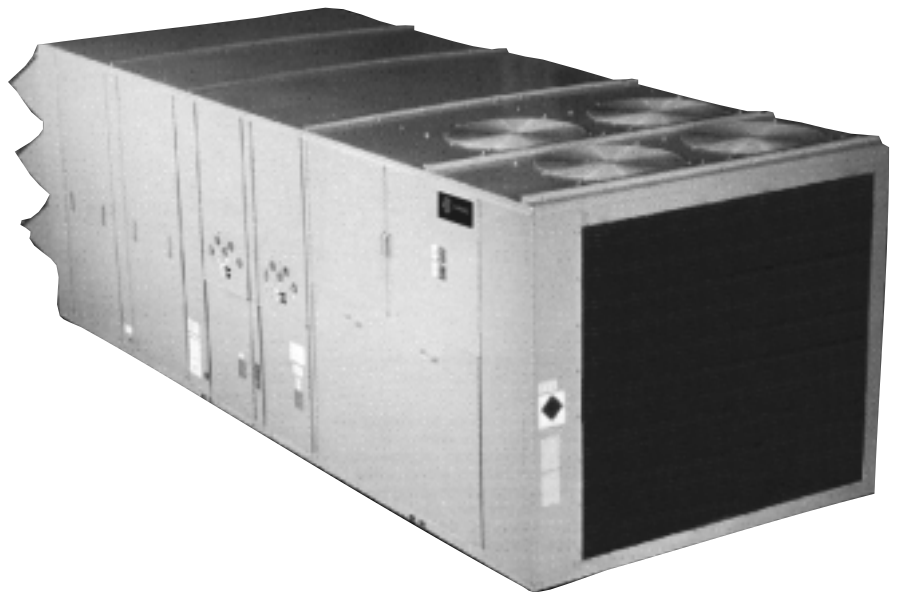




Packaged Rooftop Air Conditioners

27 ½ to 50 Ton - 60 Hz
Voyager™ Commercial



October 2001

RT-PRC007-EN



Introduction

Packaged Rooftop Air Conditioners

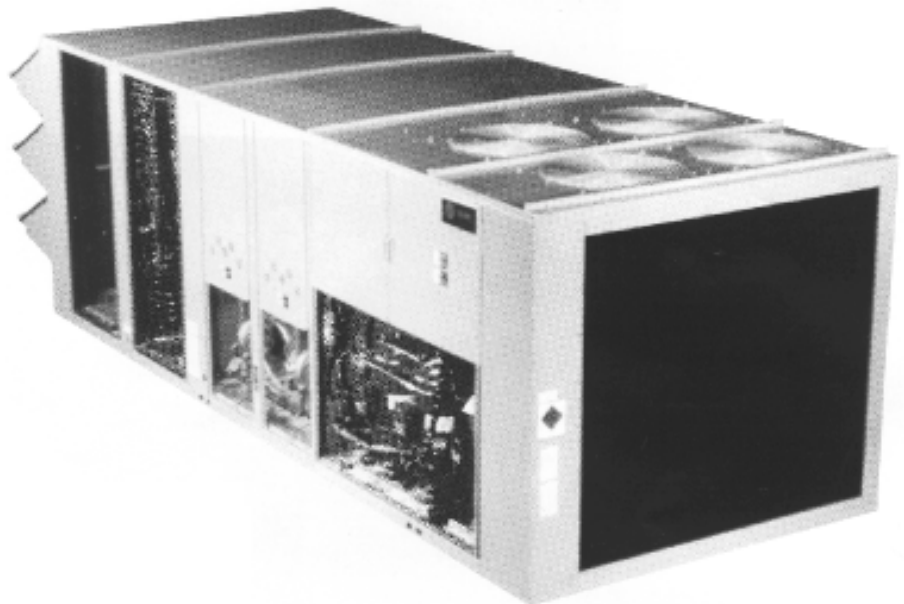
Through the years, Trane has designed and developed the most complete line of Packaged Rooftop products available in the market today. Trane was the first to introduce the Micro —microelectronic unit controls— and again moved ahead with the introduction of the Voyager Commercial products.

The Voyager Commercial line offers 27½ to 50 ton models; five sizes to meet the changing demands of the commercial rooftop market.

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

Voyager Commercial features cutting edge technologies like the reliable 3-D® Scroll compressors, Trane engineered microprocessor 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®.



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Features and Benefits

Standard Features

- Factory installed and commissioned microelectronic 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

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
- Integrated Comfort™ System Control Option
- Ventilation Override
- Hinged Service Access
- Factory installed condenser coil guards
- Black epoxy coated condenser coil
- Sloped stainless steel evaporator coil drain pans

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.

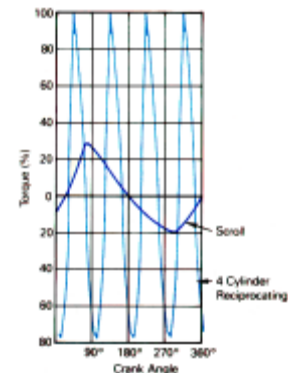
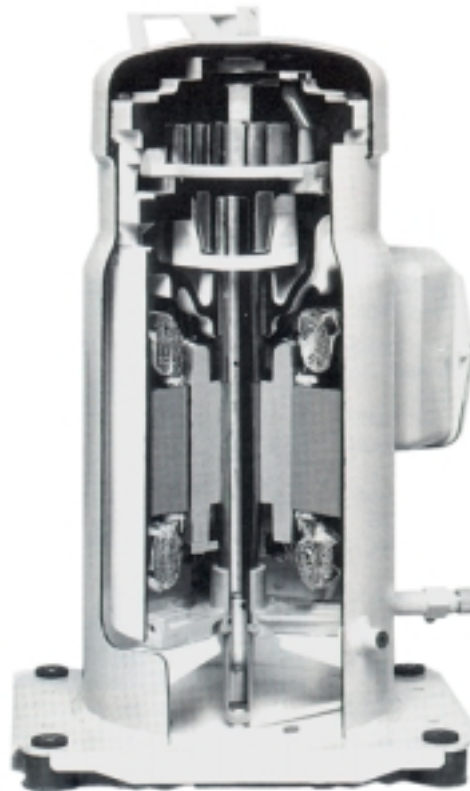
Suction Gas Cooled Motor

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.

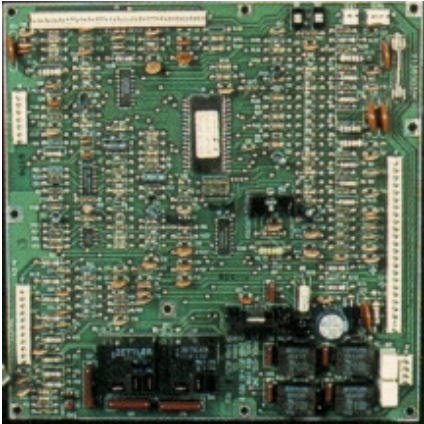


One of two matched scroll plates — the distinguishing feature of the scroll compressor.

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

Features and Benefits

Quality and Reliability



Micro Controls

The Micro provides unit control for heating, cooling and ventilating utilizing input from sensors that measure outdoor and indoor temperature.

Quality and Reliability are enhanced through the use of time-tested micro-processor controls and logic.

The Micro:

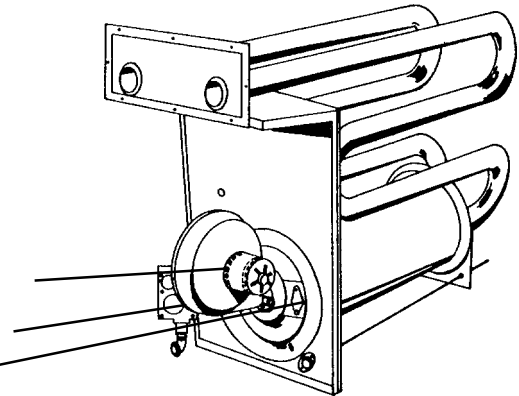
- prevents the unit from short cycling, considerably improving compressor life.
- ensures that the compressor will run for a specific amount of time which allows oil to return for better lubrication, enhancing the reliability of the commercial compressor.

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

Forced Combustion Blower

Negative Pressure Gas Valve

Hot Surface Ignitor



Drum and Tube Heat Exchanger

Drum and Tube Heat Exchanger

The drum and tube heat exchanger is designed for increased efficiency and reliability and has utilized improved technology incorporated in the large roof top commercial units for almost 20 years.

