	16.1		19.4		22.8		16.1		19.4		22.8		16.1		19.4		22.8		16.1		19.4		22.8	
L/s	(°C)	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC
	23.9	79.1	62.1	87.9	50.4	97.3	35.2	75.6	60.1	83.8	48.6	93.2	33.4	71.8	58.0	79.7	46.6	88.5	31.4	67.7	55.7	75.3	44.5	83.5	29.3
3540	26.7	80.0	73.0	88.2	59.8	97.6	46.3	76.5	71.2	84.1	57.7	93.2	44.5	72.7	68.9	80.0	55.7	88.8	42.5	68.9	66.8	75.6	53.6	83.8	40.4
	29.4	82.1	82.1	88.5	70.3	97.9	57.1	78.8	78.8	84.7	68.3	93.5	55.4	75.6	75.6	80.6	66.2	89.1	53.3	72.1	72.1	76.2	63.9	84.1	51.0
	32.2	86.5	86.5	89.1	81.2	98.2	67.7	83.2	83.2	85.6	79.1	93.8	65.6	79.7	79.7	81.5	77.1	89.4	63.6	76.2	76.2	77.4	74.7	84.4	61.3
	23.9	80.3	64.2	89.1	51.9	98.5	35.8	76.8	62.1	85.0	50.1	94.1	33.7	72.7	60.1	80.9	48.1	89.4	31.9	68.6	57.7	76.2	46.0	84.7	29.9
3780	26.7	81.2	75.9	89.4	61.5	98.8	47.5	77.7	73.9	85.3	59.5	94.4	45.4	73.9	71.8	81.2	57.4	89.7	43.7	70.0	69.5	76.5	55.4	84.7	41.3
	29.4	83.8	83.8	89.7	73.0	99.1	58.9	80.6	80.6	85.9	70.9	94.7	56.9	77.4	77.4	81.5	68.6	90.0	54.8	73.6	73.6	77.1	66.5	85.0	52.5
	32.2	88.5	88.5	90.6	84.4	99.4	70.0	85.3	85.3	86.7	82.4	95.0	68.0	81.8	81.8	82.6	80.3	90.3	65.6	78.0	78.0	78.5	78.0	85.6	63.6
	23.9	82.4	68.3	91.1	54.8	100.8	36.6	78.5	66.2	87.0	53.0	96.1	34.6	74.4	63.9	82.4	51.0	91.1	32.8	70.3	61.5	78.0	48.9	86.2	30.8
4250	26.7	83.5	81.2	91.4	65.4	100.8	49.5	80.0	79.1	87.3	63.3	96.4	47.8	75.9	75.9	82.9	61.0	91.4	45.7	72.1	72.1	78.2	58.6	86.5	43.4
	29.4	87.3	87.3	92.0	77.7	101.1	62.1	84.1	84.1	87.9	75.6	96.7	60.1	80.3	80.3	83.5	73.6	92.0	58.0	76.5	76.5	79.1	71.2	86.7	55.7
	32.2	92.0	92.0	93.2	90.6	101.7	74.4	88.8	88.8	89.4	88.5	97.0	72.4	85.0	85.0	85.0	85.0	92.3	70.3	81.2	81.2	81.2	81.2	87.3	68.0
	23.9	84.1	72.1	92.6	57.7	102.3	37.5	80.3	69.8	88.5	55.4	97.6	35.5	76.2	67.7	83.8	53.0	92.6	33.4	71.8	65.4	79.1	51.0	87.3	31.4
4720	26.7	85.3	85.3	93.2	68.6	102.6	51.6	82.1	82.1	88.8	66.5	97.9	49.5	78.2	78.2	84.4	64.5	93.2	47.5	74.4	74.4	79.7	62.1	87.9	45.4
	29.4	90.3	90.3	93.8	82.4	102.9	65.4	86.7	86.7	89.7	80.3	98.5	63.3	82.9	82.9	85.3	78.2	93.5	61.0	79.1	79.1	80.6	75.9	88.2	58.6
	32.2	95.2	95.2	95.2	95.2	103.5	78.8	91.7	91.7	91.7	91.7	98.8	76.8	87.9	87.9	87.9	87.9	94.1	74.4	83.8	83.8	83.8	83.8	88.8	72.1
	23.9	85.6	75.6	94.1	59.8	103.7	38.1	81.8	73.6	89.7	57.7	99.1	36.3	77.4	71.2	85.0	55.7	93.8	34.3	73.0	68.9	80.3	53.3	88.5	32.2
5190	26.7	87.9	87.9	94.7	72.1	104.0	53.6	84.4	84.4	90.3	69.8	99.4	51.6	80.6	80.6	85.6	67.7	94.4	49.5	76.5	76.5	80.9	65.4	88.8	47.2
	29.4	92.9	92.9	95.5	87.0	104.6	68.3	89.4	89.4	91.4	85.0	99.6	66.2	85.3	85.3	86.7	82.6	94.7	63.9	81.2	81.2	82.1	80.6	89.4	61.5
	32.2	98.2	98.2	98.2	98.2	104.9	82.9	94.4	94.4	94.4	94.4	100.2	80.9	90.6	90.6	90.3	90.3	95.2	78.5	86.2	86.2	86.2	86.2	90.3	76.5

Notes:
1. All capacities shown are gross and have not considered indoor fan heat. To obtain net cooling, subtract indoor fan heat.
2. TGC = Total gross capacity.
3. SHC = Sensible heat capacity.

Performance Data

50 Hz

Table PD-19 – 29 Ton Gross Cooling Capacities (MBh) (I-P)

		Ambient Temperature – °F																							
		85						95						105						115					
	Ent	Entering Wet Bulb Temperature – °F																							
	DB	61		67		73		61		67		73		61		67		73		61		67		73	
cfm	(°F)	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC
	75	318	260	352	204	389	141	304	252	336	197	371	133	288	244	319	189	352	125	272	235	301	181	332	118
8750	80	323	309	353	249	389	189	309	301	337	241	372	182	294	293	320	233	353	174	278	278	302	224	333	166
	85	336	336	355	296	390	237	323	323	339	288	373	229	309	309	322	280	354	221	294	294	305	271	334	212
	90	353	353	359	344	391	283	340	340	344	336	374	275	326	326	328	328	355	267	311	311	311	311	336	258
	75	320	264	354	207	391	141	306	256	337	199	372	134	290	248	320	192	353	126	273	239	302	183	334	118
9000	80	325	314	354	252	391	191	311	306	338	244	373	184	295	295	321	236	354	176	280	280	303	227	335	168
	85	339	339	357	301	392	240	326	326	341	293	374	232	312	312	324	284	355	224	297	297	306	276	335	215
	90	357	357	362	350	393	287	344	344	346	342	376	279	329	329	329	329	357	271	314	314	314	314	337	262
	75	327	279	360	217	397	144	312	271	343	209	378	137	296	263	326	201	359	129	279	254	307	193	338	121
10000	80	332	332	361	266	398	199	319	319	345	258	380	191	304	304	327	249	360	183	289	289	309	241	340	175
	85	351	351	364	319	399	252	337	337	348	311	380	244	322	322	331	303	361	236	307	307	313	294	341	227
	90	370	370	370	370	401	305	356	356	355	355	382	296	340	340	340	340	363	288	325	325	324	324	343	279
	75	333	294	365	227	402	147	318	286	348	219	383	139	301	277	330	211	363	132	284	268	311	203	342	124
11000	80	341	341	367	279	404	207	328	328	350	271	385	199	313	313	332	262	365	191	297	297	313	254	344	183
	85	361	361	371	338	405	264	347	347	354	330	386	256	332	332	337	321	366	248	316	316	319	312	345	239
	90	381	381	381	381	407	321	366	366	366	366	388	313	350	350	350	350	369	305	334	334	334	334	348	296
	75	338	308	370	236	407	150	322	300	352	228	387	142	306	291	334	220	367	134	288	282	314	210	346	126
12000	80	350	350	372	292	408	214	336	336	354	284	389	206	320	320	336	275	369	198	304	304	317	266	347	190
	85	370	370	377	356	410	276	355	355	360	347	390	268	340	340	342	339	370	259	323	323	323	323	349	250
	90	391	391	391	391	413	338	376	376	375	375	394	330	359	359	359	359	374	321	342	342	342	342	353	312

Notes:
1. All capacities shown are gross and have not considered indoor fan heat. To obtain net cooling, subtract indoor fan heat.
2. TGC = Total gross capacity.
3. SHC = Sensible heat capacity.

Table PD-19a – 105 kW (29 Ton) Gross Cooling Capacity (kW) (SI)

		Ambient Temperature – °C																							
		29.4						35.0						40.6						46.1					
	Ent	Entering Wet Bulb Temperature – °C																							
	DB	16.1		19.4		22.8		16.1		19.4		22.8		16.1		19.4		22.8		16.1		19.4		22.8	
L/s	(°C)	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC
	23.9	93.2	76.2	103.2	59.8	114.0	41.3	89.1	73.9	98.5	57.7	108.7	39.0	84.4	71.5	93.5	55.4	103.2	36.6	79.7	68.9	88.2	53.0	97.3	34.6
4130	26.7	94.7	90.6	103.5	73.0	114.0	55.4	90.6	88.2	98.8	70.6	109.0	53.3	86.2	85.9	93.8	68.3	103.5	51.0	81.5	81.5	88.5	65.6	97.6	48.6
	29.4	98.5	98.5	104.0	86.7	114.3	69.5	94.7	94.7	99.4	84.4	109.3	67.1	90.6	90.6	94.4	82.1	103.7	64.8	86.2	86.2	89.4	79.4	97.9	62.1
	32.2	103.5	103.5	105.2	100.8	114.6	82.9	99.6	99.6	100.8	98.5	109.6	80.6	95.5	95.5	96.1	96.1	104.0	78.2	91.1	91.1	91.1	91.1	98.5	75.6
	23.9	93.8	77.4	103.7	60.7	114.6	41.3	89.7	75.0	98.8	58.3	109.0	39.3	85.0	72.7	93.8	56.3	103.5	36.9	80.0	70.0	88.5	53.6	97.9	34.6
4250	26.7	95.2	92.0	103.7	73.9	114.6	56.0	91.1	89.7	99.1	71.5	109.3	53.9	86.5	86.5	94.1	69.2	103.7	51.6	82.1	82.1	88.8	66.5	98.2	49.2
	29.4	99.4	99.4	104.6	88.2	114.9	70.3	95.5	95.5	99.9	85.9	109.6	68.0	91.4	91.4	95.0	83.2	104.0	65.6	87.0	87.0	89.7	80.9	98.2	63.0
	32.2	104.6	104.6	106.1	102.6	115.2	84.1	100.8	100.8	101.4	100.2	110.2	81.8	96.4	96.4	96.4	96.4	104.6	79.4	92.0	92.0	92.0	92.0	98.8	76.8
	23.9	95.8	81.8	105.5	63.6	116.3	42.2	91.4	79.4	100.5	61.3	110.8	40.2	86.7	77.1	95.5	58.9	105.2	37.8	81.8	74.4	90.0	56.6	99.1	35.5
4720	26.7	97.3	97.3	105.8	78.0	116.6	58.3	93.5	93.5	101.1	75.6	111.4	56.0	89.1	89.1	95.8	73.0	105.5	53.6	84.7	84.7	90.6	70.6	99.6	51.3
	29.4	102.9	102.9	106.7	93.5	116.9	73.9	98.8	98.8	102.0	91.1	111.4	71.5	94.4	94.4	97.0	88.8	105.8	69.2	90.0	90.0	91.7	86.2	99.9	66.5
	32.2	108.4	108.4	108.4	108.4	117.5	89.4	104.3	104.3	104.0	104.0	112.0	86.7	99.6	99.6	99.6	99.6	106.4	84.4	95.2	95.2	95.0	95.0	100.5	81.8
	23.9	97.6	86.2	107.0	66.5	117.8	43.1	93.2	83.8	102.0	64.2	112.2	40.7	88.2	81.2	96.7	61.8	106.4	38.7	83.2	78.5	91.1	59.5	100.2	36.3
5190	26.7	99.9	99.9	107.6	81.8	118.4	60.7	96.1	96.1	102.6	79.4	112.8	58.3	91.7	91.7	97.3	76.8	107.0	56.0	87.0	87.0	91.7	74.4	100.8	53.6
	29.4	105.8	105.8	108.7	99.1	118.7	77.4	101.7	101.7	103.7	96.7	113.1	75.0	97.3	97.3	98.8	94.1	107.3	72.7	92.6	92.6	93.5	91.4	101.1	70.0
	32.2	111.7	111.7	111.7	111.7	119.3	94.1	107.3	107.3	107.3	107.3	113.7	91.7	102.6	102.6	102.6	102.6	108.1	89.4	97.9	97.9	97.9	97.9	102.0	86.7
	23.9	99.1	90.3	108.4	69.2	119.3	44.0	94.4	87.9	103.2	66.8	113.4	41.6	89.7	85.3	97.9	64.5	107.6	39.3	84.4	82.6	92.0	61.5	101.4	36.9
5660	26.7	102.6	102.6	109.0	85.6	119.6	62.7	98.5	98.5	103.7	83.2	114.0	60.4	93.8	93.8	98.5	80.6	108.1	58.0	89.1	89.1	92.9	78.0	101.7	55.7
	29.4	108.4	108.4	110.5	104.3	120.2	80.9	104.0	104.0	105.5	101.7	114.3	78.5	99.6	99.6	100.2	99.4	108.4	75.9	94.7	94.7	94.7	94.7	102.3	73.3
	32.2	114.6	114.6	114.6	114.6	121.0	99.1	110.2	110.2	109.9	109.9	115.5	96.7	105.2	105.2	105.2	105.2	109.6	94.1	100.2	100.2	100.2	100.2	103.5	91.4

Notes:
1. All capacities shown are gross and have not considered indoor fan heat. To obtain net cooling, subtract indoor fan heat.
2. TGC = Total gross capacity.
3. SHC = Sensible heat capacity.

Performance Data 50 Hz

Table PD-20 – 33 Ton Gross Cooling Capacities (MBh) (I-P)

		Ambient Temperature – °F																							
		85						95						105						115					
	Ent	Entering Wet Bulb Temperature – °F																							
	DB	61		67		73		61		67		73		61		67		73		61		67		73	
cfm	(°F)	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC
	75	389	307	433	242	480	171	370	296	412	231	457	160	350	284	390	220	433	149	328	272	366	208	407	138
10000	80	394	362	434	295	481	227	375	351	413	284	458	216	355	339	391	272	434	205	334	327	368	260	409	193
	85	405	405	436	349	482	281	389	389	416	338	460	271	371	371	394	326	436	259	352	352	371	314	410	248
	90	428	428	441	404	483	335	411	411	421	393	461	324	393	393	400	381	437	312	373	373	377	369	412	300
	75	398	323	441	252	488	174	378	311	419	241	465	163	357	299	397	230	440	152	335	287	373	218	414	141
11000	80	404	384	442	309	490	235	384	372	421	298	466	224	364	361	398	286	441	213	342	342	374	274	415	201
	85	420	420	446	369	491	295	402	402	425	357	468	284	384	384	402	345	443	272	364	364	379	333	417	261
	90	444	444	452	429	492	353	426	426	431	418	469	342	407	407	410	406	445	330	387	387	386	386	419	318
	75	405	338	448	262	495	177	385	327	426	251	471	166	364	315	403	240	446	155	341	302	378	228	419	144
12000	80	413	405	450	323	497	243	391	391	428	312	473	232	372	372	405	300	448	221	352	352	380	288	421	209
	85	433	433	454	388	498	308	415	415	432	376	474	297	396	396	410	364	449	285	375	375	386	352	422	272
	90	457	457	462	454	500	370	439	439	439	439	477	359	419	419	419	419	452	347	398	398	398	398	426	335
	75	412	353	454	272	501	180	391	342	432	261	477	169	370	329	408	249	451	158	347	317	383	237	424	146
13000	80	419	419	456	337	503	251	401	401	434	325	479	240	382	382	410	313	453	228	361	361	386	301	426	217
	85	445	445	461	407	503	320	426	426	439	395	480	308	406	406	416	383	454	297	385	385	392	370	428	284
	90	470	470	470	470	507	387	450	450	450	450	483	376	430	430	430	430	458	364	408	408	408	408	432	352
	75	421	377	462	287	509	184	400	365	439	276	484	173	378	353	415	264	458	162	355	340	389	252	430	150
14600	80	434	434	465	358	510	263	415	415	442	346	486	252	395	395	418	334	460	240	374	374	393	322	432	229
	85	461	461	472	436	512	339	441	441	449	424	488	327	420	420	426	412	462	315	398	398	401	399	434	303
	90	487	487	487	487	516	414	467	467	467	467	492	403	445	445	445	445	466	391	423	423	423	423	440	379

Notes:
1. All capacities shown are gross and have not considered indoor fan heat. To obtain net cooling, subtract indoor fan heat.
2. TGC = Total gross capacity.
3. SHC = Sensible heat capacity.