The heat exchanger is manufactured using 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 2¹/₂ 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 our unique safety features.

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.

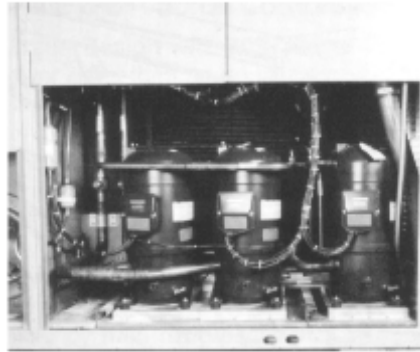
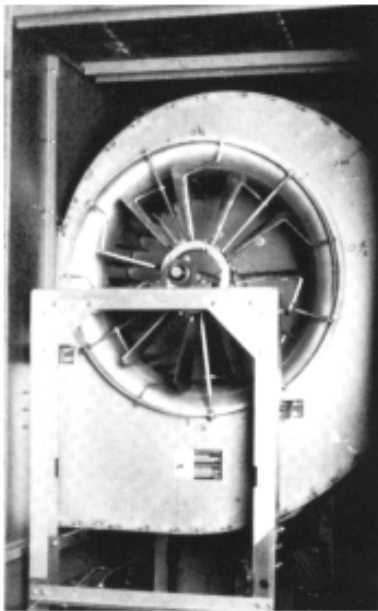
The hot surface ignitor is a gas ignition device which doubles as a safety device utilizing a continuous test to prove the flame. The design is cycle tested at the factory for quality and reliability.

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

Features and Benefits

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.



Excellent Part-Load Efficiency

The Scroll compressor's unique design 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.

Ease of Installation

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 time isn't spent changing to high static oversized motors.

Single Point Power

A single electrical connection powers the unit.

Micro™

The function of the Micro replaces the need for field installed anti-shortcycle timer and time delay relays. The Micro ensures that these controls are integral to 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.



Features and Benefits

Easy to Service

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:

A Simpler Design

The Voyager design uses fewer parts than previous units. Since it is simpler in design, it is easier to diagnose.

Micro

The Micro 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, the Micro is operational. The light indicates that the Micro is functioning properly.

The Micro features expanded diagnostic capabilities when utilized with Trane's 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).

Easy Access Low Voltage Terminal Board

Voyager's Low Voltage Terminal Board is external to the electrical control cabinet. It is extremely easy to locate and attach the thermostat wire. This is another cost and time-saving installation feature.

Value

Low Ambient Cooling

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

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.

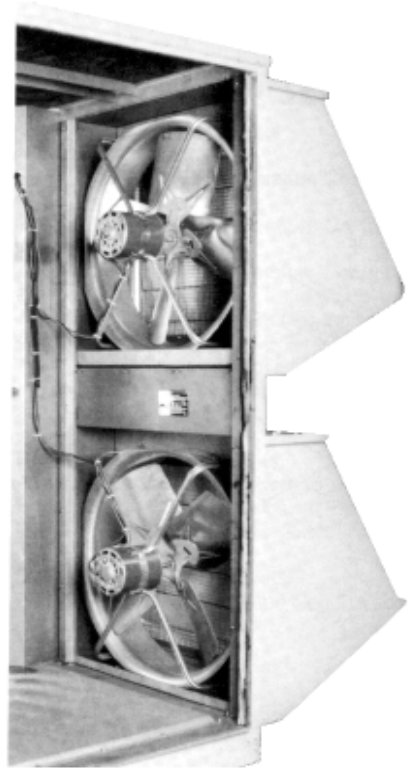
Micro Benefits

The Micro in the Voyager units has built-in anti-short-cycle timer, time delay relay and minimum "on" time controls. These controls are functions of the Micro and are factory tested to assure proper operation.

The Micro 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 feature of the Micro. It functions constantly as the Micro and zone sensor work together in harmony to provide tighter comfort control than conventional electro-mechanical thermostats.



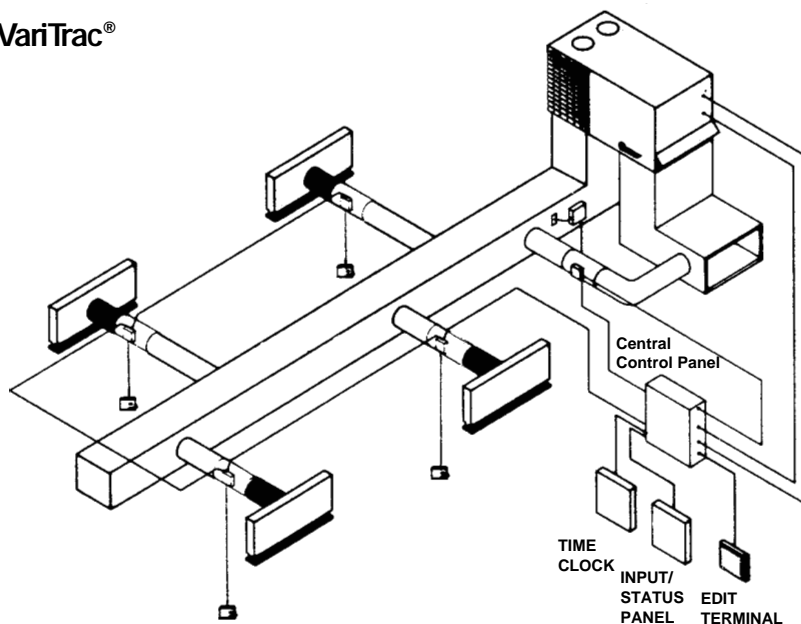
Horizontal Discharge with Power Exhaust Option

Features and Benefits

VariTrac

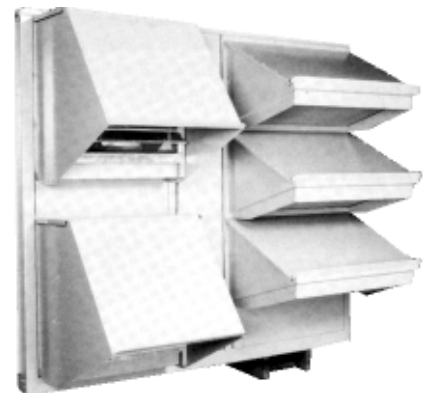
Trane's changeover VAV System for light commercial applications is also available. Coupled with Voyager Commercial, it provides the latest in technological advances for comfort management systems and can allow thermostat control in every zone served by VariTrac™.

VariTrac®



Downflow and Horizontal Economizers

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



Trane Communication Interface (TCI)

Available factory or field installed. This module when applied with the Micro easily interfaces with Trane's Integrated Comfort™ System.

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.

Trane factory built roof curbs

Available for all units.

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

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

$Tsp = 1.50 \text{ inches} / 0.86 = 1.74 \text{ inches tsp.}$

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

$Bhp = 6.93 \times 0.86 = 5.96$

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.

Application Considerations

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.

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's 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

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 = $258.4 MBh \div (1.085 \times 12,000 cfm) = 19.8 F$

Supply air dry bulb: 81.5 - 19.8 = 61.7.

Unit enthalpy difference = $361 \div (4.5 \times 12,000) = 6.7$

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/ft³. 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.

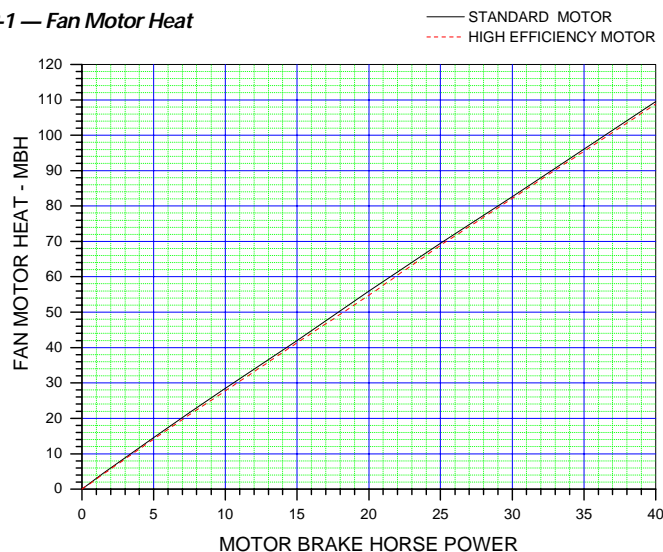
Unit Electrical Requirements

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. Use the model number nomenclature on page 14.

Figure SP-1 — Fan Motor Heat





General Data

Table GD-1 — General Data — 27 1/2 - 30 Tons

	27 1/2Ton		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 Connection Pipe Size (in.)	3/4	1	3/4	1
Electric Heat				
KW Range ⁵	27-90		27-90	
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	1/750/10.00		1/750/10.00	
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:

- 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.
- 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.
- Steady State Efficiency is rated in accordance with DOE test procedures.
- Refrigerant charge is an approximate value. For a more precise value, see unit nameplate and service instructions.
- Maximum KW @ 208V = 41, @ 240V = 54.
- Filter dimensions listed are nominal. For actual filter and rack sizes see the Unit Installation, Operation, Maintenance Guide.



General Data

Table GD-2— General Data — 35-40 Ton

	35 Ton		40 Ton	
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 Connection Pipe Size (in.)	³ / ₄	1	³ / ₄	1
Electric Heat				
KW Range ⁵	27-90		41-108	
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:

- 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.
- 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.
- Steady State Efficiency is rated in accordance with DOE test procedures.
- Refrigerant charge is an approximate value. For a more precise value, see unit nameplate and service instructions.
- Maximum KW @ 208V = 41, @ 240V = 54.
- Filter dimensions listed are nominal. For actual filter and rack sizes see the Unit Installation, Operation, Maintenance Guide.

General Data

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 Connection Pipe Size (in.)	3/4		1
Electric Heat			
KW Range ⁵		41-108	
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	

Notes:

- 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.
- 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.
- Steady State Efficiency is rated in accordance with DOE test procedures.
- Refrigerant charge is an approximate value. For a more precise value, see unit nameplate and service instructions.
- Maximum KW @ 208V = 41, @ 240V = 54.
- Filter dimensions listed are nominal. For actual filter and rack sizes see the Unit Installation, Operation, Maintenance Guide.

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.



Performance Adjustment Factors

Table PD-1— Enthalpy of Saturated AIR

Wet Bulb Temperature	Btu Per Lb.
40	15.23
41	15.70
42	16.17
43	16.66
44	17.15
45	17.65
46	18.16
47	18.68
48	19.21
49	19.75
50	20.30
51	20.86
52	21.44
53	22.02
54	22.62
55	23.22
56	23.84
57	24.48
58	25.12
59	25.78
60	26.46
61	27.15
62	27.85
63	28.57
64	29.31
65	30.06
66	30.83
67	31.62
68	32.42
69	33.25
70	34.09
71	34.95
72	35.83
73	36.74
74	37.66
75	38.61

Figure PD-1 — Air Density Ratios

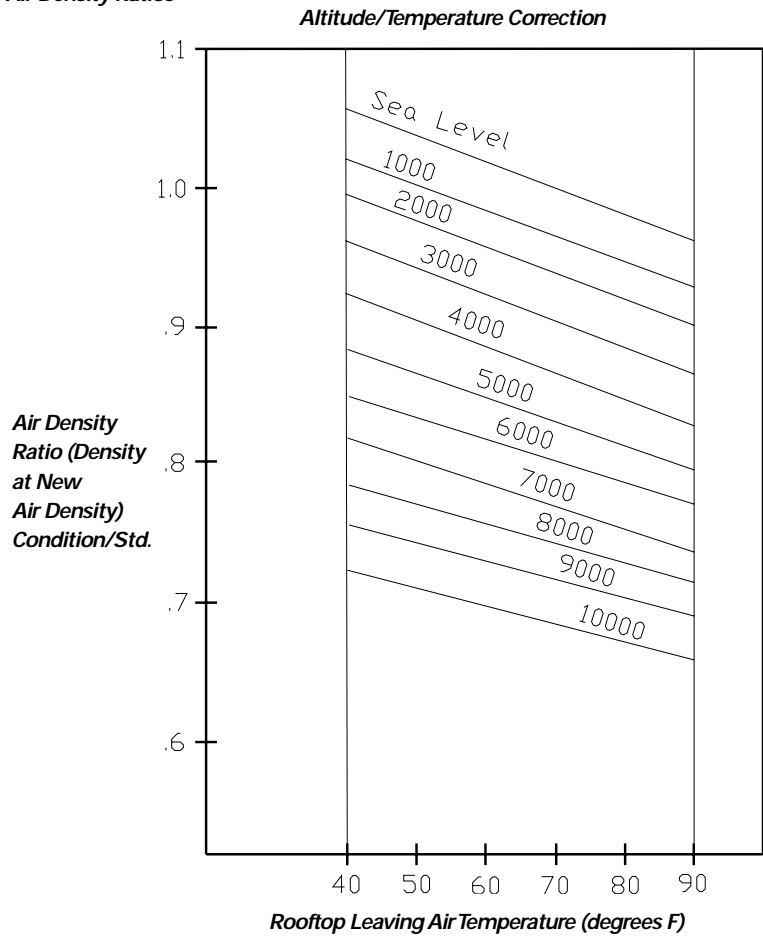


Table PD-2 — Cooling Capacity Altitude Correction Factors

	Altitude (Ft.)							
	Sea Level	1000	2000	3000	4000	5000	6000	7000
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	114 F	113 F	112 F	111 F	110 F	109 F	108 F

Note:
SHR = Sensible Heat Ratio

Table PD-3 — Gas Heating Capacity Altitude Correction Factors

	Altitude (Ft.)						
	Sea Level To 2000	2001 To 2500	2501 To 3500	3501 To 4500	4501 To 5500	5501 To 6500	6501 To 7500
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.



Performance Data

Table PD-4 — 27 1/2 Ton Gross Cooling Capacities (MBh)

CFM		Ambient Temperature — Deg F																							
		85						95						105						115					
		Ent DB		61		67		73		61		67		73		61		67		73		61		67	
		Entering Wet Bulb Temperature — Deg 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
8000	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
	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
9000	75	299	242	331	189	367	133	285	235	316	182	351	126	272	222	301	175	334	119	257	219	286	168	316	112
	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
10000	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
	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
11000	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
	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
12100	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
	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)

CFM		Ambient Temperature — Deg F																							
		85						95						105						115					
		Ent DB		61		67		73		61		67		73		61		67		73		61		67	
		Entering Wet Bulb Temperature — Deg 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
9000	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
	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
10000	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
	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
11000	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
	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
12000	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
	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
13200	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
	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

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

CFM		Ambient Temperature — Deg F																							
		85						95						105						115					
		Ent DB		61		67		73		61		67		73		61		67		73		61		67	
		Entering Wet Bulb Temperature — Deg 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
10500	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
	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
12000	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
	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
13000	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
	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
14000	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
	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
14400	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
	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)

CFM		Ambient Temperature — Deg F																							
		85						95						105						115					
		Ent DB		61		67		73		61		67		73		61		67		73		61		67	
		Entering Wet Bulb Temperature — Deg 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
12000	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
	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
14000	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
	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		
15000	75	482	411	530	317	586	211	459	398	505	305	558	199	436	385	479	292	530	187	411	371	452	279		
	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		
16000	75	488	425	536	321	591	213	465	412	510	309	563	202	441	399	484	296	534	189	416	385	456	282		
	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		
17600	75	497	448	543	335	598	217	473	435	517	322	570	206	449	422	490	308	541	193	424	408	462	295		
	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

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

Ent DB		Ambient Temperature — Deg F																								
		85						95						105						115						
		Entering Wet Bulb Temperature — Deg F																								
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	
15000	75	556	459	614	356	679	244	529	444	585	342	647	230	502	429	555	327	614	216	475	414	524	312			
	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			
17000	75	570	491	627	373	691	250	543	476	597	359	659	236	515	460	566	344	625	222	486	445	533	328			
	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							
18000	75	576	506	633	386	696	252	548	491	602	371	663	239	520	476	570	356	629	224	491	460	538	340			
	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							
19000	75	581	522	638	391	701	255	554	507	607	377	668	241	525	491	575	362	633	227	496	475	542	345			
	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							
20000	75	587	537	642	400	705	257	559	522	611	386	672	244	530	506	579	371	637	230	501	490	545	353			
	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