Table PD-20a – 120 kW (33 Ton) Gross Cooling Capacity (kW) (SI)

		Ambient Temperature – °C																							
		29.4						35.0						40.6						46.1					
	Ent	Entering Wet Bulb Temperature – °C																							
	DB	16.1		19.4		22.8		16.1		19.4		22.8		16.1		19.4		22.8		16.1		19.4		22.8	
L/s	(°C)	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC
	23.9	114.0	90.0	126.9	70.9	140.7	50.1	108.4	86.7	120.7	67.7	133.9	46.9	102.6	83.2	114.3	64.5	126.9	43.7	96.1	79.7	107.3	61.0	119.3	40.4
4720	26.7	115.5	106.1	127.2	86.5	141.0	66.5	109.9	102.9	121.0	83.2	134.2	63.3	104.0	99.4	114.6	79.7	127.2	60.1	97.9	95.8	107.9	76.2	119.9	56.6
	29.4	118.7	118.7	127.8	102.3	141.3	82.4	114.0	114.0	121.9	99.1	134.8	79.4	108.7	108.7	115.5	95.5	127.8	75.9	103.2	103.2	108.7	92.0	120.2	72.7
	32.2	125.4	125.4	129.2	118.4	141.6	98.2	120.5	120.5	123.4	115.2	135.1	95.0	115.2	115.2	117.2	111.7	128.1	91.4	109.3	109.3	110.5	108.1	120.7	87.9
	23.9	116.6	94.7	129.2	73.9	143.0	51.0	110.8	91.1	122.8	70.6	136.3	47.8	104.6	87.6	116.3	67.4	129.0	44.5	98.2	84.1	109.3	63.9	121.3	41.3
5190	26.7	118.4	112.5	129.5	90.6	143.6	68.9	112.5	109.0	123.4	87.3	136.6	65.6	106.7	105.8	116.6	83.8	129.2	62.4	100.2	100.2	109.6	80.3	121.6	58.9
	29.4	123.1	123.1	130.7	108.1	143.9	86.5	117.8	117.8	124.6	104.6	137.2	83.2	112.5	112.5	117.8	101.1	129.8	79.7	106.7	106.7	111.1	97.6	122.2	76.5
	32.2	130.1	130.1	132.5	125.7	144.2	103.5	124.8	124.8	126.3	122.5	137.5	100.2	119.3	119.3	120.2	119.0	130.4	96.7	113.4	113.4	113.1	113.1	122.8	93.2
	23.9	118.7	99.1	131.3	76.8	145.1	51.9	112.8	95.8	124.8	73.6	138.0	48.6	106.7	92.3	118.1	70.3	130.7	45.4	99.9	88.5	110.8	66.8	122.8	42.2
5660	26.7	121.0	118.7	131.9	94.7	145.7	71.2	114.6	114.6	125.4	91.4	138.6	68.0	109.0	109.0	118.7	87.9	131.3	64.8	103.2	103.2	111.4	84.4	123.4	61.3
	29.4	126.9	126.9	133.1	113.7	145.9	90.3	121.6	121.6	126.6	110.2	138.9	87.0	116.1	116.1	120.2	106.7	131.6	83.5	109.9	109.9	113.1	103.2	123.7	79.7
	32.2	133.9	133.9	135.4	133.1	146.5	108.4	128.7	128.7	128.7	128.7	139.8	105.2	122.8	122.8	122.8	122.8	132.5	101.7	116.6	116.6	116.6	116.6	124.8	98.2
	23.9	120.7	103.5	133.1	79.7	146.8	52.8	114.6	100.2	126.6	76.5	139.8	49.5	108.4	96.4	119.6	73.0	132.2	46.3	101.7	92.9	112.2	69.5	124.3	42.8
6140	26.7	122.8	122.8	133.6	98.8	147.4	73.6	117.5	117.5	127.2	95.2	140.4	70.3	112.0	112.0	120.2	91.7	132.8	66.8	105.8	105.8	113.1	88.2	124.8	63.6
	29.4	130.4	130.4	135.1	119.3	147.4	93.8	124.8	124.8	128.7	115.8	140.7	90.3	119.0	119.0	121.9	112.2	133.1	87.0	112.8	112.8	114.9	108.4	125.4	83.2
	32.2	137.7	137.7	137.7	137.7	148.6	113.4	131.9	131.9	131.9	131.9	141.6	110.2	126.0	126.0	126.0	126.0	134.2	106.7	119.6	119.6	119.6	119.6	126.6	103.2
	23.9	123.4	110.5	135.4	84.1	149.2	53.9	117.2	107.0	128.7	80.9	141.8	50.7	110.8	103.5	121.6	77.4	134.2	47.5	104.0	99.6	114.0	73.9	126.0	44.0
6890	26.7	127.2	127.2	136.3	104.9	149.5	77.1	121.6	121.6	129.5	101.4	142.4	73.9	115.8	115.8	122.5	97.9	134.8	70.3	109.6	109.6	115.2	94.4	126.6	67.1
	29.4	135.1	135.1	138.3	127.8	150.1	99.4	129.2	129.2	131.6	124.3	143.0	95.8	123.1	123.1	124.8	120.7	135.4	92.3	116.6	116.6	117.5	116.9	127.2	88.8
	32.2	142.7	142.7	142.7	142.7	151.2	121.3	136.9	136.9	136.9	136.9	144.2	118.1	130.4	130.4	130.4	130.4	136.6	114.6	124.0	124.0	124.0	124.0	129.0	111.1

Notes:
1. All capacities shown are gross and have not considered indoor fan heat. To obtain net cooling, subtract indoor fan heat.
2. TGC = Total gross capacity.
3. SHC = Sensible heat capacity.

Performance Data 50 Hz

Table PD-21 – 42 Ton Gross Cooling Capacities (MBh) (I-P)

		Ambient Temperature – °F																							
		85						95						105						115					
	Ent	Entering Wet Bulb Temperature – °F																							
	DB	61		67		73		61		67		73		61		67		73		61		67		73	
cfm	(°F)	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC
	75	469	385	519	298	574	206	446	372	494	286	546	193	421	358	467	272	517	180	395	344	438	259	486	167
12500	80	476	459	521	369	576	279	454	446	495	355	548	267	428	428	469	342	519	254	406	406	441	328	488	240
	85	498	498	525	440	578	351	477	477	500	427	550	338	455	455	474	413	521	325	432	432	446	399	489	311
	90	526	526	533	513	580	421	504	504	508	500	552	408	482	482	481	481	523	394	458	458	458	458	493	380
	75	476	402	526	309	582	209	453	388	500	296	553	196	428	374	472	283	523	183	401	360	444	269	491	170
13500	80	485	481	528	383	583	288	462	462	502	370	555	275	440	440	475	356	525	262	416	416	447	342	—	—
	85	511	511	533	460	585	365	489	489	508	447	556	351	467	467	481	433	526	338	443	443	453	419	—	—
	90	540	540	543	539	588	440	518	518	517	517	560	427	494	494	494	494	530	413	470	470	469	469	—	—
	75	483	418	532	319	588	211	459	404	506	306	558	199	434	390	478	293	528	186	407	375	448	279	—	—
14500	80	494	494	535	398	590	296	472	472	509	384	561	283	449	449	481	371	530	270	425	425	452	356	—	—
	85	523	523	541	480	591	378	501	501	515	467	562	364	477	477	488	453	532	351	453	453	459	439	—	—
	90	553	553	552	552	595	458	530	530	530	530	567	445	506	506	506	506	537	431	480	480	480	480	—	—
	75	489	433	538	329	593	214	465	420	511	316	563	202	439	406	482	302	532	189	412	391	452	289	—	—
15500	80	504	504	541	412	595	304	482	482	514	399	566	291	458	458	486	385	535	278	434	434	457	370	—	—
	85	534	534	548	500	597	390	511	511	522	487	568	377	487	487	494	473	537	363	462	462	465	458	—	—
	90	564	564	564	564	602	476	541	541	541	541	573	463	516	516	516	516	542	449	490	490	490	490	—	—
	75	495	449	543	339	598	217	470	435	515	326	568	204	444	421	486	312	536	191	417	406	456	295	—	—
16500	80	513	513	546	426	600	312	491	491	519	413	570	299	467	467	491	399	539	286	441	441	461	384	—	—
	85	544	544	554	520	603	403	521	521	528	506	573	390	496	496	500	492	542	376	470	470	470	470	—	—
	90	575	575	575	575	608	494	551	551	551	551	578	481	526	526	526	526	548	467	—	—	—	—	—	—

Notes:
1. All capacities shown are gross and have not considered indoor fan heat. To obtain net cooling, subtract indoor fan heat.
2. TGC = Total gross capacity.
3. SHC = Sensible heat capacity.

Table PD-21a – 148 kW (42 Ton) Gross Cooling Capacity (kW) (SI)

		Ambient Temperature – °C																							
		29.4						35.0						40.6						46.1					
	Ent	Entering Wet Bulb Temperature – °C																							
	DB	16.1		19.4		22.8		16.1		19.4		22.8		16.1		19.4		22.8		16.1		19.4		22.8	
L/s	(°C)	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC	TGC	SHC
	75	137	113	152	87	168	60	131	109	145	84	160	57	123	105	137	80	152	53	116	101	128	76	142	49
5900	80	140	135	153	108	169	82	133	131	145	104	161	78	125	125	137	100	152	74	119	119	129	96	143	70
	85	146	146	154	129	169	103	140	140	147	125	161	99	133	133	139	121	153	95	127	127	131	117	143	91
	90	154	154	156	150	170	123	148	148	149	147	162	120	141	141	141	141	153	115	134	134	134	134	144	111
	75	140	118	154	91	171	61	133	114	147	87	162	57	125	110	138	83	153	54	118	106	130	79	144	50
6370	80	142	141	155	112	171	84	135	135	147	108	163	81	129	129	139	104	154	77	122	122	131	100	—	—
	85	150	150	156	135	171	107	143	143	149	131	163	103	137	137	141	127	154	99	130	130	133	123	—	—
	90	158	158	159	158	172	129	152	152	152	152	164	125	145	145	145	145	155	121	138	138	137	137	—	—
	75	142	123	156	93	172	62	135	118	148	90	164	58	127	114	140	86	155	55	119	110	131	82	—	—
6840	80	145	145	157	117	173	87	138	138	149	113	164	83	132	132	141	109	155	79	125	125	132	104	—	—
	85	153	153	159	141	173	111	147	147	151	137	165	107	140	140	143	133	156	103	133	133	135	129	—	—
	90	162	162	162	162	174	134	155	155	155	155	166	130	148	148	148	148	157	126	141	141	141	141	—	—
	75	143	127	158	96	174	63	136	123	150	93	165	59	129	119	141	89	156	55	121	115	132	85	—	—
7320	80	148	148	159	121	174	89	141	141	151	117	166	85	134	134	142	113	157	81	127	127	134	108	—	—
	85	156	156	161	147	175	114	150	150	153	143	166	110	143	143	145	139	157	106	135	135	136	134	—	—
	90	165	165	165	165	176	140	159	159	159	159	168	136	151	151	151	151	159	132	144	144	144	144	—	—
	75	145	132	159	99	175	64	138	127	151	96	166	60	130	123	142	91	157	56	122	119	134	86	—	—
7790	80	150	150	160	125	176	91	144	144	152	121	167	88	137	137	144	117	158	84	129	129	135	113	—	—
	85	159	159	162	152	177	118	153	153	155	148	168	114	145	145	147	144	159	110	138	138	138	138	—	—
	90	169	169	169	169	178	145	161	161	161	161	169	141	154	154	154	154	161	137	—	—	—	—	—	—

Notes:
1. All capacities shown are gross and have not considered indoor fan heat. To obtain net cooling, subtract indoor fan heat.
2. TGC = Total gross capacity.
3. SHC = Sensible heat capacity.

Performance Data

50 Hz

Table PD-22 – Electric Heat Air Temperature Rise (°F) (I-P)

Heater	Total	CFM										
Input (kW)	MBh	7000	8000	9000	10000	11000	12000	13000	14000	15000	16000	17000
26.9	92	12.1	10.6	9.4	8.5	7.7	7.1	–	–	–	–	–
40.4	138	18.2	15.9	14.1	12.7	11.6	10.6	9.8	9.1	8.5	7.9	7.5
53.8	184	24.2	21.2	18.8	16.9	15.4	14.1	13.0	12.1	11.3	10.6	10.0
67.3	230	30.2	26.5	23.5	21.2	19.2	17.6	16.3	15.1	14.1	13.2	12.5
80.7	276	–	–	–	25.4	23.1	21.2	19.5	18.1	16.9	15.9	14.9

Notes:
1. Air temperature rise = (kW x 3413)/(scfm x 1.085).
2. All heaters on constant volume units provide 2 increments of capacity.
3. Air temperature rise in this table are based on heater operating at 415 volts.

Table PD-22a – Electric Heat Air Temperature Rise (Degrees Celsius) (SI)

Heater	L/s										
Input (kW)	3300	3780	4250	4720	5190	5660	6140	6610	7080	7550	8020
26.9	6.8	5.9	5.3	4.7	4.3	4.0	—	—	—	—	—
40.4	10.2	8.9	7.9	7.1	6.5	5.9	5.5	5.1	4.8	4.5	4.2
53.8	13.6	11.9	10.5	9.5	8.6	7.9	7.3	6.8	6.3	5.9	5.6
67.3	17.0	14.8	13.2	11.9	10.8	9.9	9.1	8.5	7.9	7.4	7.0
80.7	—	—	—	14.2	13.0	11.9	11.0	10.2	9.5	8.9	8.4

Notes:
1. Air temperature rise in this table are based on heater operating at 415 volts.
2. All heaters on constant volume units provide 2 increments of capacity.

Table PD-23 – Available Electric Heat kW Ranges

Nominal Unit Size Tons	Nominal Voltage (V) 380	415
22.9	23-56	27-67
25.0	23-56	27-67
29.2	23-56	27-67
33.3	34-68	40-81
42.7	34-68	40-81

Notes:
1. kW ranges in this table are based on heater operating at nominal voltages 380 or 415.

Table PD-24 – Natural Gas Heating Capacities

Tons	Unit Model No.	Heat Input MBh (kW) (See Note 1)	Heating Output MBh (kW) (See Note 1)	Air Temp. Rise, °F (°C)
22.9-29.2	YCD/YCH275**L YCD/YCH300**L YCD/YCH350**L	290,000 (85)	243,000 (69)	10-40 (-12.2 , 4.4)
22.9-29.2	YCD/YCH275**H YCD/YCH300**H YCD/YCH350**H	500,000 (147)	405,000 (119)	25-55 (-3.9 , 12.8)
33.3-42.7	YCD/YCH400**L YCD/YCH500**L	335,000 (98)	271,350 (80)	5-35 (-15 , 1.6)
33.3-42.7	YCD/YCH400**H YCD/YCH500**H	670,000 (196)	542,700 (159)	20-50 (-6.7 , 10)

Note:
1. Total heating capacity.