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	350,000/250,000	283,500/202,500	10-40
	YCD/YCH420**L			
27½-35	YCD/YCH330**H	600,000/425,000	486,000/344,500	25-55
	YCD/YCH360**H			
	YCD/YCH420**H			
40-50	YCD/YCH480**L	400,000/300,000	324,000/243,000	5-35
	YCD/YCH480**H			
40-50	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

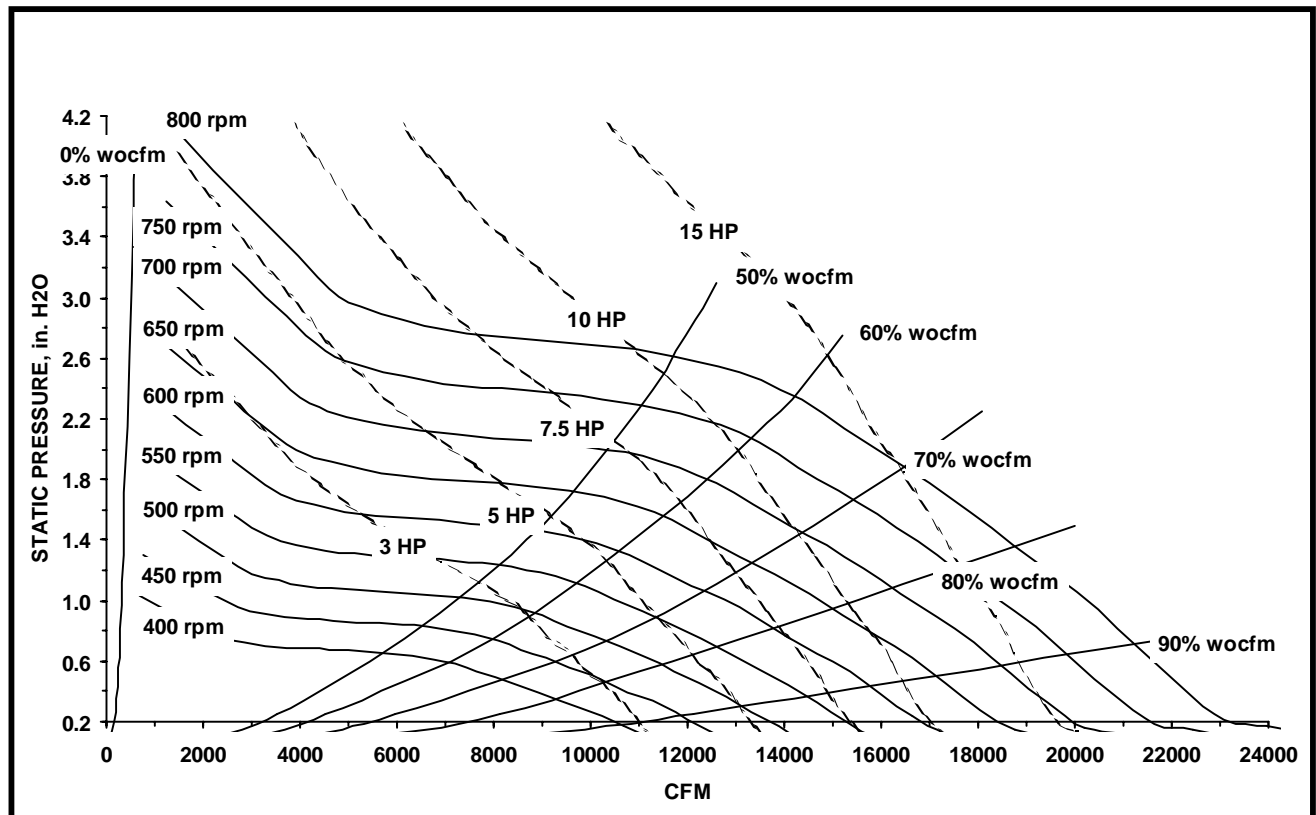
Table PD-12 — Supply Fan Performance — 27½ - 35 Ton

SCFM	Static Pressure (in. wg) ¹																	
	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00		2.25	
RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	
8000	341	1.39	401	1.85	451	2.30	501	2.84	552	3.45	599	4.11	644	4.80	686	5.51	726	6.24
8500	355	1.60	412	2.08	462	2.58	508	3.09	556	3.71	602	4.38	646	5.09	688	5.83	728	6.59
9000	368	1.84	423	2.35	473	2.88	516	3.39	561	4.00	606	4.68	649	5.41	691	6.16	730	6.94
9500	382	2.10	435	2.64	484	3.20	526	3.73	568	4.32	611	5.00	653	5.74	694	6.51	732	7.31
10000	396	2.39	448	2.96	495	3.53	537	4.12	576	4.69	616	5.36	657	6.11	697	6.89	735	7.71
10500	410	2.71	461	3.31	506	3.89	549	4.53	585	5.10	623	5.76	662	6.50	701	7.30	738	8.13
11000	425	3.07	474	3.68	518	4.29	560	4.95	597	5.57	631	6.20	668	6.93	705	7.73	742	8.58
11500	440	3.46	488	4.08	530	4.72	571	5.39	608	6.08	641	6.71	676	7.41	711	8.20	747	9.06
12000	455	3.89	501	4.52	542	5.19	582	5.86	619	6.60	652	7.27	684	7.95	718	8.73	752	9.57
12500	470	4.34	515	4.98	555	5.69	593	6.38	630	7.13	664	7.87	694	8.55	726	9.30	758	10.14
13000	485	4.84	528	5.47	569	6.23	605	6.94	641	7.69	675	8.49	706	9.21	734	9.93	765	10.76
13500	501	5.36	542	6.00	582	6.79	617	7.54	652	8.29	686	9.12	717	9.91	745	10.65	774	11.43
14000	516	5.91	555	6.58	595	7.40	630	8.18	664	8.95	697	9.78	729	10.64	757	11.42	784	12.19
14500	532	6.51	570	7.20	609	8.04	643	8.85	676	9.65	708	10.48	740	11.38	768	12.22	795	13.02

Notes:

1. Fan performance table includes internal resistances of cabinet, and 2" standard filters. For other components refer to component static pressure drop table. Add the pressure drops from any additional components to the duct (external) static pressure, enter the table, and select motor bhp.
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.

Figure PD-2





Performance Data

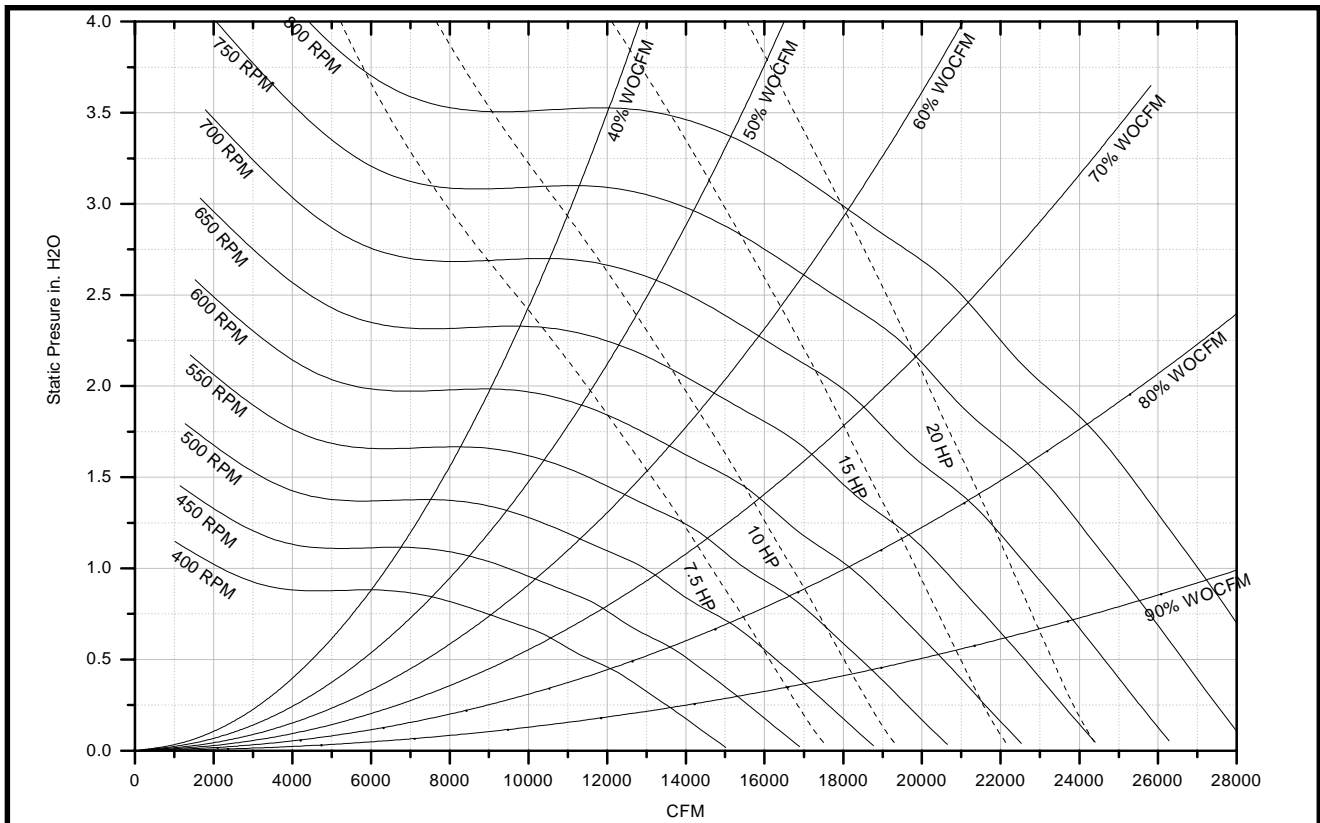
Table PD-13 — Supply Fan Performance — 40 and 50 Ton

SCFM	Static Pressure (in. wg) ¹																			
	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00		2.25		2.50	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
12000	365	3.02	408	3.66	448	4.32	485	4.99	522	5.70	556	6.44	588	7.20	620	7.96	652	8.75	682	9.56
13000	388	3.73	427	4.40	468	5.13	501	5.84	536	6.57	569	7.34	601	8.15	631	8.96	660	9.80	690	10.66
14000	412	4.54	448	5.26	486	6.03	520	6.80	551	7.57	584	8.36	615	9.21	643	10.06	672	10.96	699	11.86
15000	436	5.46	471	6.25	505	7.04	540	7.89	569	8.70	599	9.54	629	10.40	658	11.31	685	12.21	711	13.15
16000	460	6.53	493	7.36	525	8.17	559	9.08	588	9.96	615	10.83	643	11.73	672	12.66	699	13.60	724	14.58
17000	485	7.72	516	8.59	546	9.46	577	10.39	608	11.36	634	12.28	659	13.20	687	14.17	713	15.15	739	16.16
18000	509	9.06	540	9.97	568	10.91	596	11.84	627	12.88	654	13.86	678	14.84	702	15.83	728	16.85	753	17.88
19000	534	10.54	563	11.50	590	12.49	617	13.45	645	14.51	674	15.60	697	16.64	719	17.64	743	18.71	768	19.79
20000	560	12.18	587	13.18	613	14.24	638	15.25	664	16.31	692	17.45	717	18.57	739	19.66	760	20.74	783	21.85

Notes:

1. Fan performance table includes internal resistances of cabinet, and 2" standard filters. For other components refer to component static pressure drop table. Add the pressure drops from any additional components to the duct (external) static pressure, enter the table, and select motor bhp.
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-3





Performance Data

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

Nominal Tons	CFM Std Air	Heating System					ID Coil Adder	Filters ²		Inlet Guide	
		Gas Heat		Electric Heat ³		High Eff. Filters		Vanes	Economizer		
		Low	High	1 Element	2 Element	2"				4"	
27½	8000	0.08	0.06	0.05	0.06	0.00	0.04	0.03	0.05	0.04	
	9000	0.10	0.08	0.07	0.07	0.00	0.05	0.04	0.07	0.04	
	10000	0.13	0.10	0.08	0.09	0.00	0.06	0.05	0.08	0.05	
	11000	0.15	0.12	0.10	0.11	0.00	0.08	0.05	0.10	0.06	
	12000	0.18	0.14	0.12	0.13	0.00	0.09	0.07	0.12	0.07	
30	9000	0.10	0.08	0.07	0.07	0.00	0.05	0.04	0.07	0.04	
	10000	0.13	0.10	0.08	0.09	0.00	0.06	0.05	0.08	0.05	
	11000	0.15	0.12	0.10	0.11	0.00	0.08	0.05	0.10	0.06	
	12000	0.18	0.14	0.12	0.13	0.00	0.09	0.07	0.12	0.07	
	13000	0.21	0.16	0.14	0.15	0.00	0.11	0.08	0.14	0.09	
35	10500	0.14	0.11	0.09	0.10	0.11	0.07	0.05	0.09	0.06	
	11500	0.17	0.13	0.11	0.12	0.12	0.08	0.06	0.11	0.07	
	12500	0.20	0.15	0.13	0.14	0.14	0.10	0.07	0.13	0.08	
	13500	0.23	0.18	0.15	0.16	0.16	0.11	0.08	0.15	0.10	
	14500	0.26	0.20	0.18	0.19	0.18	0.13	0.10	0.18	0.11	
40	12000	0.01	0.03	0.08	0.13	0.00	0.09	0.07	0.04	0.07	
	13000	0.01	0.04	0.10	0.15	0.00	0.11	0.08	0.05	0.08	
	14000	0.02	0.05	0.11	0.18	0.00	0.12	0.09	0.05	0.09	
	15000	0.02	0.05	0.13	0.20	0.00	0.14	0.10	0.06	0.10	
	16000	0.02	0.06	0.15	0.23	0.00	0.16	0.12	0.07	0.11	
50	17000	0.02	0.07	0.17	0.26	0.00	0.18	0.13	0.08	0.12	
	15000	0.02	0.05	0.13	0.20	0.12	0.14	0.10	0.06	0.10	
	16000	0.02	0.06	0.15	0.23	0.13	0.16	0.12	0.07	0.11	
	17000	0.02	0.07	0.17	0.26	0.15	0.18	0.13	0.08	0.12	
	18000	0.03	0.08	0.19	0.29	0.16	0.20	0.15	0.09	0.14	
	19000	0.03	0.08	0.21	0.32	0.18	0.23	0.16	0.10	0.16	
	20000	0.03	0.09	0.23	0.36	0.19	0.25	0.18	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

Table PD-15 — Supply Air Fan Drive Selections

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

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.



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 four times. If the overpressurization condition occurs on the fifth 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 0-10 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 Panel 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 Unitary Economizer Module, 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 Panel 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 Panel: 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

Controls

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 panel. 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 panel 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 Unitary Economizer Module (UEM), 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 UCP initiates the heating cycle by energizing the K5 relay, heating relay(s), and the ignition control module(s). The K5 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 ignition control module(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 UCP 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 UCP 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 UCP deenergizes the K5 relay, the heating relays, and the ignition control module, terminating the heat cycle.

Electric Heating

When heat is required, the UCP 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 UCP will cycle first stage heat on and off as required to maintain zone temperature. If first stage cannot satisfy



Controls

the requirement, the UCP will energize the second stage electric heat contactor(s) if the appropriate limits are closed. The UCP 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 UCP 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

An interface is required to use a conventional thermostat instead of a zone sensor module with the UCP. The Conventional Thermostat Interface (CTI) is connected between conventional thermostat and the UCP and 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.

Control Sequences of Operation Common to Both VAV and CV Units

Ventilation override (VOM)

Ventilation override allows an external system to assume control of the unit for the purpose of exhaust or pressurization. There are two inputs associated with ventilation override, the initiate input and the select input. When the UCP senses a continuous closed condition on the initiate input at the low voltage terminal board the unit will begin ventilation override depending on the condition of the select input. The default condition of the select input is exhaust (input open). A closed select input will yield pressurization. The component state matrix for ventilation override is as follows:

System Component	Exhaust	Pressurization
Heat/Cool	off	off
IGV	closed	open
Supply Fan	off	on
Exhaust Fan	on	off
Outside Air Damper	closed	open
Return Air Damper	open	closed
VAV Boxes	n/a	open

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 Unitary Economizer Module (UEM) 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 UCP 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

$MCA = (1.25 \times LOAD1) + LOAD2 + LOAD4$

$MOP = (2.25 \times LOAD1) + LOAD2 + LOAD4$

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.

$RDE = (1.5 \times LOAD1) + LOAD2 + LOAD4$

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.

$DSS = 1.15 \times (LOAD1 + LOAD2 + LOAD4)$
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 were 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).