Performance Data

50 Hz

Table PD-25 – Supply Fan Performance – 23-29 Ton (I-P)

	Static Pressure (in. wg)																	
	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00		2.25	
scfm	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
6670	283	0.80	351	1.18	410	1.58	469	2.08	524	2.63	573	3.20	617	3.78	659	4.37	696	4.96
7085	291	0.90	358	1.31	413	1.70	469	2.21	524	2.78	574	3.37	619	3.98	660	4.59	698	5.22
7500	299	1.02	364	1.43	418	1.86	472	2.35	524	2.92	574	3.55	619	4.18	661	4.82	699	5.46
7915	306	1.14	371	1.58	425	2.05	475	2.51	524	3.08	574	3.72	620	4.38	661	5.04	701	5.73
8330	313	1.27	378	1.75	433	2.25	478	2.69	527	3.26	574	3.89	620	4.58	662	5.27	702	5.99
8745	321	1.42	386	1.93	439	2.43	484	2.92	530	3.45	574	4.08	620	4.79	663	5.51	702	6.24
9160	330	1.58	394	2.12	445	2.62	492	3.18	533	3.67	577	4.30	620	4.99	664	5.74	703	6.50
9575	339	1.76	403	2.32	452	2.84	499	3.44	538	3.93	580	4.53	622	5.22	663	5.96	703	6.76
9990	349	1.95	411	2.54	459	3.08	505	3.68	545	4.24	583	4.80	624	5.49	663	6.21	703	7.02
10405	360	2.17	419	2.77	467	3.34	511	3.92	552	4.57	588	5.09	628	5.77	665	6.49	703	7.28
10820	371	2.41	426	3.00	475	3.62	518	4.20	560	4.90	595	5.46	631	6.07	668	6.80	705	7.59
11235	383	2.66	434	3.25	483	3.90	525	4.50	566	5.19	603	5.85	634	6.41	671	7.13	707	7.90
11650	394	2.93	441	3.51	492	4.21	532	4.83	572	5.51	610	6.25	642	6.84	675	7.50	710	8.26
12065	405	3.23	449	3.79	500	4.53	540	5.18	578	5.83	616	6.61	649	7.30	680	7.90	714	8.67

Table PD-25 – Supply Fan Performance – 23-29 Ton (I-P) Continued

	Static Pressure (in. wg)					
	2.50		2.75		3.00	
scfm	rpm	bhp	rpm	bhp	rpm	bhp
6670	733	5.60	767	6.23	800	6.88
7085	735	5.86	769	6.52	802	7.18
7500	736	6.13	771	6.82	803	7.49
7915	737	6.40	772	7.10	806	7.83
8330	739	6.70	773	7.41	807	8.16
8745	740	6.99	775	7.73	808	8.49
9160	740	7.25	776	8.06	809	8.83
9575	740	7.54	777	8.38	810	9.17
9990	741	7.83	776	8.65	811	9.51
10405	742	8.14	777	8.99	812	9.86
10820	741	8.41	777	9.31	812	10.21
11235	742	8.74	778	9.63	812	10.55
11650	745	9.11	778	9.96	812	10.89
12065	747	9.47	779	10.34	811	11.24

Table PD-25a – Supply Fan Performance – 82-105 kW (SI)

	Static Pressure (Pascals)																	
	62.9		124.1		186.2		248.3		310.4		372.5		434.6		496.7		558.8	
(L/s)	rpm	(kW)	rpm	(kW)	rpm	(kW)	rpm	(kW)	rpm	(kW)	rpm	(kW)	rpm	(kW)	rpm	(kW)	rpm	(kW)
3148	283	0.59	351	0.88	410	1.17	469	1.55	524	1.96	573	2.39	617	2.82	659	3.26	696	3.70
3344	291	0.67	358	0.98	413	1.27	469	1.65	524	2.07	574	2.52	619	2.97	660	3.42	698	3.89
3539	299	0.76	364	1.07	418	1.39	472	1.75	524	2.18	574	2.64	619	3.12	661	3.59	699	4.07
3735	306	0.85	371	1.18	425	1.53	475	1.87	524	2.29	574	2.77	620	3.26	661	3.76	701	4.27
3931	313	0.95	378	1.30	433	1.68	478	2.01	527	2.43	574	2.90	620	3.41	662	3.93	702	4.46
4127	321	1.06	386	1.44	439	1.81	484	2.18	530	2.58	574	3.04	620	3.57	663	4.11	702	4.65
4323	330	1.18	394	1.58	445	1.95	492	2.37	533	2.74	577	3.21	620	3.72	664	4.28	703	4.84
4519	339	1.31	403	1.73	452	2.12	499	2.56	538	2.93	580	3.38	622	3.89	663	4.45	703	5.04
4715	349	1.45	411	1.89	459	2.30	505	2.74	545	3.17	583	3.58	624	4.09	663	4.63	703	5.23
4910	360	1.62	419	2.06	467	2.49	511	2.93	552	3.40	588	3.79	628	4.31	665	4.84	703	5.43
5106	371	1.80	426	2.24	475	2.70	518	3.13	560	3.65	595	4.07	631	4.53	668	5.07	705	5.66
5302	383	1.98	434	2.42	483	2.91	525	3.36	566	3.87	603	4.37	634	4.78	671	5.32	707	5.89
5498	394	2.19	441	2.62	492	3.14	532	3.60	572	4.11	610	4.66	642	5.10	675	5.59	710	6.16
5694	405	2.41	449	2.83	500	3.38	540	3.87	578	4.35	616	4.93	649	5.44	680	5.89	714	6.46

Notes:
1. Supply fan performance table includes internal resistance of rooftop. For total static pressure determination, system external static must be added to appropriate component static pressure drops, (evaporator coil, filters, optional economizer, optional heating system, optional roof curb).
2. The pressure drops from the supply fan to the space should not exceed 2.25” (558.8 Pa) positive.
3. Maximum air flow 23 ton (80 kW) is 4756 L/s, 25 ton is 5190 L/s, 29 ton is 5663 L/s
4. Maximum motor kW for 23 ton unit is 7.5 (10 hp), 25 ton is 7.5 kW (10 hp), 29 ton is 11.2 kW (15 hp).

Continued on the following page.

Figure PD-4 — Supply Fan Performance — 23-29 Ton

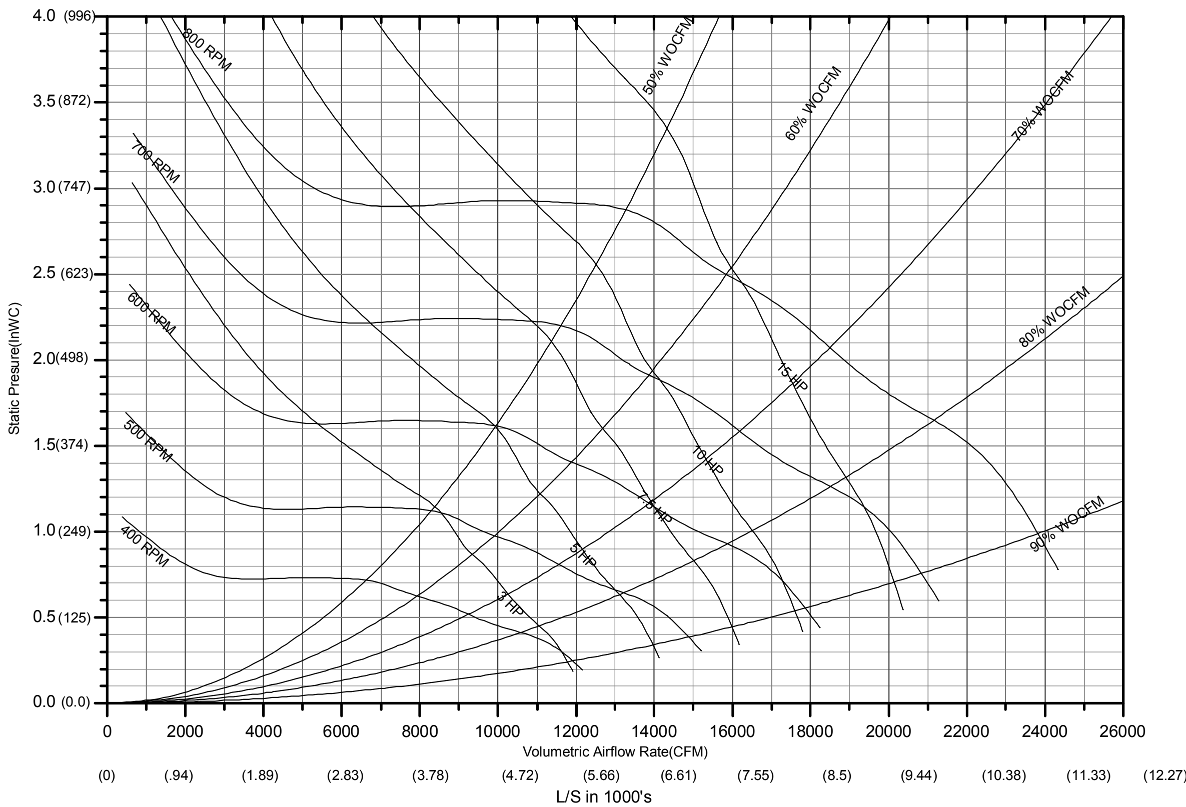


Table PD-25a – Supply Fan Performance – 23-29 Ton kW (SI) Continued

	Static Pressure (Pascals)					
	620.9		683.0		745.1	
(L/s)	rpm	(kW)	rpm	(kW)	rpm	(kW)
3148	733	4.18	767	4.65	800	5.13
3344	735	4.37	769	4.86	802	5.36
3539	736	4.57	771	5.08	803	5.58
3735	737	4.77	772	5.29	806	5.84
3931	739	5.00	773	5.53	807	6.08
4127	740	5.21	775	5.76	808	6.33
4323	740	5.41	776	6.01	809	6.58
4519	740	5.62	777	6.25	810	6.84
4715	741	5.84	776	6.45	811	7.09
4910	742	6.07	777	6.70	812	7.35
5106	741	6.27	777	6.94	812	7.62
5302	742	6.52	778	7.18	812	7.87
5498	745	6.79	778	7.43	812	8.12
5694	747	7.06	779	7.71	811	8.38

Performance Data 50 Hz

Table PD-26 – Supply Fan Performance – 33 and 42 Ton (I-P)

	Static Pressure (in. wg)																			
	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00		2.25		2.50	
cfm	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
9996	273	1.46	324	1.95	372	2.49	417	3.04	458	3.64	495	4.25	535	4.92	572	5.59	605	6.23	636	6.90
10829	287	1.78	336	2.30	383	2.87	422	3.44	464	4.06	501	4.71	535	5.38	572	6.11	606	6.81	638	7.53
11662	301	2.14	348	2.69	390	3.27	432	3.91	469	4.53	506	5.21	541	5.91	573	6.64	607	7.41	639	8.17
12495	315	2.53	360	3.12	401	3.74	442	4.41	476	5.07	512	5.76	546	6.49	578	7.24	609	8.03	639	8.82
13328	329	2.96	373	3.60	412	4.27	450	4.94	486	5.67	518	6.38	551	7.12	584	7.91	614	8.71	642	9.52
14161	344	3.45	387	4.14	424	4.85	459	5.55	495	6.31	527	7.08	557	7.83	589	8.62	619	9.45	648	10.31
14994	358	3.99	401	4.77	437	5.48	470	6.23	503	6.98	538	7.83	565	8.61	594	9.41	625	10.27	653	11.13
15827	373	4.58	415	5.45	449	6.17	482	6.98	513	7.75	546	8.61	576	9.46	602	10.30	630	11.14	659	12.04
16660	388	5.24	429	6.19	463	6.93	495	7.78	525	8.61	554	9.43	586	10.36	613	11.26	637	12.13	664	13.04

Table PD-26 – Supply Fan Performance – 33 and 42 Ton (I-P) Continued

	Static Pressure (in. wg)							
	2.75		3.00		3.25		3.50	
cfm	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
9996	665	7.63	691	8.35	717	9.10	743	9.87
10829	669	8.24	697	8.99	722	9.77	748	10.57
11662	671	8.97	699	9.73	727	10.47	751	11.26
12495	670	9.66	700	10.49	728	11.33	755	12.13
13328	671	10.38	700	11.27	729	12.17	756	13.04
14161	674	11.16	702	12.08	730	13.01	757	13.96
14994	680	12.03	706	12.96	731	13.87	757	14.88
15827	686	12.99	711	13.92	737	14.90	761	15.87
16660	691	13.97	717	14.94	742	15.96	765	16.94

Table PD-26a – Supply Fan Performance – 105-148 kW (SI)

	Static Pressure (Pascals)																			
	62.1		124,2		186.3		248.1		310.4		372.5		434.6		496.7		558.8		620.9	
(L/s)	rpm	(kW)	rpm	(kW)	rpm	(kW)	rpm	(kW)	rpm	(kW)	rpm	(kW)	rpm	(kW)	rpm	(kW)	rpm	(kW)	rpm	(kW)
4717	273	1.09	324	1.46	372	1.86	417	2.27	458	2.72	495	3.17	535	3.67	572	4.17	605	4.64	636	5.14
5111	287	1.33	336	1.72	383	2.14	422	2.57	464	3.03	501	3.51	535	4.01	572	4.55	606	5.08	638	5.62
5504	301	1.59	348	2.00	390	2.44	432	2.91	469	3.38	506	3.88	541	4.41	573	4.95	607	5.52	639	6.09
5897	315	1.88	360	2.33	401	2.79	442	3.29	476	3.78	512	4.30	546	4.84	578	5.40	609	5.99	639	6.57
6290	329	2.21	373	2.68	412	3.19	450	3.69	486	4.23	518	4.76	551	5.31	584	5.90	614	6.49	642	7.10
6683	344	2.57	387	3.09	424	3.62	459	4.14	495	4.70	527	5.28	557	5.84	589	6.43	619	7.05	648	7.69
7076	358	2.97	401	3.56	437	4.09	470	4.65	503	5.21	538	5.84	565	6.42	594	7.02	625	7.66	653	8.30
7469	373	3.42	415	4.07	449	4.60	482	5.20	513	5.78	546	6.42	576	7.06	602	7.68	630	8.31	659	8.98
7862	388	3.91	429	4.61	463	5.17	495	5.80	525	6.42	554	7.03	586	7.73	613	8.40	637	9.05	664	9.72

Table PD-26a – Supply Fan Performance – 105-148 kW (SI) Continued

	Static Pressure (Pascals)							
	683.0		745.1		807.2		869.3	
(L/s)	rpm	(kW)	rpm	(kW)	rpm	(kW)	rpm	(kW)
4717	665	5.69	691	6.22	717	6.78	743	7.36
5111	669	6.14	697	6.70	722	7.28	748	7.88
5504	671	6.69	699	7.25	727	7.81	751	8.40
5897	670	7.20	700	7.83	728	8.45	755	9.05
6290	671	7.74	700	8.41	729	9.07	756	9.72
6683	674	8.32	702	9.01	730	9.71	757	10.41
7076	680	8.97	706	9.66	731	10.35	757	11.10
7469	686	9.69	711	10.38	737	11.11	761	11.84
7862	691	10.42	717	11.14	742	11.90	765	12.63

Notes:
1. Supply fan performance table includes internal resistance of rooftop. For total static pressure determination, system external static must be added to appropriate component static pressure drops, (evaporator coil, filters, optional economizer, optional heating system, optional roof curb).
2. The pressure drops from the supply fan to the space should not exceed 2.5” wg (620.9 Pa) positive.
3. Max cfm for 33 ton unit 6825 L/s, 42 ton -7860 L/s
4. Max motor hp for 33 ton unit-11.2 kW (15 hp), 42 ton 14.9 kW (20 hp)

Figure PD-5 – Supply Fan Performance – 33 and 42 Ton (I-P)

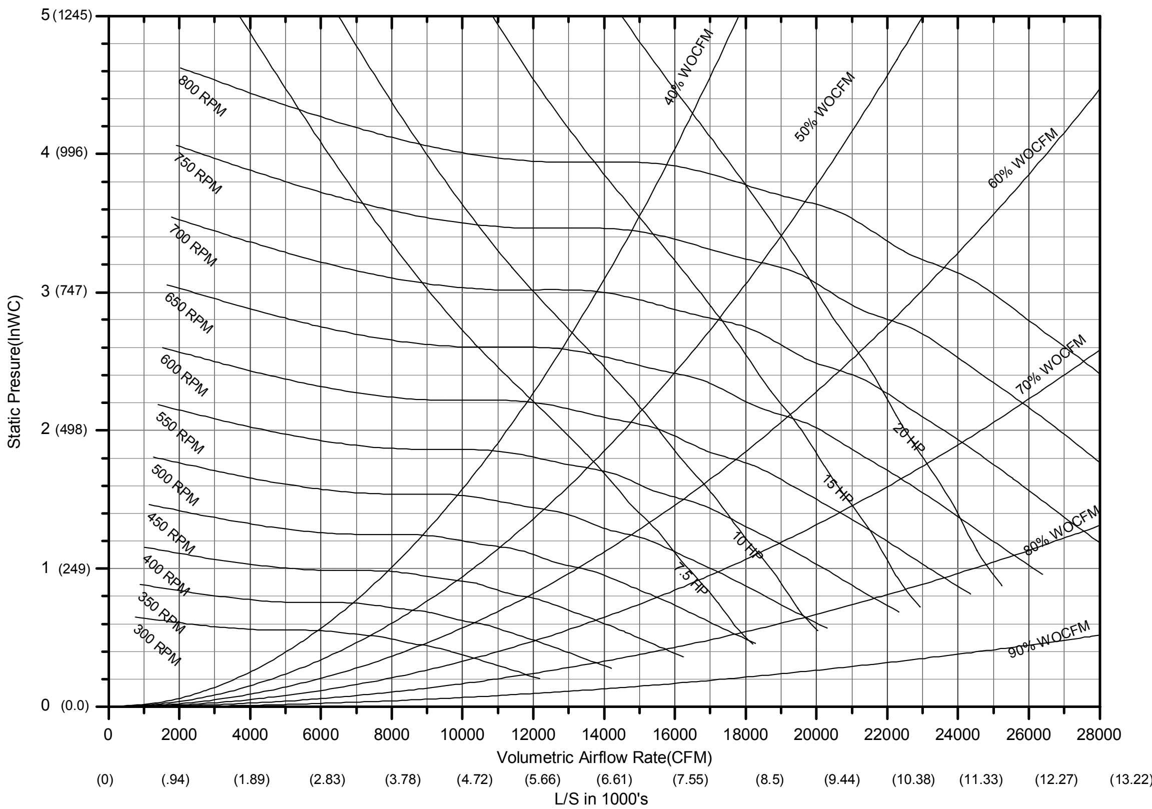


Table PD-27 – Component Static Pressure Drops — in. wg (I-P)