For units using heaters less than 50 kw.

$MCA = 1.25 \times (LOAD1 + LOAD2 + LOAD4) + (1.25 \times LOAD3)$

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

$MCA = 1.25 \times (LOAD1 + LOAD2 + LOAD4) + LOAD3$

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

$MOP = (2.25 \times LOAD1) + LOAD2 + LOAD3 + LOAD4$

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.

$RDE = (1.5 \times LOAD1) + LOAD2 + LOAD3 + LOAD4$

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.

$DSS = 1.15 \times (LOAD1 + LOAD2 + LOAD3 + LOAD4)$

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 — Ton 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

Table ED-2 — 27½-50 Ton Electrical Service Sizing Data¹

Model	Electrical Characteristics	Allowable Voltage Range	Compressor		Supply		Fan Motors			Exhaust			
			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	75	22.3/21.5	3	1.1	70	2	1.0	6.7
	230/60/3	207-253		41.9/62.8	247/376	10.0	29.7/29.0						
	460/60/3	414-506		18.1/27.3	95/142	7.5	19.6/18.8						
	575/60/3	517-633		14.6/21.8	76/114	10.0	26.4/25.2						
TC/TE/YC*360	208/60/3	187-229	2/15	62.8	409	75	22.3/21.5	3	1.1	70	2	1.0	6.7
	230/60/3	207-253		62.8	376	10.0	29.7/29.0						
	460/60/3	414-506		27.3	142	7.5	19.6/18.8						
	575/60/3	517-633		21.8	114	10.0	26.4/25.2						
TC/TE/YC*420	208/60/3	187-229	2/15	62.8	409	75	22.3/21.5	3	1.1	70	2	1.0	6.7
	230/60/3	207-253		62.8	376	10.0	29.7/29.0						
	460/60/3	414-506		27.3	142	7.5	19.6/18.8						
	575/60/3	517-633		21.8	114	10.0	26.4/25.2						
TC/TE/YC*480	208/60/3	187-229	2/15,1/10	62.8/62.8/41.9	409/409/269	75	22.3/21.5	4	1.1	70	2	1.0	6.7
	230/60/3	207-253		62.8/62.8/41.9	376/376/247	10.0	29.7/29.0						
	460/60/3	414-506		27.3/27.3/18.1	142/142/95	7.5	19.6/18.8						
	575/60/3	517-633		21.8/21.8/14.6	114/114/76	10.0	26.4/25.2						
TC/TE/YC*600	208/60/3	187-229	3/15	62.8	409	10.0	29.7/29.0	4	1.1	70	2	1.0	6.7
	230/60/3	207-253		62.8	376	15.0	44.4/41.5						
	460/60/3	414-506		27.3	142	20.0	58.7/56.1						
	575/60/3	517-633		21.8	114	10.0	26.4/25.2						

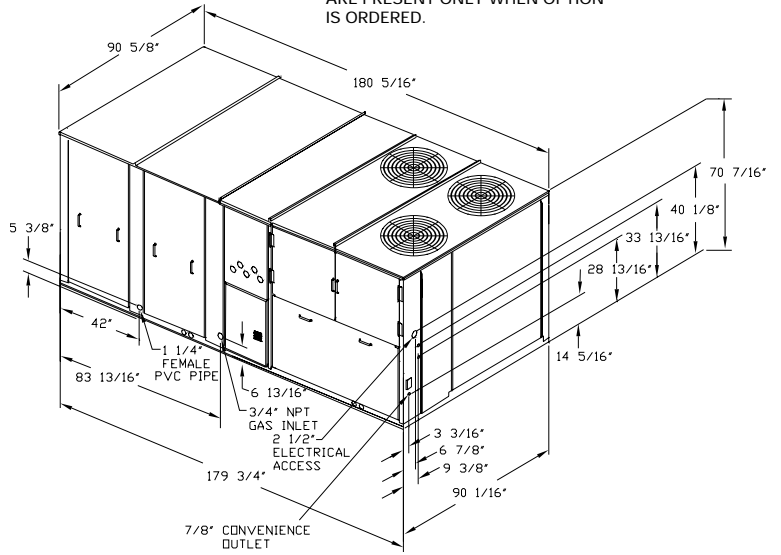
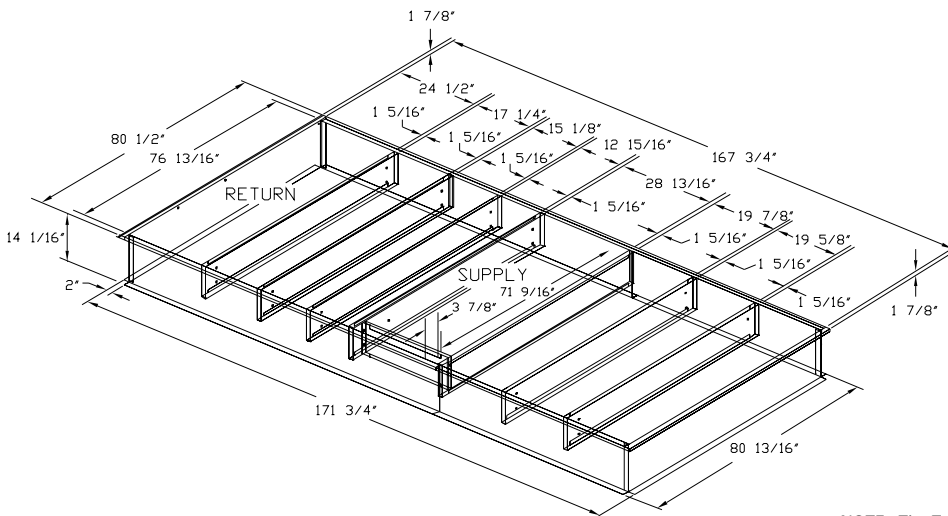
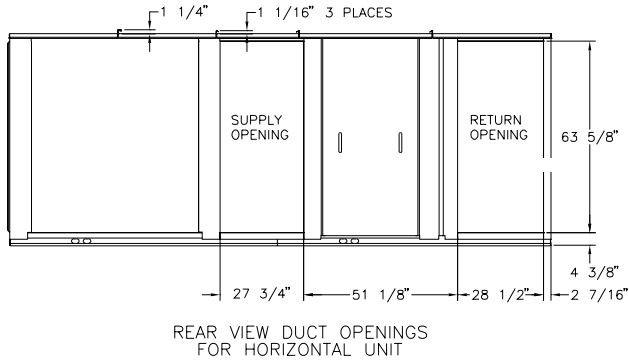
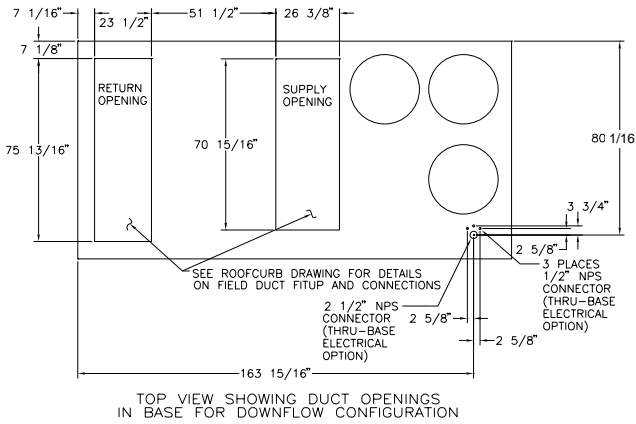
Notes:

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

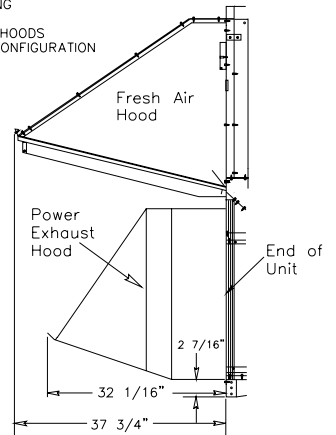
Dimensional Data

Figure DD-1 — 27 1/2 - 35 Tons (TC, TE, YC Low Heat)

- NOTES:**
 1. ALL DIMENSIONS INCHES.
 2. THRU-BASE ELECTRICAL LOCATIONS ARE PRESENT ONLY WHEN OPTION IS ORDERED.