Nominal Std Tons (kW)	CFM Std Air	Heating System: Gas Heat Low	Gas Heat High	Electric Heat 1 Element	Electric Heat 2 Element	ID Coil Dry	ID Coil Wet	Filters: Throwaway 2"	High Eff. Filters 2"	High Eff. Filters 4"	Inlet Guide Vanes	Economizer
23 (80)	6670	0.07	0.05	0.04	0.05	0.07	0.09	0.05	0.08	0.07	0.04	0.331
	7500	0.08	0.07	0.06	0.06	0.08	0.1	0.07	0.11	0.1	0.06	0.04
	8330	0.1	0.08	0.07	0.08	0.09	0.12	0.08	0.13	0.12	0.07	0.049
	9170	0.13	0.1	0.08	0.09	0.12	0.14	0.09	0.15	0.14	0.08	0.059
	10000	0.15	0.12	0.1	0.11	0.13	0.17	0.11	0.18	0.16	0.1	0.07
25 (88)	7500	0.08	0.07	0.06	0.06	0.08	0.1	0.07	0.11	0.1	0.06	0.04
	8330	0.1	0.08	0.07	0.08	0.09	0.12	0.08	0.13	0.12	0.07	0.049
	9170	0.13	0.1	0.08	0.09	0.12	0.14	0.09	0.15	0.14	0.08	0.059
	10000	0.15	0.12	0.1	0.11	0.13	0.17	0.11	0.18	0.17	0.12	0.07
29 (103)	8750	0.11	0.09	0.08	0.08	0.16	0.2	0.09	0.15	0.13	0.08	0.054
	9580	0.14	0.11	0.09	0.1	0.18	0.23	0.1	0.17	0.16	0.11	0.065
	11200	0.19	0.15	0.13	0.14	0.24	0.3	0.12	0.21	0.19	0.13	0.077
	12100	0.22	0.17	0.15	0.16	0.27	0.33	0.13	0.22	0.21	0.15	0.091
33 (118)	10000	0.01	0.03	0.07	0.11	0.15	0.19	0.11	0.18	0.16	0.03	70
	10800	0.01	0.03	0.08	0.13	0.17	0.22	0.12	0.21	0.18	0.04	0.076
	11700	0.01	0.04	0.1	0.15	0.2	0.24	0.13	0.23	0.2	0.04	0.085
	12500	0.01	0.04	0.11	0.17	0.22	0.27	0.14	0.26	0.23	0.05	0.096
	13300	0.02	0.05	0.12	0.19	0.24	0.3	0.15	0.28	0.25	0.06	0.107
	14200	0.02	0.06	0.14	0.22	0.27	0.33	0.17	0.32	0.28	0.07	0.12
42 (146)	12500	0.01	0.04	0.11	0.17	0.29	0.36	0.14	0.26	0.23	0.05	0.095
	13300	0.02	0.05	0.12	0.19	0.32	0.4	0.15	0.28	0.25	0.06	0.108
	14200	0.02	0.06	0.16	0.24	0.36	0.44	0.17	0.34	0.29	0.07	0.12
	15800	0.02	0.07	0.18	0.27	0.42	0.53	0.19	0.38	0.34	0.08	0.136
	16700	0.03	0.08	0.2	0.3	0.46	0.57	0.2	0.41	0.36	0.09	0.155

Note:
1. Static pressure drops of accessory components must be added to external static pressure to enter fan performance tables.

Performance Data 50 Hz

Table PD-27a – Component Static Pressure Drops — Pa (SI)

Nominal Std Tons (kW)	L/s Std Air	Heating System: Gas Heat Low	Heating System: Gas Heat High	Heating System: Electric Heat 1 Element	Heating System: Electric Heat 2 Element	ID Coil Dry	ID Coil Wet	Filters: Throwaway Adder	Filters: High Eff. Filters 50 mm	Filters: High Eff. Filters 100 mm	Inlet Guide Vanes	Economizer
80 (23)	3150	17	13	11	12	17	22	12	19	17	11	0.05
	3540	21	16	14	15	19	24	17	26	24	14	0.07
	3930	26	20	17	19	22	29	19	31	29	17	0.08
	4320	31	24	21	23	29	34	22	36	34	21	0.1
	4720	37	29	25	27	31	41	26	43	38	25	0.12
88 (25)	3540	21	16	14	15	19	24	17	26	24	14	0.07
	3930	26	20	17	19	22	29	19	31	29	17	0.08
	4320	31	24	21	23	29	34	22	36	34	25	0.12
	5120	44	34	29	32	31	41	26	43	41	29	0.14
103 (29)	4130	29	22	19	21	38	48	22	36	31	19	0.09
	4520	34	27	23	25	43	55	24	41	38	23	0.11
	4920	41	32	27	29	58	72	29	50	46	27	0.13
	5310	47	37	32	34	65	79	31	53	50	32	0.15
118 (33)	4720	2	7	18	27	36	46	26	43	38	8	0.12
	5120	3	8	21	32	41	53	29	50	43	10	0.14
	5510	3	10	24	37	48	58	31	55	48	11	0.16
	5900	4	11	27	42	53	65	34	62	55	13	0.18
	6290	4	12	31	48	58	72	36	67	60	15	0.21
	6680	5	14	35	54	65	79	41	77	67	16	0.24
146 (42)	5900	4	11	27	42	70	86	34	62	55	13	0.18
	6290	4	12	31	48	77	96	36	67	60	15	0.21
	6680	5	14	35	54	86	106	41	82	72	16	0.24
	7070	5	16	39	60	101	127	46	91	82	18	0.27
	7470	6	18	44	67	110	137	48	98	86	21	0.3

Note:
1. Static pressure drops of accessory components must be added to external static pressure to enter fan performance tables.

Performance Data

50 Hz

Table PD-28 – Supply Air Fan Drive Selections

Nominal Tons (kW)	5 hp rpm	5 hp Drive No	7.5 hp rpm	7.5 hp Drive No	10 hp rpm	10 hp Drive No	15 hp rpm	15 hp Drive No
23 (80)	458	A						
	500	B						
	541	C						
	583		583	D				
	625		625*	E				
25 (88)	458	A						
	500	B						
	541	C						
	583		583	D				
	625		625	E				
29 (103)	500	B						
	541		541	C				
	583		583	D				
	658				658**	F		
	664				664*	G		
33 (118)	417		417	H				
	437		437	J				
	479		479	K				
	521				521	L		
	562				562	M		
	604				604	N		
42 (146)	437		437	J				
	479		479	K				
	521				521	L		
	562				562	M		
	604						604	N

Note:
*For YC gas/electrics only.
**For TC and TE Cooling only and with electric Heat units only.

Table PD-29 – Power Exhaust Fan Performance (I-P)

Exhaust Airflow (cfm)	External Static Pressure – Inches of Water: High Speed ESP	Med Speed ESP	Low Speed ESP
1000	0.800	–	–
1500	0.780	–	–
2000	0.750	–	0.400
2500	0.720	–	0.380
3000	0.680	–	0.370
3500	0.650	0.420	0.360
4000	0.610	0.380	0.340
4500	0.560	0.360	0.320
5000	0.520	0.330	0.300
5500	0.460	0.310	0.280
6000	0.420	0.290	0.250
6500	0.360	0.270	0.230
7000	0.310	0.240	0.190
7500	0.250	0.200	0.150
8000	0.200	0.160	0.120
8500	0.150	0.120	0.070
9000	0.100	0.060	0.000
9500	0.040	0.000	–
10000	0.000	–	–

Table PD-29a – Power Exhaust Fan Performance (SI)

Exhaust Airflow (L/s)	External Static Pressure – Pa: High Speed ESP	Med Speed ESP	Low Speed ESP
470	199.3	–	–
710	194.3	–	–
940	186.8	–	99.6
1180	179.4	–	94.7
1420	169.4	–	92.2
1650	161.9	104.6	89.7
1890	152.0	94.7	84.7
2120	139.5	89.7	79.7
2360	129.5	82.2	74.7
2600	114.6	77.2	69.7
2830	104.6	72.2	62.3
3070	89.7	67.3	57.3
3300	77.2	59.8	47.3
3540	62.3	49.8	37.4
3780	49.8	39.9	29.9
4010	37.4	29.9	17.4
4250	24.9	14.9	0.0
4480	10.0	0.0	–
4720	0.0	–	–

Notes:
1. Performance in table is with both motors operating.
2. High speed = both motors on high speed. Medium speed is one motor on high speed and one on low speed. Low speed is both motors on low speed.
3. Power Exhaust option is not to be applied on systems that have more return air static pressure drop than the maximum shown in the table for each motor speed tap.

Controls

VAV Units Only

Sequence of Operation

1

Supply Air Pressure Control

Inlet Guide Vane Control

Inlet guide vanes are driven by a modulating 2-10 vdc signal from the VAV Module. A pressure transducer measures duct static pressure, and the inlet guide vanes are modulated to maintain the supply air static pressure within an adjustable user-defined range. The range is determined by the supply air pressure setpoint and supply air pressure deadband, which are set through a unit mounted potentiometer.

Inlet guide vane assemblies installed on the supply fan inlets regulate fan capacity and limit horsepower at lower system air requirements. When in any position other than full open, the vanes pre-spin intake air in the same direction as supply fan rotation. As the vanes approach the full-closed position, the amount of "spin" induced by the vanes increases at the same time that intake airflow and fan horsepower diminish. The inlet guide vanes will close when the supply fan is shut down.

Supply Air Static Pressure Limit

The opening of the inlet guide vanes and VAV boxes are coordinated, with respect to time, during unit start up and transition to/from Occupied/Unoccupied modes to prevent overpressurization of the supply air ductwork. However, if for any reason the supply air pressure exceeds the fixed supply air static pressure limit of 3.5" W.C., the supply fan is shut down and the inlet guide vanes are closed. The unit is then allowed to restart three times. If the overpressurization condition occurs on the fourth time, the unit is shut down and a manual reset diagnostic is set and displayed at any of the remote panels with LED status lights or communicated to the Integrated Comfort system.

Variable Frequency Drives (VFD) Control

Variable frequency drives are driven by a modulating 2-10 vdc signal from the VAV module. A pressure transducer measures duct static pressure, and the VFD is modulated to maintain the supply air static pressure within an adjustable user-defined range. The range is determined by the supply air pressure setpoint and supply air pressure deadband, which are set through a unit mounted potentiometer. Variable frequency drives provide supply fan motor speed modulation. The drive will accelerate or decelerate as required to maintain the supply static pressure setpoint. When subjected to high ambient return conditions the VFD shall reduce its output frequency to maintain operation. Bypass control is offered to provide full nominal airflow in the event of drive failure.

2

Supply Air Temperature Controls

Cooling/Economizer

During occupied cooling mode of operation, the economizer (if available) and primary cooling are used to control the supply air temperature. The supply air temperature setpoint is user-defined at the unit mounted VAV Setpoint Potentiometer or at the remote panel. If the enthalpy of the outside air is appropriate to use "free cooling," the economizer will be used first to attempt to satisfy the supply setpoint.

On units with economizer, a call for cooling will modulate the fresh air dampers open. The rate of economizer modulation is based on deviation of the discharge temperature from setpoint, i.e., the further away from setpoint, the faster the fresh air damper will open. Note that the economizer is only allowed to function freely if ambient conditions are below the enthalpy control setting or below the return air enthalpy if unit has comparative enthalpy installed. If outside air is not suitable for "economizing," the fresh air dampers drive to the minimum open position. A field adjustable potentiometer on the Economizer Actuator, Tracer™, or a remote potentiometer can provide the input to establish the minimum damper position.

At outdoor air conditions above the enthalpy control setting, primary cooling only is used and the fresh air dampers remain at minimum position.

If the unit does not include an economizer, primary cooling only is used to satisfy cooling requirements.

Supply Air Setpoint Reset

Supply air reset can be used to adjust the supply air temperature setpoint on the basis of a zone temperature, return air temperature, or on outdoor air temperature. Supply air reset adjustment is available on the unit mounted VAV Setpoint Potentiometer for supply air cooling control.

a

Reset Based on Outdoor Air Temperature

Outdoor air cooling reset is sometimes used in applications where the outdoor temperature has a large effect on building load. When the outside air temperature is low and the building cooling load is low, the supply air setpoint can be raised, thereby preventing subcooling of critical zones. This reset can lower usage of primary cooling and result in a reduction in primary cooling energy usage.

There are two user-defined parameters that are adjustable through the VAV Setpoint Potentiometer: reset temperature setpoint and reset amount. The amount of reset applied is dependent upon how far the outdoor air temperature is below the supply air reset setpoint. The amount is zero where they are equal and increases linearly toward the value set at the reset amount input. The maximum value is 20 F. If the outdoor air temperature is more than 20 F below the reset temperature setpoint the amount of reset is equal to the reset amount setpoint.

b

Reset Based On Zone Or Return Temperature

Zone or return reset is applied to the zone(s) in a building that tend to overcool or overheat. The supply air temperature setpoint is adjusted based on the temperature of the critical zone(s) or the return air temperature. This can have the effect of improving comfort and/or lowering energy usage. The user-defined parameters are the same as for outdoor air reset.

Logic for zone or return reset control is the same except that the origins of the temperature inputs are the zone sensor or return sensor respectively. The amount of reset applied is dependent upon how far the zone or return air temperature is below the supply air reset setpoint. The amount is zero where they are equal and increases linearly toward the value set at the reset amount potentiometer on the VAV Setpoint potentiometer. The maximum value is 3 F. If the return or zone temperature is more than 3 F below the reset temperature setpoint the amount of reset is equal to the reset amount setpoint.

3

Zone Temperature Control

Unoccupied Zone Heating and Cooling

During Unoccupied mode, the unit is operated as a CV unit. Inlet guide vanes and VAV boxes are driven full open. The unit controls zone temperature to the Unoccupied zone cooling and heating (heating units only) setpoints.

Daytime Warm-up

During occupied mode, if the zone temperature falls to a temperature three degrees below the Morning Warm-up setpoint, Daytime Warm-up is initiated. The system changes to CV heating (full unit airflow), the VAV boxes are fully opened and the CV heating algorithm is in control until the Morning Warm-up setpoint is reached. The unit is then returned to VAV cooling mode. The Morning Warm-up setpoint is set at the unit mounted VAV Setpoint potentiometer or at a remote panel.

Morning Warm-up (MWU)

Morning warm-up control (MWU) is activated whenever the unit switches from unoccupied to occupied and the zone temperature is at least 1.5 F below the MWU setpoint. When MWU is activated the VAV box output will be energized for at least 6 minutes to drive all boxes open, the inlet guide vanes are driven full open, and all stages of heat (gas or electric) are energized. When MWU is activated the economizer damper is driven fully closed. When the zone temperature meets or exceeds the MWU setpoint minus 1.5 F, the heat will be staged down. When the zone temperature meets or exceeds the MWU setpoint then MWU will be terminated and the unit will switch over to VAV cooling.

CV Units Only

Sequence of Operation

1

Occupied Zone Temperature Control

Cooling/Economizer

During occupied cooling mode, the economizer (if provided) and primary cooling are used to control zone temperature. If the enthalpy of outside air is appropriate to use “free cooling”, the economizer will be used first to attempt to satisfy the cooling zone temperature setpoint; then primary cooling will be staged up as necessary.

On units with economizer, a call for cooling will modulate the fresh air dampers open. The rate of economizer modulation is based on deviation of the zone temperature from setpoint, i.e., the further away from setpoint, the faster the fresh air damper will open. First stage of cooling will be allowed to start after the economizer reaches full open.

Note that the economizer is allowed to function freely only if ambient conditions are below the enthalpy control setting or below the return air enthalpy if unit has comparative enthalpy. If outside air is not suitable for “economizing,” the fresh air dampers drive to the minimum open position. A field adjustable potentiometer on the Economizer Actuator, Tracer or a remote potentiometer can provide the input to establish the minimum damper position.

At outdoor air temperatures above the enthalpy control setting, primary cooling only is used and the outdoor air dampers remain at minimum position.

If the unit does not include an economizer, primary cooling only is used to satisfy cooling requirements.

Heating

Gas Heating

When heating is required the RTRM initiates the heating cycle through the ignition control module(s) (IGN). The IGN relay brings on the combustion fan motor. The ignition control module(s) begin the ignition process by preheating the hot surface ignitor(s). After the hot surface ignitor is preheated the gas valve is opened to ignite first stage. If ignition does not take place the IGN(s) will attempt to ignite 2 more times before locking out. When ignition does occur the hot surface ignitor is deenergized and then functions as a flame sensor. The RTRM will energize the supply fan contactor 45 seconds after the initiation of the heat cycle. If more capacity is needed to satisfy the heating setpoint, the RTRM will call for the second stage of heat by driving the combustion blower motor to high speed.

When the space temperature rises above the heating setpoint, the RTRM terminates the heat cycle.

Electric Heating

When heat is required, the RTRM initiates first stage heating by energizing the first stage electric heat contactor. The first stage electric heater bank(s) will be energized if the appropriate limits are closed. The RTRM will cycle first stage heat on and off as required to maintain zone temperature. If first stage cannot satisfy the requirement, the RTRM will energize the second stage electric heat contactor(s) if the appropriate limits are closed. The RTRM will cycle second stage on and off as required while keeping stage one energized.

The supply fan is energized approximately 1 second before the electric heat contactors. When the space temperature rises above the heating setpoint, the RTRM deenergizes the supply fan and all electric heat contactors.

Supply Air Tempering

This feature is available only with Tracer™ or with systems using programmable zone sensors (CV only with economizer). For gas and electric heat units in the Heat mode but not actively heating, if the supply air temperature drops to 10 F below the occupied zone heating temperature setpoint, one stage of heat will be brought on to maintain a minimum supply air temperature. The heat stage is dropped if the supply air temperature rises to 10 F above the occupied zone heating temperature setpoint.

Auto Changeover

When the System Mode is "Auto," the mode will change to cooling or heating as necessary to satisfy the zone cooling and heating setpoints. The zone cooling and heating setpoints can be as close as 2 F apart.

Unoccupied Zone Temperature Control Cooling and Heating

Both cooling or heating modes can be selected to maintain Unoccupied zone temperature setpoints. For Unoccupied periods, heating or primary cooling operation can be selectively locked out at the remote panels or TRACER.

Conventional Thermostat Interface

Conventional Thermostat Interface (CTI) is a standard part of the RTRM. The CTI will allow only two steps of heating or cooling. The CTI provides zone temperature control only and is mutually exclusive of the Trane Communications Interface (TCI).

Control Sequences of Operation Common to Both VAV and CV Units

Ventilation override (VOM)

Applying 24 volts to one of the three Ventilation Override inputs manually activates ventilation override. One input is provided to request the pressurize mode, the second input to request the purge mode, and the third input to request the exhaust mode.

If more than one mode is requested at the same time, the pressurize request will have priority followed by purge. When any ventilation override mode is active, all heating and cooling is turned off. For the case where the unit is required to turn off, the emergency stop input is used. The ICS can also initiate any ventilation override mode.

Affected Function	Mode and Priority		
	Pressurize	Purge	Exhaust
	1	2	3
Heat/Cool	off	off	off
IGV/VFD	open/full speed	open/full speed	open/full speed
Supply Fan	on	on	off
Exhaust Fan	off	on	on
Economizer	open	open	closed
VAV Boxes	forced open	forced open	normal operation

Controls

Coil Freeze Protection FROSTAT™

The FROSTAT system eliminates the need for hot gas bypass and adds a suction line surface temperature sensor to determine if the coil is in a condition of impending frost. If impending frost is detected primary cooling capacity is shed as necessary to prevent icing. All compressors are turned off after they have met their minimum 3 minute on times. The supply fan is forced on until the FROSTAT device no longer senses a frosting condition or for 60 seconds after the last compressor is shut off, whichever is longer.

Occupied/Unoccupied Switching

There are 3 ways to switch Occupied/ Unoccupied:

1

NSB Panel

2

Electronic time clock or field-supplied contact closure

3

TRACER

Night Setback Sensors

Trane's night setback sensors are programmable with a time clock function that provides communication to the rooftop unit through a 2-wire communications link. The desired transition times are programmed at the night setback sensor and communicated to the unit.

Night setback (unoccupied mode) is operated through the time clock provided in the sensors with night setback. When the time clock switches to night setback operation, the outdoor air dampers close and heating/cooling can be enabled or disabled. As the building load changes, the night setback sensor communicates the need for the rooftop heating/cooling (if enabled) function and the evaporator fan. The rooftop unit will cycle through the evening as heating/cooling (if enabled) is required in the space. When the time clock switches from night setback to occupied mode, all heating/cooling functions begin normal operation.

When using the night setback options with a VAV heating/cooling rooftop, airflow must be maintained through the rooftop unit. This can be accomplished by electrically tying the VAV boxes to the VAV heat relay contacts on the Low voltage terminal board or by using changeover thermostats. Either of these methods will assure adequate airflow through the unit and satisfactory temperature control of the building.

Timed override Activation—ICS

When this function is initiated by pushing the override button on the ICS sensor, TRACER will switch the unit to the occupied mode. Unit operation (occupied mode) during timed override is terminated by a signal from TRACER.

Timed override Activation—Non-ICS

When this function is initiated by the push of an override button on the programmable zone sensor, the unit will switch to the occupied mode. Automatic Cancellation of the Timed override Mode occurs after three hours of operation.

Comparative Enthalpy Control of Economizer

The Economizer Actuator receives inputs from optional return air humidity and temperature sensors and determines whether or not it is feasible to economize. If the outdoor air enthalpy is greater than the return air enthalpy then it is not feasible to economize and the economizer damper will not open past its minimum position.

Fan Failure Switch

The fan failure switch will disable all unit functions and "flash" the Service LED on the zone sensor.

Emergency Stop Input

A binary input is provided on the RTRM for installation of field provided switch or contacts for immediate shutdown of all unit functions. The binary input is brought out to Low Voltage Terminal Board One (LTB1).

Electrical Data

Electrical Service Sizing

To correctly size electrical service wiring for your unit, find the appropriate calculations listed below. Each type of unit has its own set of calculations for MCA (Minimum Circuit Ampacity), MOP (Maximum Overcurrent Protection), and RDE (Recommended Dual Element fuse size). Read the load definitions that follow and then find the appropriate set of calculations based on your unit type.

Set 1 is for cooling only and cooling with gas heat units, and set 2 is for cooling with electric heat units.

Load Definitions: (To determine load values, see the Electrical Service Sizing Data Tables.)

LOAD1 = CURRENT OF THE LARGEST MOTOR (COMPRESSOR OR FAN MOTOR)

LOAD2 = SUM OF THE CURRENTS OF ALL REMAINING MOTORS

LOAD3 = CURRENT OF ELECTRIC HEATERS

LOAD4 = ANY OTHER LOAD RATED AT 1 AMP OR MORE

Set 1. Cooling Only Rooftop Units and Cooling with Gas Heat Rooftop Units

MCA = (1.25 x LOAD1) + LOAD2 + LOAD4

MOP = (2.25 x LOAD1) + LOAD2 + LOAD4

Select a fuse rating equal to the MOP value. If the MOP value does not equal a standard fuse size as listed in NEC 240-6, select the next lower standard fuse rating. NOTE: If selected MOP is less than the MCA, then reselect the lowest standard maximum fuse size which is equal to or larger than the MCA, provided the reselected fuse size does not exceed 800 amps.

RDE = (1.5 x LOAD1) + LOAD2 + LOAD4

Select a fuse rating equal to the RDE value. If the RDE value does not equal a standard fuse size as listed in NEC 240-6, select the next higher standard fuse rating. NOTE: If the selected RDE is greater than the selected MOP value, then reselect the RDE value to equal the MOP value.

(Keep in mind when determining LOADS that crankcase heaters are disabled in the cooling mode).

DSS = 1.15 x (LOAD1 + LOAD2 + LOAD4)

Select a disconnect switch size equal to or larger than the DSS value calculated.

Set 2. Rooftop units with Electric Heat

To arrive at the correct MCA, MOP, and RDE values for these units, you must perform two sets of calculations. First calculate the MCA, MOP, and RDE values as if the unit was in cooling mode (use the equations given in Set 1). Then calculate the MCA, MOP, and RDE values as if the unit was in the heating mode as follows.

(Keep in mind when determining LOADS that the compressors and condenser fans don’t run while the unit is in the heating mode and crankcase heaters are disabled in the cooling mode.)

For units using heaters less than 50 kw.

MCA = 1.25 x (LOAD1 + LOAD2 + LOAD4) + (1.25 x LOAD3)

For units using heaters equal to or greater than 50 kw.

MCA = 1.25 x (LOAD1 + LOAD2 + LOAD4) + LOAD3

The nameplate MCA value will be the larger of the cooling mode MCA value or the heating mode MCA value calculated above.

MOP = (2.25 x LOAD1) + LOAD2 + LOAD3 + LOAD4

The selection MOP value will be the larger of the cooling mode MOP value or the heating mode MOP value calculated above.

Select a fuse rating equal to the MOP value. If the MOP value does not equal a standard fuse size as listed in NEC 240-6, select the next lower standard fuse rating. NOTE: If selected MOP is less than the MCA, then reselect the lowest standard maximum fuse size which is equal to or larger than the MCA, provided the reselected fuse size does not exceed 800 amps.

RDE = (1.5 x LOAD1) + LOAD2 + LOAD3 + LOAD4

The selection RDE value will be the larger of the cooling mode RDE value or the heating mode RDE value calculated above.

Select a fuse rating equal to the RDE value. If the RDE value does not equal a standard fuse size as listed in NEC 240-6, select the next higher standard fuse rating. NOTE: If the selected RDE is greater than the selected MOP value, then reselect the RDE value to equal the MOP value.

DSS = 1.15 x (LOAD1 + LOAD2 + LOAD3 + LOAD4)

NOTE: Keep in mind when determining LOADS that the compressors and condenser fans don’t run while the unit is in the heating mode.

The selection DSS value will be the larger of the cooling mode DSS or the heating mode DSS calculated above.

Select a disconnect switch size equal to or larger than the DSS value calculated.

Table ED-1 — Electrical Service Sizing Data — Electric Heat Module (Electric Heat Only)

Models: TED/TEH 330 thru 600 Electric Heat FLA						
Nominal Unit Size (Tons)	Nominal Unit Voltage	KW Heater 36	54	72	90	108
		FLA	FLA	FLA	FLA	FLA
27½	208	74.9	112.4	—	—	—
30.0	230	86.6	129.9	—	—	—
35.0	460	43.3	65.0	86.6	108.3	—
	575	—	52.0	69.3	86.6	—
40.0	208	—	112.4	—	—	—
50.0	230	—	129.9	—	—	—
	460	—	65.0	86.6	108.3	129.9
	575	—	52.0	69.3	86.6	103.9

Notes:
1. All FLA in this table are based on heater operating at 208, 240, 480, and 600 volts.

Electrical Data

60 Hz

Table ED-2 — 27½-50 Ton Electrical Service Sizing Data[1]

						Fan Motors							
			Compressor			Supply		Condenser			Exhaust		
Model	Electrical Characteristics	Allowable Voltage Range	No/Ton	RLA (Ea.)	LRA (Ea.)	HP	Standard/ Hi-Efficiency FLA	No.	HP	FLA (Ea.)	No.	HP	FLA (Ea.)
TC/TE/YC*330	208/60/3	187-229	1/10,1/15	41.9/62.8	269/409	7.5	22.3/21.5	3	1.1	7.0	2	1.0	6.7
						10.0	29.7/29.0						
	230/60/3	207-253		41.9/62.8	247/376	7.5	19.6/18.8			7.0			6.7
						10.0	26.4/25.2						
	460/60/3	414-506		18.1/27.3	95/142	7.5	9.8/9.4			3.5			2.9
						10.0	13.2/12.6						
	575/60/3	517-633		14.6/21.8	76/114	7.5	7.8/7.5			2.8			2.3
						10.0	10.3/10.1						
TC/TE/YC*360	208/60/3	187-229	2/15	62.8	409	7.5	22.3/21.5	3	1.1	7.0	2	1.0	6.7
						10.0	29.7/29.0						
	230/60/3	207-253		62.8	376	7.5	19.6/18.8			7.0			6.7
						10.0	26.4/25.2						
	460/60/3	414-506		27.3	142	7.5	9.8/9.4			3.5			2.9
						10.0	13.2/12.6						
	575/60/3	517-633		21.8	114	7.5	7.8/7.5			2.8			2.3
						10.0	10.3/10.1						
TC/TE/YC*420	208/60/3	187-229	2/15	62.8	409	7.5	22.3/21.5	3	1.1	7.0	2	1.0	6.7
						10.0	29.7/29.0						
						15.0	44.4/41.5						
	230/60/3	207-253		62.8	376	7.5	19.6/18.8			7.0			6.7
						10.0	26.4/25.2						
						15.0	38.6/36.0						
	460/60/3	414-506		27.3	142	7.5	9.8/9.4			3.5			2.9
						10.0	13.2/12.6						
						15.0	19.3/18.0						
	575/60/3	517-633		21.8	114	7.5	7.8/7.5			2.8			2.3
						10.0	10.3/10.1						
						15.0	15.4/14.5						
TC/TE/YC*480	208/60/3	187-229	2/15,1/10	62.8/62.8/41.9	409/409/269	10.0	29.7/29.0	4	1.1	7.0	2	1.0	6.7
						15.0	44.4/41.5						
	230/60/3	207-253		62.8/62.8/41.9	376/376/247	10.0	26.4/25.2			7.0			6.7
						15.0	38.6/36.0						
	460/60/3	414-506		27.3/27.3/18.1	142/142/95	10.0	13.2/12.6			3.5			2.9
						15.0	19.3/18.0						
	575/60/3	517-633		21.8/21.8/14.6	114/114/76	10.0	10.3/10.1			2.8			2.3
						15.0	15.4/14.5						
TC/TE/YC*600	208/60/3	187-229	3/15	62.8	409	10.0	29.7/29.0	4	1.1	7.0	2	1.0	6.7
						15.0	44.4/41.5						
						20.0	58.7/56.1						
	230/60/3	207-253		62.8	376	10.0	26.4/25.2			7.0			6.7
						15.0	38.6/36.0						
						20.0	51.0/49.4						
	460/60/3	414-506		27.3	142	10.0	13.2/12.6			3.5			2.9
						15.0	19.3/18.0						
						20.0	25.5/24.7						
	575/60/3	517-633		21.8	114	10.0	10.3/10.1			2.8			2.3
						15.0	15.4/14.5						
						20.0	20.4/19.6						

Notes:
1. All customer wiring and devices must be installed in accordance with local and national electrical codes.

Table ED-3 — Electrical Service Sizing Data — Crankcase Heaters — Heating Mode Only)

Nominal Unit Size (Tons)	FLA Add — Unit Voltage 200	230	460	575
27½ - 35	2	2	1	1
40, 50	3	3	2	2

Electrical Data

50 Hz

Table ED-4 – Electrical Service Sizing Data

		Compressor			Fan Motors Supply		Fan Motors Condenser			Fan Motors Exhaust				
Model	Electrical[2] Characteristics	No/Ton	RLA (Ea.)	LRA (Ea.)	HP	FLA	No.	HP	FLA (Ea.)	No.	HP	FLA (Ea.)	MCA*	Max. Fuse Size
TC/TE/YC*275	380-415/50/3	1/10, 1/15	18.1/27.3	110/174	5	13.1	3	.75	4.4	2	.75	2.9	79	100
TC/TE/YC*305	380-415/50/3	2/15	27.3	174	5	13.1	3	.75	4.4	2	.75	2.9	93	110
TC/TE/YC*350	380-415/50/3	2/15	27.3	174	5	13.1	3	.75	4.4	2	.75	2.9	93	110
TC/TE/YC*400	380-415/50/3	2/15,	27.3	174	7.5	16.6	4	.75	4.4	2	.75	2.9	119	125
		1/10	18.1	110										
TC/TE/YC*500	380-415/50/3	3/15	27.3	174	7.5	16.6	4	.75	4.4	2	.75	2.9	128	150

Notes:
1. All customer wiring and devices must be installed in accordance with local and national electrical codes.
2. Allowable voltage range for the 380V unit is 342-418V, allowable voltage range for the 415V unit is 373-456.
* Minimum Circuit Ampacity.