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

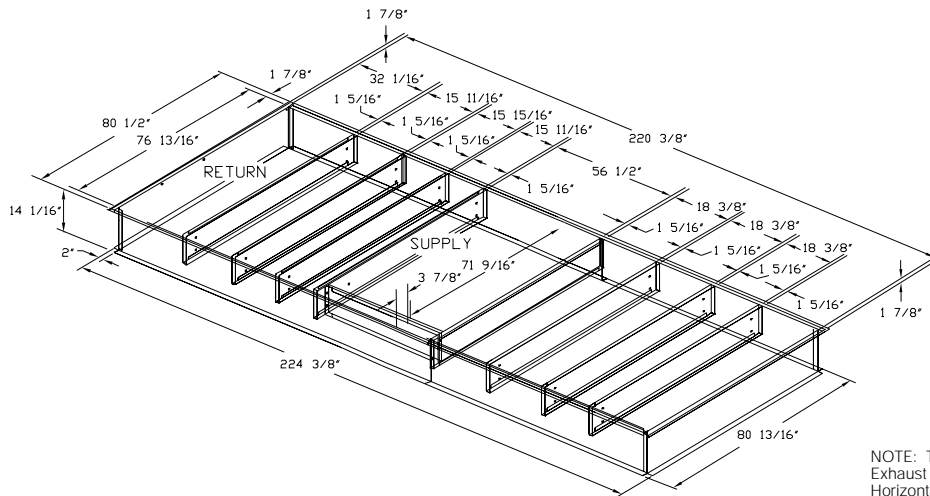
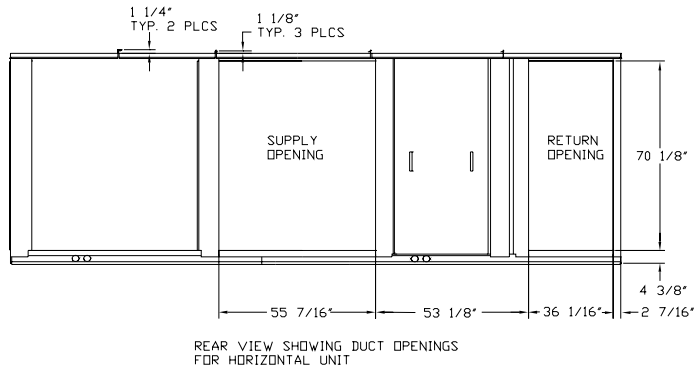
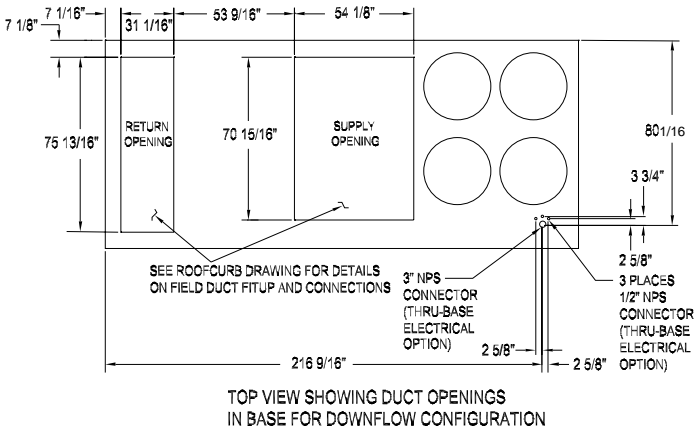


SIDE VIEW SHOWING POWER EXHAUST HOODS FOR HORIZONTAL CONFIGURATION

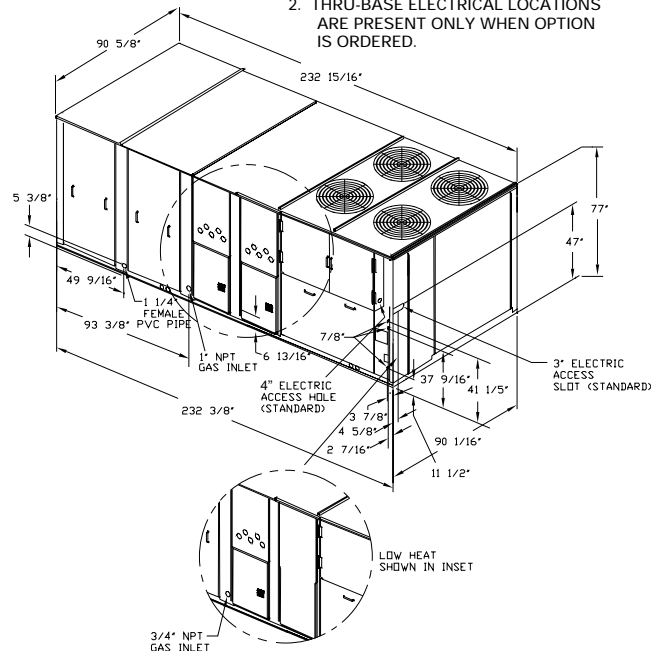
NOTE: The Two Horizontal Power Exhaust Hoods and the three Horizontal Fresh Air Hoods are located side by side. The Fresh Air Hoods (not shown) extend only 23 15/16" from the end of the unit.

Dimensional Data

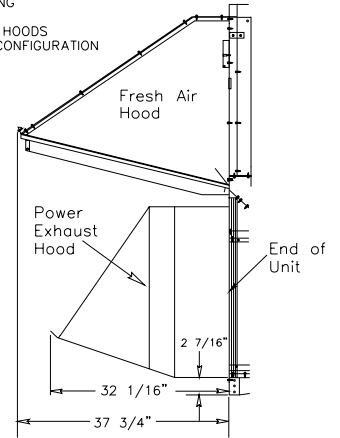
Figure DD-3 — 40-50 Tons (TC, TE, YC Low & High Heat)



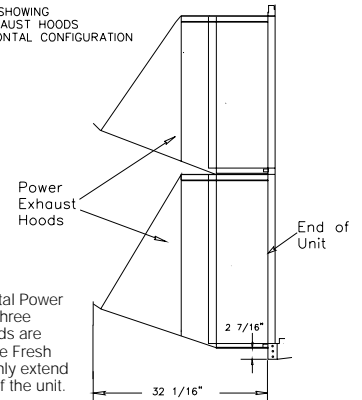
- NOTES:
 1. ALL DIMENSIONS INCHES.
 2. THRU-BASE ELECTRICAL LOCATIONS ARE PRESENT ONLY WHEN OPTION IS ORDERED.



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



SIDE VIEW SHOWING POWER EXHAUST HOODS FOR HORIZONTAL CONFIGURATION



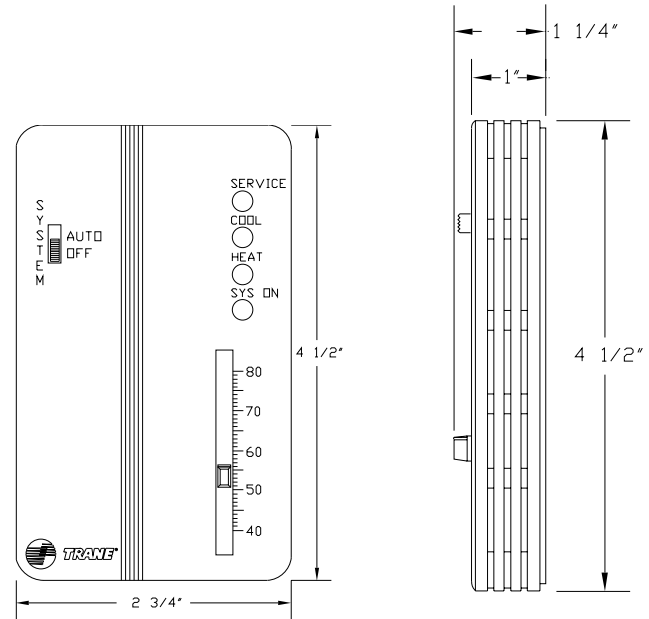
NOTE: The Two Horizontal Power Exhaust Hoods and the three Horizontal Fresh Air Hoods are located side by side. The Fresh Air Hoods (not shown) only extend 23 15/16" from the end of the unit.