Table ED-5 – Electrical Service Sizing Data – Electric Heat Module (Electric Heat Units Only)

Models: TED/TEH 275 thru 500
Electric Heat FLA

Nominal Unit Size (Tons)	Nominal Unit Voltage	KW Heater (380/415V) 23/27	34/40	45/54	56/67	68/81
23-29	380	34.5	51.1	68.9	85.5	–
	415	37.6	55.6	–	–	–
33, 42	380	–	51.1	68.9	85.5	103.4
	415	–	55.6	75.1	93.2	112.7

Notes:
1. All FLA in this table are based on heater operating at 380 or 415 volts as shown above.

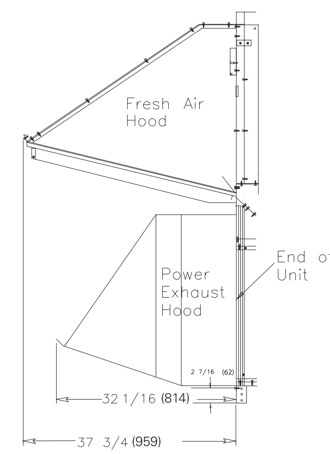
Table ED-6— Electrical Service Sizing Data — Crankcase Heaters — Heating Mode Only)

Nominal Unit Size (Tons)	FLA Add Unit Voltage 380	415
23 - 29	1	1
33 - 42	2	2

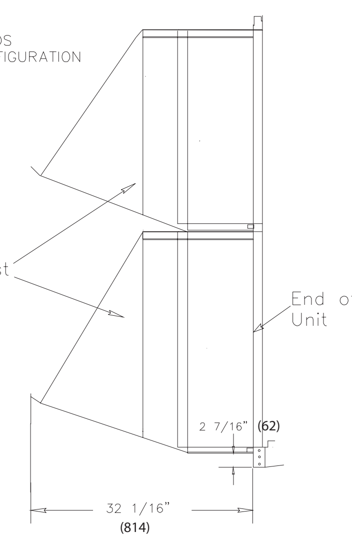
Dimensional Data 60/50 Hz

Figure DD-1— Fresh Air, Power Exhaust Hoods

SIDE VIEW SHOWING
FRESH AIR AND
POWER EXHAUST HOODS
FOR DOWNFLOW CONFIGURATION



SIDE VIEW SHOWING
POWER EXHAUST HOODS
FOR HORIZONTAL CONFIGURATION

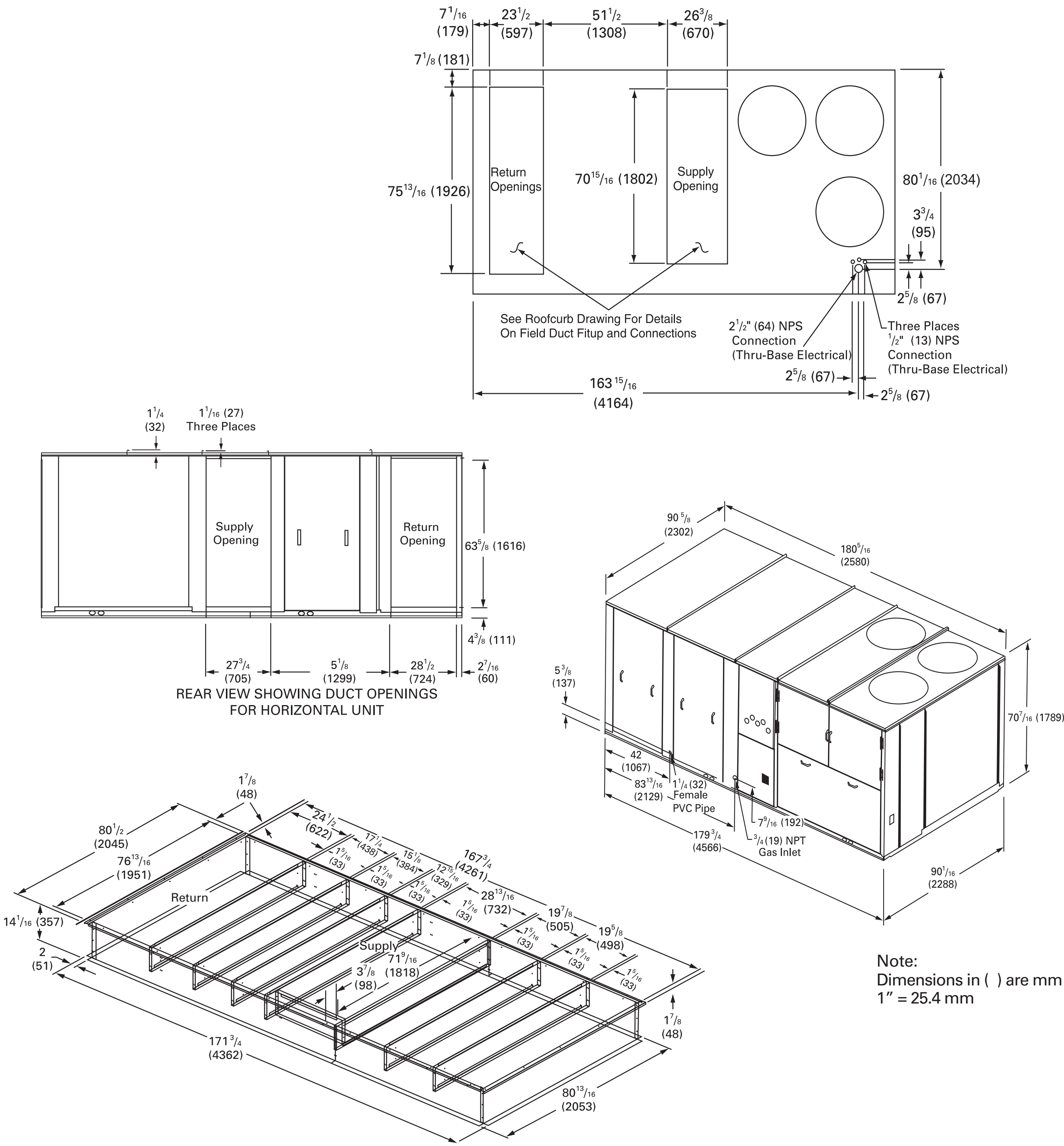


NOTE: The Two Horizontal Power Exhaust Hoods and the three Horizontal Fresh Air Hoods are located side by side. The Fresh Air Hoods (not shown) extend only 23 15/16" from the end of the unit.

Dimensional Data

60/50 Hz

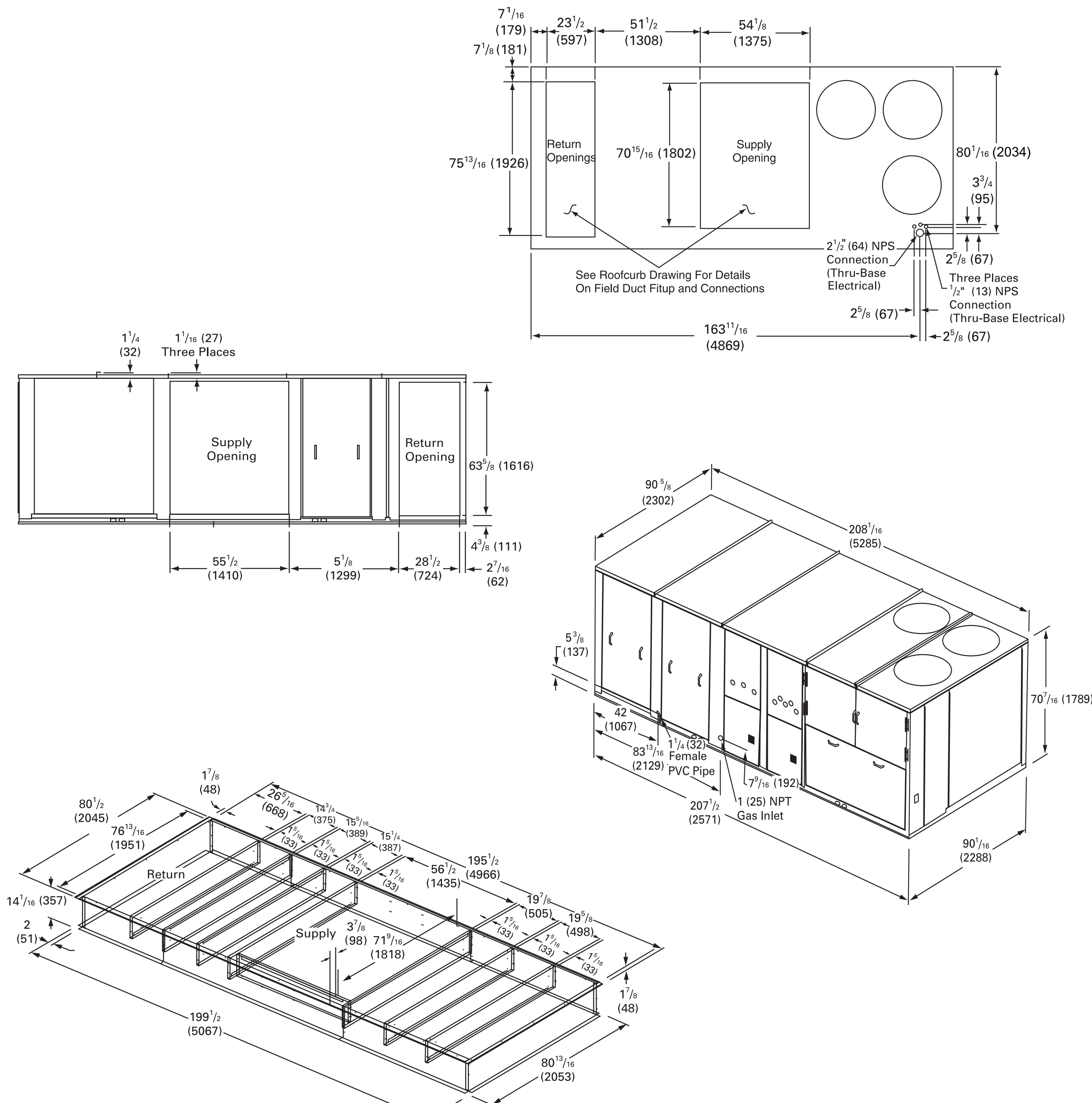
Figure DD-2 – 60 Hz 27½-35, 50 Hz 23-29 Tons (TC, TE, YC Low Heat)



Note:
Dimensions in ( ) are mm
1" = 25.4 mm

Dimensional Data 60/50 Hz

Figure DD-3– 60 Hz 27½-35, 50 Hz 23-29 Tons (YC High Heat)

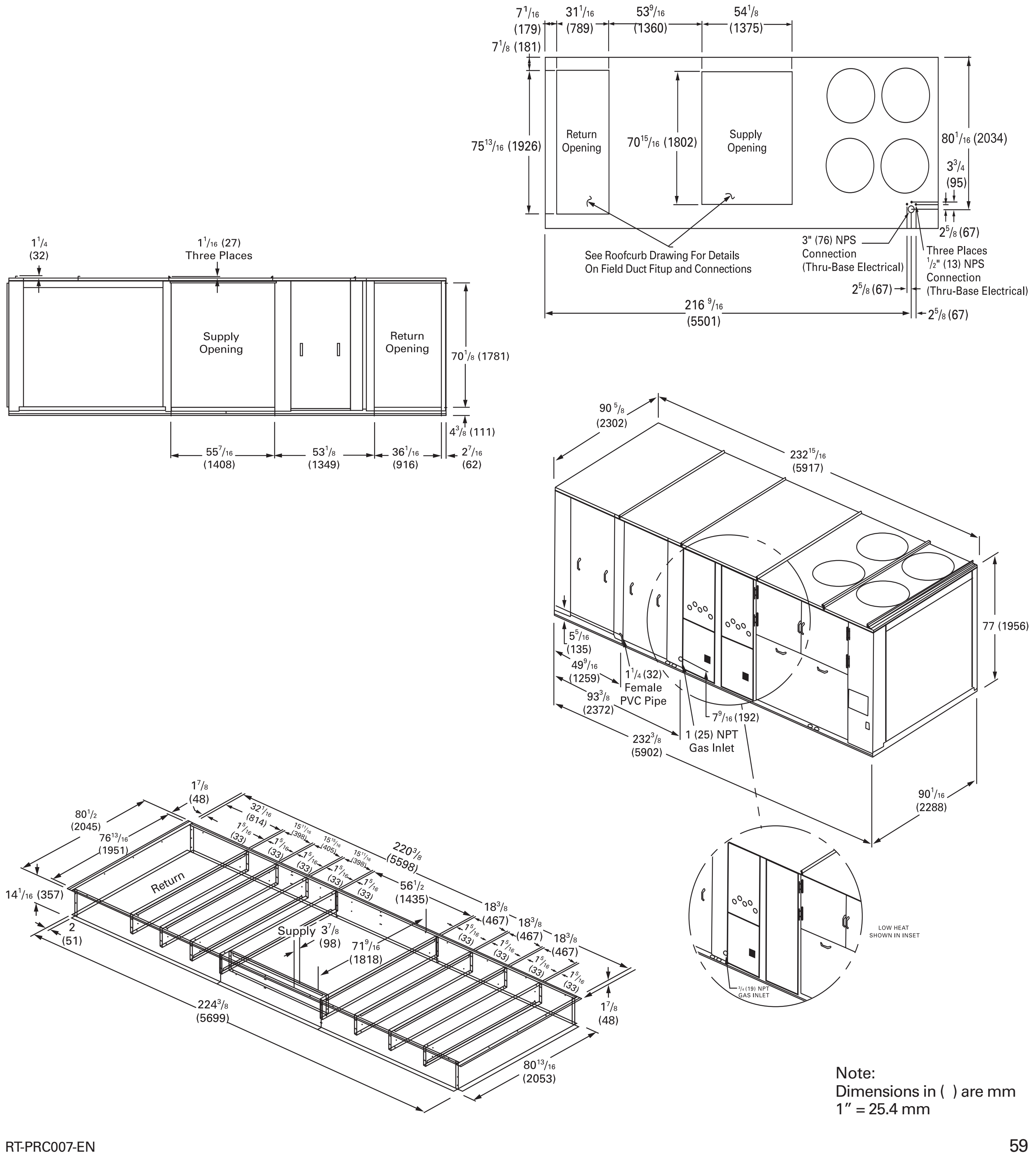


Note:
Dimensions in ( ) are mm
1" = 25.4 mm

Dimensional Data

60/50 Hz

Figure DD-4 – 60 Hz 40-50, 50 Hz 33-42 Tons (TC, TE, YC Low & High Heat)

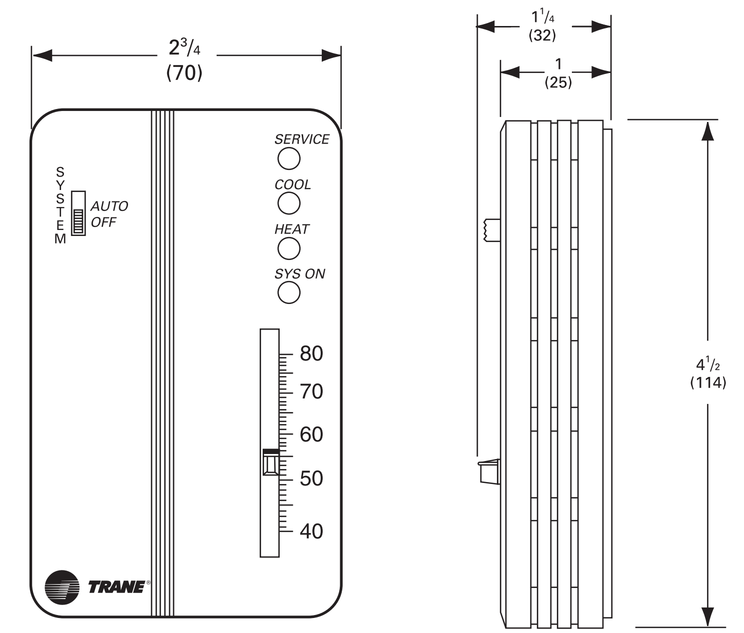


Note:
Dimensions in ( ) are mm
1” = 25.4 mm

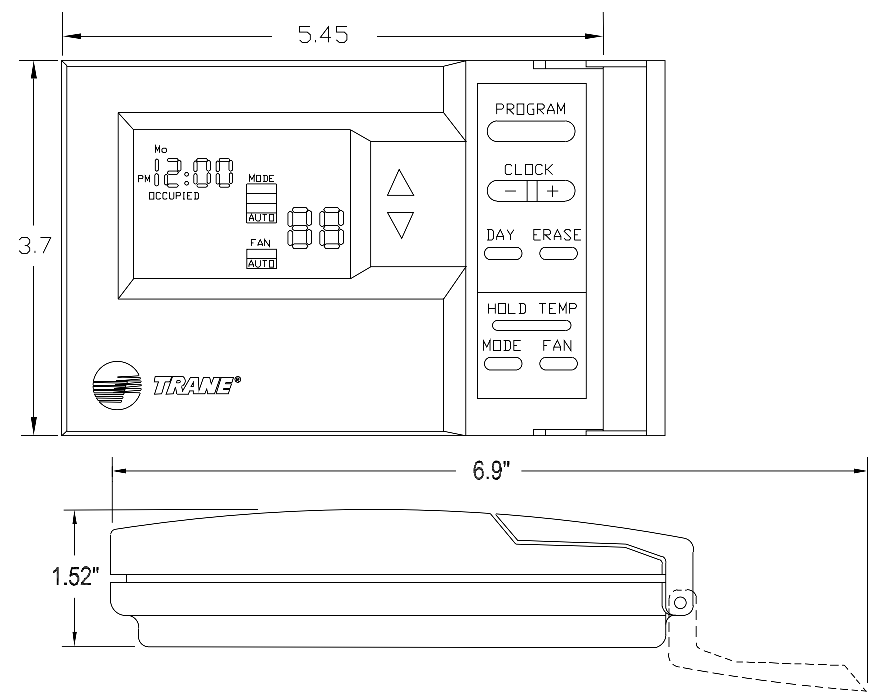
Dimensional Data (Variable Air Volume VAV)

Field Installed Sensors

SINGLE SETPOINT SENSOR WITH SYSTEM FUNCTION LIGHTS (BAYSENS021)*



PROGRAMMABLE NIGHT-SETBACK SENSOR (BAYSENS020)*

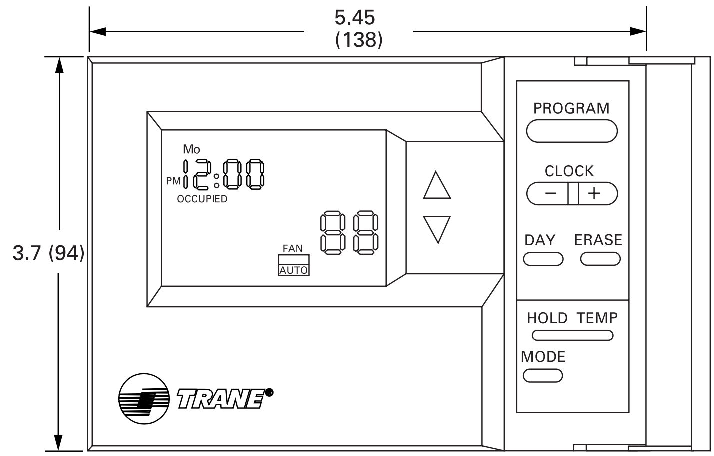


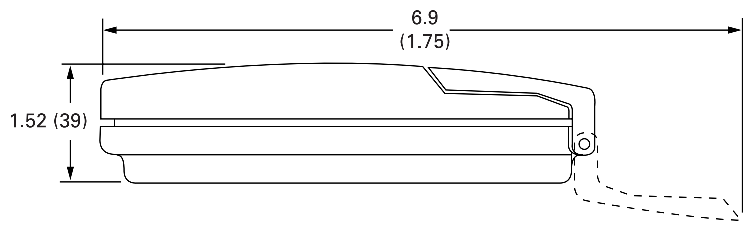
Note:
1. Remote sensors are available for use with all zone sensors to provide remote sensing capabilities.

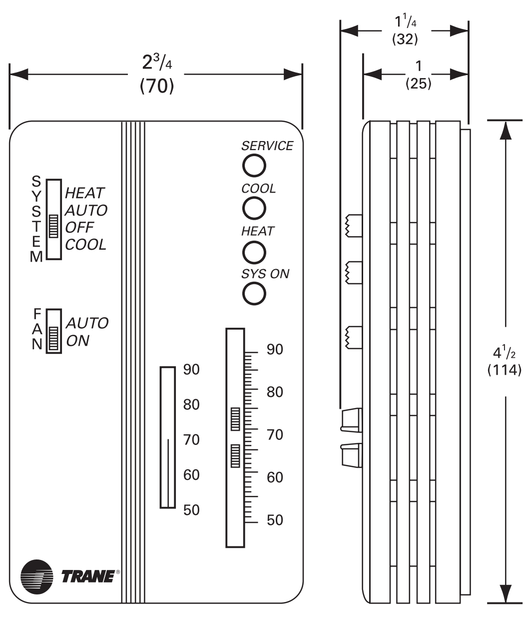
Dimensional Data (Constant Volume CV)

Field Installed Sensors

PROGRAMMABLE NIGHT-SETBACK SENSOR (BAYSENS019*)







DUAL SETPOINT, MANUAL/AUTOMATIC CHANGEOVER SENSOR WITH SYSTEM FUNCTION LIGHTS (BAYSENS010*)

WITHOUT LED STATUS INDICATORS (BAYSENS008*)

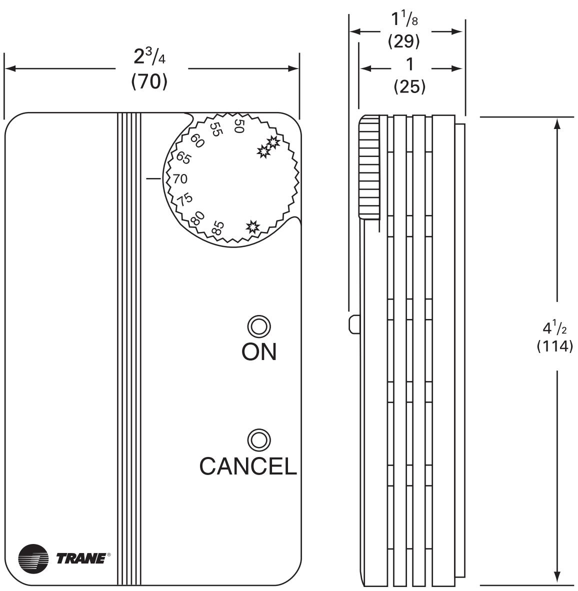
SINGLE SETPOINT WITHOUT LED STATUS INDICATORS (BAYSENS006*)

Note:
1. Remote sensors are available for use with all zone sensors to provide remote sensing capabilities.

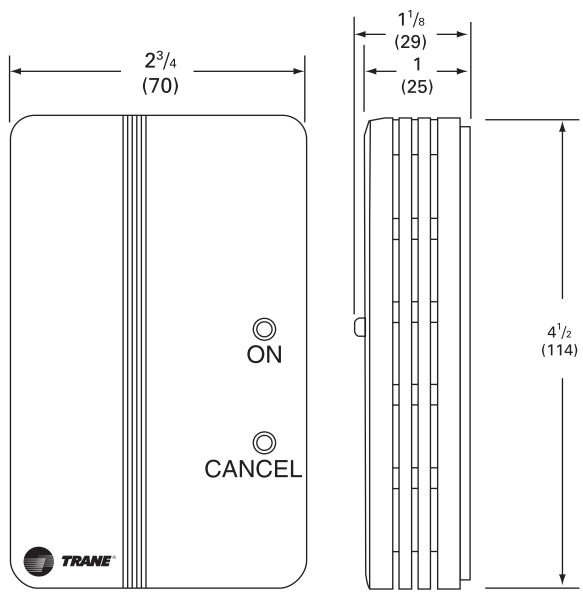
Dimensional Data (CV and VAV)

Integrated Comfort™ System Sensors

ZONE TEMPERATURE SENSOR W/TIMED OVERRIDE BUTTON AND LOCAL SETPOINT ADJUSTMENT (BAYSENS014)[1]

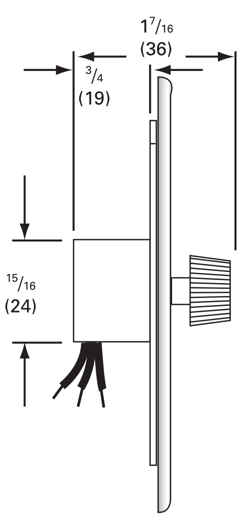


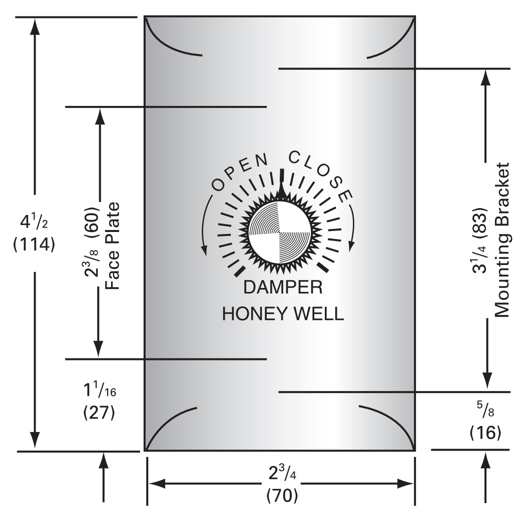
ZONE TEMPERATURE SENSOR W/TIMED OVERRIDE BUTTONS (BAYSENS013*) ALSO AVAILABLE SENSOR ONLY (BAYSENS017*)



TEMPERATURE SENSOR (BAYSENS016*)

REMOTE MINIMUM POSITION POTENTIOMETER CONTROL (BAYSTAT023*)





Note:
1. Remote sensors are available for use with all zone sensors to provide remote sensing capabilities.

Dimensional Data and Weights

WALL-MOUNTED CO_2 SENSOR (BAYCO2K005)*
DUCT-MOUNTED CO_2 SENSOR (NOT PICTURED) (BAYC02K006)*

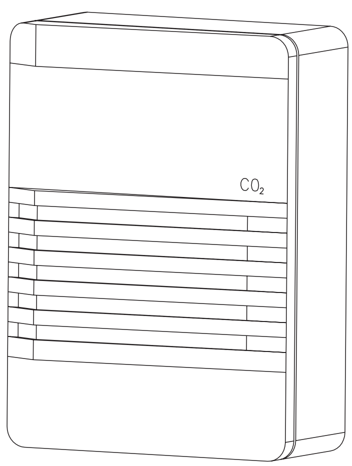


Table W-1 — Approximate Operating Weights — Lbs.[2]

	Basic Unit Weights[1]			
Unit Model	**YC Low Heat**	**YC High Heat**	**TC**	**TE**
**D330/275	3650	4012	3520	3553
**H330/275	3650	4077	3565	3598
**D360/305	3730	4092	3600	3633
**H360/305	3730	4142	3600	3633
**D420/350	3815	4177	3685	3718
**H420/350	3815	4227	3685	3718
**D480/400	4765	4885	4540	4575
**H480/400	4790	4915	4540	4575
**D600/500	4935	5055	4710	4745
**H600/500	4960	5085	4710	4745

Table W-1a — Approximate Operating Weights — kg

	Basic Unit Weights[1]			
Unit Model	**YC Low Heat**	**YC High Heat**	**TC**	**TE**
**D330/275	1656	1820	1597	1612
**H330/275	1656	1849	1617	1632
**D360/305	1692	1856	1633	1648
**H360/305	1692	1879	1633	1648
**D420/350	1731	1895	1672	1687
**H420/350	1731	1895	1672	1687
**D480/400	2161	2216	2059	2075
**H480/400	2161	2216	2059	2075
**D600/500	2239	2293	2137	2152
**H600/500	2239	2293	2137	2152

Notes
1. Basic unit weight includes minimum HP Supply Fan motor.
2. Optional high static and high efficiency motor weights are in addition to the standard motor weight included in the basic unit weight.
3. Point Loading is identified with corner A being the corner with the compressors. As you move clockwise around the unit as viewed from the top, mid-point B, corner C, corner D, mid-point E and corner F.
4. Point load calculations provided are based on the unit weight for YC high heat models. To calculate point loads for a specific model, multiply the percentages given in Table W-5 by the unit weight listed in table W-1.

Table W-2 — Point Loading Average Weight[3,4] — lbs.

Model	A	B	C	D	E	F
**D330/275	843	883	481	642	682	481
**H330/275	856	897	489	652	693	489
**D360/305	859	900	491	655	696	491
**H360/305	870	911	497	663	704	497
**D420/350	877	919	501	668	710	501
**H420/350	888	930	507	676	719	507
**D480/400	1026	1075	586	782	830	586
**H480/400	1032	1081	590	786	836	590
**D600/500	1062	1112	607	809	859	607
**D600/500	1068	1119	610	814	864	610

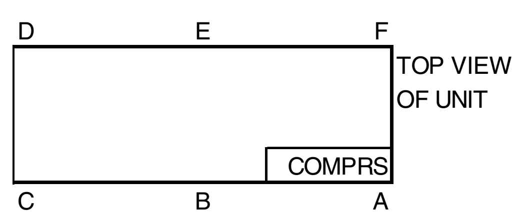
Table W-2a— Point Loading Average Weight[3,4] — kg.

Model	A	B	C	D	E	F
**D330/275	382.38	400.53	218.18	291.21	309.36	218.18
**H330/275	388.28	406.88	221.81	295.75	314.34	221.81
**D360/305	389.64	408.24	222.72	297.11	315.71	222.72
**H360/305	394.63	413.23	225.44	300.74	319.33	225.44
**D420/350	397.81	416.86	227.25	303.00	322.06	227.25
**H420/350	402.80	421.85	229.98	306.63	326.14	229.98
**D480/400	465.39	487.62	265.81	354.72	376.49	265.81
**H480/400	468.12	490.34	267.62	356.53	379.21	267.62
**D600/500	481.72	504.40	275.34	366.96	389.64	275.34
**H600/500	484.44	507.58	276.70	369.23	391.91	276.70

Table W-3— Point Loading Percentages of Total Unit Weight[1]

A	B	C	D	E	F
21%	22%	12%	16%	17%	12%

1. To calculate point loads for a specific model, multiply percentages by unit weight listed in table Table W-1.



Weights

Table W-4— Approximate Operating Weights — lb — Weight of Optional Components

Unit Model	Baro. Relief	Power Exhaust	Hi-Stat/ Hi Eff. Sup Fan Motor[2]	0-25% Man Damper	Econ.	Inlet Guide Vanes	Var. Freq. Drives (VFD's) W/O Bypass	Var. Freq. Drives (VFD's) With Bypass	Serv Valves	Thru-the base Elec.	Non-Fused Discon. Switch	Fact. GFI with Discon. Switch	Roof Curb Lo/Hi
**D330/275	110	165	120	50	260	55	85	115	11	6	30	85	310/330
**H330/300	145	200	120	50	285	55	85	115	11	6	30	85	310/330
**D360/305	110	165	120	50	260	55	85	115	11	6	30	85	310/330
**H330/305	145	200	120	50	285	55	85	115	11	6	30	85	310/330
**D420/350	110	165	120	50	260	55	115	150	11	6	30	85	310/330
**H420/350	145	200	120	50	285	55	115	150	11	6	30	85	310/330
**D480/400	110	165	125	50	290	70	115	150	18	6	30	85	365/368
**H480/400	145	200	125	50	300	70	115	150	18	6	30	85	365/365
**D600/500	110	165	125	50	290	70	115	150	18	6	30	85	365/365
**H600/500	145	200	125	50	300	70	115	150	18	6	30	85	365/365

Table W-4a — Approximate Operating Weights — kg — Weight of Optional Components

Unit Model	Baro. Relief	Power Exhaust	Hi-Stat/ Hi Eff. Sup Fan Motor[2]	0-25% Man Damper	Econ.	Inlet Guide Vanes	Var. Freq. Drives (VFD's) W/O Bypass	Var. Freq. Drives (VFD's) With Bypass	Serv Valves	Thru-the base Elec.	Non-Fused Discon. Switch	Fact. GFI with Discon. Switch	Roof Curb Lo/Hi
**D275	50	74	54	23	117	25	38.6	52.2	5	3	14	38	141/150
**H275	65	90	54	23	128	25	38.6	52.2	5	3	14	38	141/150
**D305	50	74	54	23	117	25	38.6	52.2	5	3	14	38	141/150
**H305	65	90	54	23	128	25	38.6	52.2	5	3	14	38	141/150
**D350	50	74	54	23	117	25	52.2	68.04	5	3	14	38	141/150
**H350	65	90	54	23	128	25	52.2	68.04	5	3	14	38	141/150
**D400	50	74	56	23	131	32	52.2	68.04	8	3	14	38	169
**H400	65	90	56	23	135	32	52.2	68.04	8	3	14	38	169
**D500	50	74	56	23	131	32	52.2	68.04	8	3	14	38	169
**H500	65	90	56	23	135	32	52.2	68.04	8	3	14	38	169

Notes:
1. Basic unit weight includes minimum hp Supply Fan Motor.
2. Optional high static and high efficiency motor weights are in addition to the standard motor weight included in the basic unit weight.

Table W-5— Minimum Operating Clearances for Unit Installation

	Econo / Exhaust End	Condenser Coil[2] End / Side	Service Side Access
Single Unit[1]	6 Feet (1.82 m)	8 Feet / 4 Feet (2.43/1.21 m)	4 Feet (1.21 m)
Multiple Unit[1,3]	12 Feet (3.65 m)	16 Feet / 8 Feet (4.87/2.43 m)	8 Feet (2.43 m)

Notes:
1. Horizontal and Downflow Units, all sizes.
2. Condenser coil is located at the end and side of the unit.
3. Clearances on multiple unit installations are distances between units.

Mechanical Specifications

General

The units shall be dedicated downflow or horizontal airflow. The operating range shall be between 115 F and 0 F in cooling as standard from the factory for all units. Cooling performance shall be rated in accordance with ARI testing procedures. All units shall be factory assembled, internally wired, fully charged with HCFC-22 and 100% run tested to check cooling operation, fan and blower rotation and control sequence before leaving the factory. Wiring internal to the unit shall be numbered for simplified identification. Units shall be UL listed and labeled, classified in accordance to UL 1995/CAN/CSA No. 236-M90 for Central Cooling Air Conditioners. Canadian units shall be CSA Certified.

Casing

Unit casing shall be constructed of zinc coated, heavy gauge, galvanized steel. All components shall be mounted in a weather resistant steel cabinet with a painted exterior. Where top cover seams exist, they shall be double hemmed and gasket sealed to prevent water leakage. Cabinet construction shall allow for all maintenance on one side of the unit. Service panels shall have handles and shall be removable while providing a water and air tight seal. Control box access shall be hinged. The indoor air section shall be completely insulated with fire resistant, permanent, odorless, foil faced glass fiber material. The base of the unit shall have provisions for crane lifting.

Filters

Two inch, throwaway filters shall be standard on all size units. Two inch "high efficiency", and four inch "high efficiency" filters shall be optional.

Compressors

Trane 3-D™ Scroll compressors have a simple mechanical design with only three major moving parts. Scroll type compression provides inherently low vibration. The 3-D Scroll provides a completely enclosed compression chamber which leads to increased efficiency. Exhaustive testing on the 3-D Scroll, including start up with the shell full of liquid, has proven that slugging does not fail involutes. Direct-drive, 3600 rpm, suction gas-cooled hermetic motor. Trane 3-D Scroll compressor includes centrifugal oil pump, oil level sightglass and oil charging valve. Each compressor shall have crankcase heaters installed, properly sized to minimize the amount of liquid refrigerant present in the oil sump during off cycles.

Refrigerant Circuits

Each refrigerant circuit shall have independent thermostatic expansion devices, service pressure ports and refrigerant line filter driers factory-installed as standard. An area shall be provided for replacement suction line driers.

Evaporator and Condenser Coils

Condenser coils shall have $^{3}/_{8}$" copper tubes mechanically bonded to lanced aluminum plate fins. Evaporator coils shall be $^{1}/_{2}$" internally finned copper tubes mechanically bonded to high performance aluminum plate fins. All coils shall be leak tested at the factory to ensure pressure integrity. All coils shall be leak tested to 200 psig and pressure tested to 450 psig. All dual circuit evaporator coils shall be of intermingled configuration. Sloped condensate drain pans are standard.

Outdoor Fans

The outdoor fan shall be direct-drive, statically and dynamically balanced, draw through in the vertical discharge position. The fan motor(s) shall be permanently lubricated and have built-in thermal overload protection.

Indoor Fan

Units shall have belt driven, FC, centrifugal fans with fixed motor sheaves. All motors shall be circuit breaker protected. All indoor fan motors meet the U.S. Energy Policy Act of 1992 (EPACT).

Electric Heaters

Electric heat shall be available for factory installation within basic unit. Electric heater elements shall be constructed of heavy-duty nickel chromium elements internally delta connected for 240 volt, wye connected for 480 and 600 volt. Staging shall be achieved through the rooftop refrigeration module (RTRM). Each heater package shall have automatically reset high limit control operating through heating element contactors. All heaters shall be individually fused from factory, where required, and meet all NEC and CEC requirements. Power assemblies shall provide single-point connection. Electric heat shall be UL listed or CSA certified.

Gas Heating Section

The heating section shall have a drum and tube heat exchanger(s) design with primary and secondary surfaces of corrosion resistant alumanized steel or optional stainless steel.

A forced combustion blower shall supply premixed fuel to a single burner ignited by a pilotless hot surface ignition system. In order to provide reliable operation, a negative pressure gas valve shall be used that requires blower operation to initiate gas flow. On an initial call for heat, the combustion blower shall purge the heat exchanger(s) 45 seconds before ignition. After three unsuccessful ignition attempts, the entire heating system shall be locked out until manually reset at the thermostat. Units shall be suitable for use with natural gas or propane (field installed kit) and also comply with California requirements for low NOx emissions. All units shall have two stage heating.

Controls

Unit shall be completely factory wired with necessary controls and terminal block for power wiring. Units shall provide an external location for mounting fused disconnect device. ReliaTel controls

Mechanical Specifications

shall be provided for all 24 volt control functions. The resident control algorithms shall make all heating, cooling and/or ventilating decisions in response to electronic signals from sensors measuring indoor and outdoor temperatures. The control algorithm maintains accurate temperature control, minimizes drift from set point and provides better building comfort. ReliaTel controls shall provide anti-short cycle timing and time delay between compressors to provide a higher level of machine protection.

Control Options

Inlet Guide Vanes shall be installed on each fan inlet to regulate capacity and limit horsepower at lower system requirements. When in any position other than full open they shall pre-spin intake air in the same direction as fan rotation. The inlet guide vanes shall close when supply fan is off, except in night setback.

The inlet guide vane actuator motor shall be driven by a modulating dc signal from the unit controls. A pressure transducer shall measure duct static pressure and modulate the inlet guide vanes to maintain the required supply air static pressure within a predetermined range.

Variable Frequency Drives (VFDs)

VFDs shall be factory installed and tested to provide supply fan motor speed modulation. The VFD shall receive a 2-10 VDC signal from the unit controls based upon supply static pressure and shall cause the drive to accelerate or decelerate as required to maintain the supply static pressure setpoint. When subjected to high ambient return conditions the VFD shall reduce its output frequency to maintain operation. Bypass control to provide full nominal air flow in the event of drive failure shall be optional.

Ventilation Override

Ventilation Override shall allow a binary input from the fire/life safety panel to cause the unit to override standard operation and assume one of two factory preset ventilation sequences, exhaust or pressurization. The two sequences shall be selectable based open a binary select input.

Trane Communication Interface (TCI)

Shall be provided to interface with the Trane Integrated Comfort™ System and shall be available field or factory-installed. The TCI shall allow control and monitoring of the rooftop unit via a two-wire communication link.

The following alarm and diagnostic information shall be available:

RTRM Originated Data

- Unit operating mode
- Unit failure status
  - Cooling failure
  - Heating failure
  - Emergency service stop indication
  - Supply fan proving
  - Timed override activation
  - High temperature thermostat status
- Zone temperature
- Supply air temperature
- Cooling status (all stages)
- Stage activated or not
- Stage locked out by RTRM
- HPC status for that stage
- Compressor disable inputs
- Heating status
- Number of stages activated
- High temperature limit status
- Economizer status
- Enthalpy favorability status
- Requested minimum position
- Damper position
- Dry bulb/enthalpy input status
- Outside air temperature
- Outside relative humidity
- Sensor Failure
  - Humidity sensor
  - OAT sensor
  - SAT sensor
  - RAT sensor
  - Zone temperature sensor
  - Mode input
  - Cooling/heating setpoints from sensors
  - Static pressure transducer
  - Unit mounted potentiometer
  - SAT from potentiometer
  - Air reset setpoint from potentiometer
- Unit Configuration data
  - Gas or electric heat
  - Economizer present
- High temp input status
- Local setpoint
- Local mode setting
- Inlet Guide Vane position
- Clogged filter service indicator
- CO_2 setpoint
- CO_2 value

Tracer Originated Data

- Command operating mode
- Host controllable functions:
  - Supply fan
  - Economizer
  - Cooling stages enabled
  - Heating stages enabled
  - Emergency shutdown
- Minimum damper position
- Heating setpoint
- Cooling setpoint
- Supply air tempering enable/disable
- Slave mode (CV only)
- Tracer/Local operation
- SAT setpoint
- Reset setpoint
- Reset amount
- MWU setpoint
- MWU enable/disable
- SAT Reset type select
- Static pressure setpoint
- Static pressure deadband
- Daytime warm-up enable/disable
- Power exhaust setpoint

LonTalk Communication Interface (LCI-R)

The field or factory-installed ReliaTel® LonTalk Communication Interface (LCI-R) will be provided to interface with the Trane Integrated Comfort System or LonTalk capable third party building management networks. The LCI-R will allow control and monitoring of the rooftrop unit via a two-wire communication link.

Outside Air

Manual Outside Air

A manually controllable outside air damper shall be adjustable for up to 25 percent outside air. Manual damper is set at desired position at unit start up.

Economizer

Economizer shall be factory installed. The assembly includes: fully modulating 0-100 percent motor and dampers, minimum position setting, preset linkage, wiring harness, and fixed dry bulb control. Solid state enthalpy and differential enthalpy control shall be a factory or field installed option.

Exhaust Air

Barometric Relief

The barometric relief damper shall be optional with the economizer. Option shall provide a pressure operated damper for the purpose of space pressure equalization and be gravity closing to prohibit entrance of outside air during the equipment “off” cycle.

Power Exhaust Fan

Power exhaust shall be available on all units and shall be factory installed. It shall assist the barometric relief damper in maintaining building pressurization.

Unit Options

Service Valves

Service valves shall be provided factory installed and include suction, liquid, and discharge 3-way shutoff valves.

Through-The-Base Electrical Provision

An electrical service entrance shall be provided which allows access to route all high and low voltage electrical wiring inside the curb, through the bottom of the outdoor section of the unit and into the control box area.

Non-Fused Disconnect Switch

A factory installed non-fused disconnect switch with external handle shall be provided and shall satisfy NEC requirements for a service disconnect. The non-fused disconnect shall be mounted inside the unit control box.

GFI Convenience Outlet (Factory Powered)

A 15A, 115V Ground Fault Interrupter convenience outlet shall be factory installed. It shall be wired and powered from a factory mounted transformer. Unit mounted non-fused disconnect with external handle shall be furnished with factory powered outlet.

GFI Convenience Outlet (Field Powered)

A 15A, 115V Ground Fault Interrupter convenience outlet shall be factory installed and shall be powered by customer provided 115V circuit.

Hinged Service Access

Filter access panel and supply fan access panel shall be hinged for ease of unit service.

Condenser Coil Guards

Factory installed condenser vinyl coated wire mesh coil guards shall be available to provide full area protection against debris and vandalism.

Stainless Steel Drain Pans

Sloped stainless steel evaporator coil drain pans are durable, long-lasting and highly corrosion resistant.

Black Epoxy Coated Condenser Coil

The coil provides corrosion protection to condenser coils for seacoast application. The protection is a factory applied thermoset vinyl coating, bonded to normal aluminum fin stock. The uniform thickness of the bonded vinyl layer exhibits excellent corrosion protection in salt spray tests performed in accordance with ASTM B117.

Black Epoxy Coated Condenser Coil

The coil provides corrosion protection to condenser coils for seacoast application. The protection is a factory applied thermoset vinyl coating, bonded to normal aluminum fin stock. The uniform thickness of the bonded vinyl layer exhibits excellent corrosion protection in salt spray tests performed in accordance with ASTM B117.

Discharge Air Sensing

Provides true discharge air sensing in heating and cooling models. This sensor is a status indicator readable through Tracer, Tracker or LCI-R. Discharge air sensing is standard with Variable Air Volume (VAV) units, optional with Constant Volume (CV) units.

Clogged Filter Indication

This optional factory installed differential pressure switch allows dirty filter indication at the zone sensor with service LED. When closed, the dirty filter switch will light the service LED on the zone sensor and allow the unit to continue normal operation.

Roof Curb

The roof curb shall be designed to mate with the unit and provide support and a water tight installation when installed properly. The roof curb design shall allow field-fabricated rectangular supply/return ductwork to be connected directly to the curb when used with downflow units. Curb design shall comply with NRCA requirements. Curb shall ship knocked down for field assembly and include wood nailer strips.

Zone Sensors

Shall be provided to interface with the ReliaTel unit controls and shall be available in either manual, automatic programmable with night setback, with system malfunction lights or remote sensor options.

Remote Potentiometer

A remote potentiometer shall be available to remotely adjust the unit economizer minimum position.

High Temperature Thermostats

Field installed, manually resettable high temperature thermostats shall provide input to the unit controls to shut down the system if the temperature sensed at the return is 135 F or at the discharge 240 F.

Reference Enthalpy Kit

Field installed enthalpy kit shall provide inputs for economizer control based upon comparison of the outside air stream to a definable enthalpy reference point. May also be factory installed.

Comparative Enthalpy Kit

Field installed enthalpy kit shall provide inputs for economizer control based upon comparison of the enthalpies of the return and outdoor air streams. Also available factory installed.

LP Conversion Kit

Field installed conversion kit shall provide orifice(s) for simplified conversion to liquefied propane gas. No change of gas valve shall be required.

Mechanical Specifications

BAYCO2K005* — Wall-mounted CO_2 sensor has the ability to monitor space occupancy levels within the building by measuring the parts per million of CO_2 (Carbon Dioxide) in the air. As the CO_2 levels increase, the outside air damper modulates to meet the CO_2 space ventilation requirements.

BAYCO2K006* — Duct-mounted CO_2 sensor has the ability to monitor space occupancy levels within the building by measuring the parts per million of CO_2 (Carbon Dioxide) in the air. As the CO_2 levels increase, the outside air damper modulates to meet the CO_2 space ventilation requirements.

BAYICSI004* — Field-installed Trane Communication Interface (TCI).

BAYLTCI001* — Field-installed LonTalk Communication Interface (LCI-R) for Constant Volume (CV) units.

BAYLTCI004* — Field-installed LonTalk Communication Interface (LCI-R) for Variable Air Volume (VAV) units.

BAYSENS006* — Zone Sensor has one temperature setpoint lever, heat, off or cool system switch, fan auto or fan on switch. Manual changeover. These sensors are for CV units only.

BAYSENS008* — Zone Sensor has two temperature setpoint levers, heat, auto, off, or cool system switch, fan auto or fan on switch. Auto changeover. These sensors are used with CV units.

BAYSENS010* — Zone Sensor has two temperature set point levers, heat, auto, off, or cool system switch, fan auto or fan on switch. Status indication LED lights, System on, Heat, Cool, and Service are provided. These sensors are used with CV units.

BAYSENS013* — Zone temperature sensor with timed override buttons used with Tracer™ Integrated Comfort system.

BAYSENS014* — Zone temperature sensor with local temperature adjustment control and timed override buttons used with Tracer Integrated Comfort system. May also be used for Morning Warm-up setpoint and sensor.

BAYSENS016* — Temperature Sensor is a bullet or pencil type sensor that could be used for temperature input such as return air duct temperature.

BAYSENS017* — Remote Sensor can be used for remote zone temperature sensing capabilities when zone sensors are used as remote panels or as a morning warm-up sensor for use with VAV units or as a zone sensor with Tracer Integrated Comfort system.

BAYSENS019* and BAYSENS020* — Electronic programmable sensors with auto or manual changeover with seven day programming. Keyboard selection of heat, cool, auto fan or on. All programmable sensors have System on, Heat, Cool, Service LED/LCD indicators as standard. Night setback sensors have two occupied, and two unoccupied programs per day. Sensors are available for CV zone temperature control and VAV zone temperature control.

BAYSENS021* — Zone Sensor with supply air single temperature setpoint and AUTO/OFF system switch. Status indication LED lights, System ON, Heat, Cool, and Service are provided. Sensors are available to be used with VAV units.

BAYSTAT023* — Remote Minimum Position Potentiometer is used to remotely specify the minimum economizer position.

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