Dimensional Data

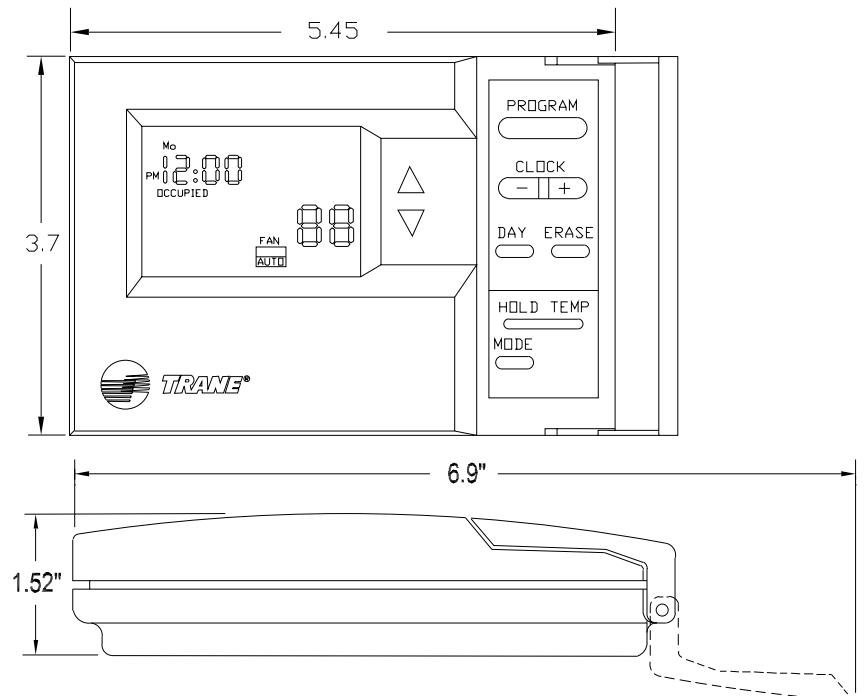
(Variable Air Volume VAV)

Field Installed Sensors

SINGLE SETPOINT SENSOR WITH SYSTEM FUNCTION LIGHTS (BAYSENS021*)



PROGRAMMABLE NIGHT-SETBACK SENSOR (BAYSENS020*)



Note:

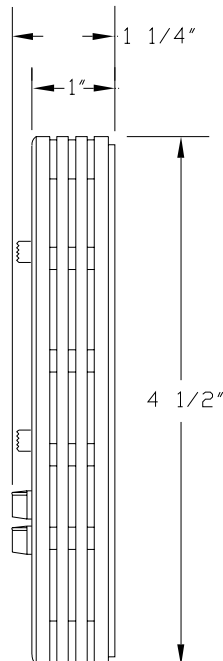
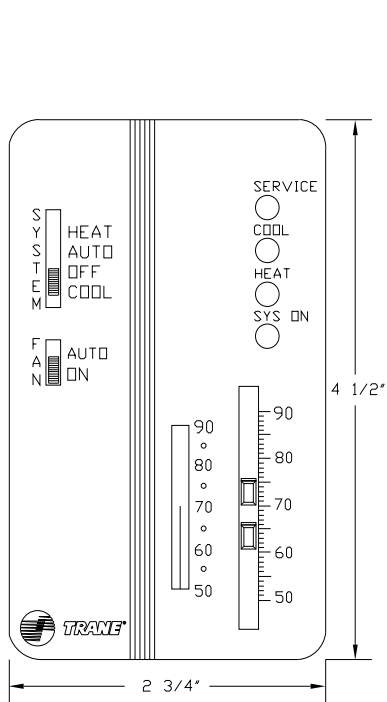
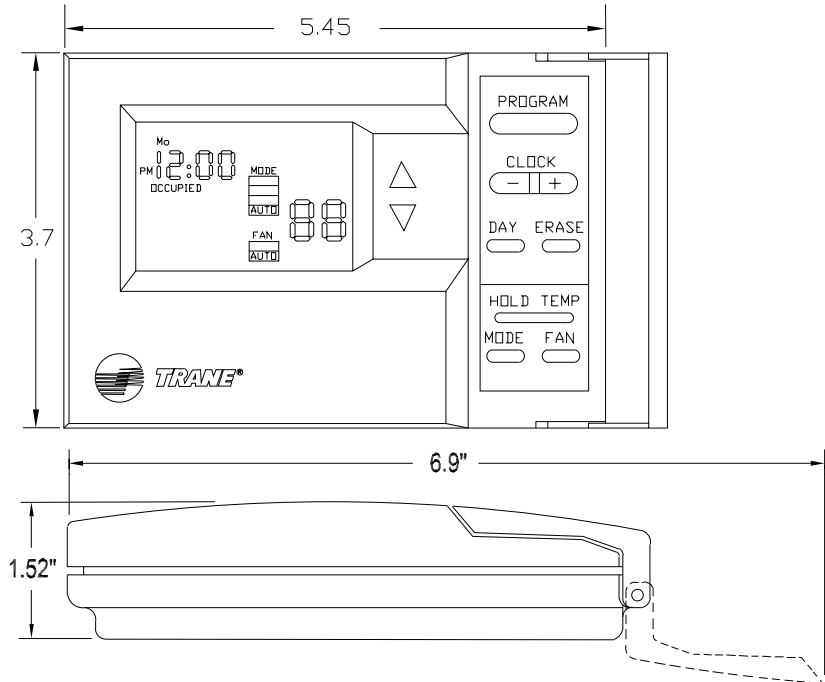
1. Remote sensors are available for use with all zone sensors to provide remote sensing capabilities.

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.

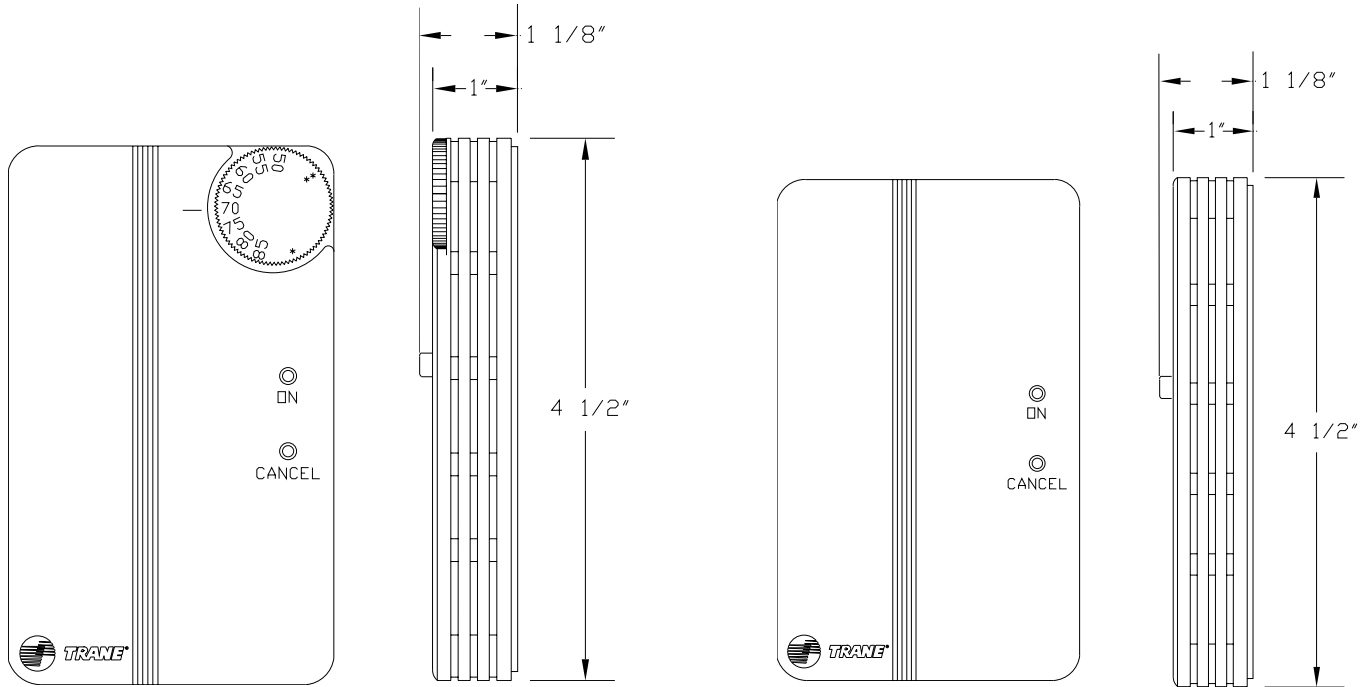
Dimensional Data

(CV and VAV)

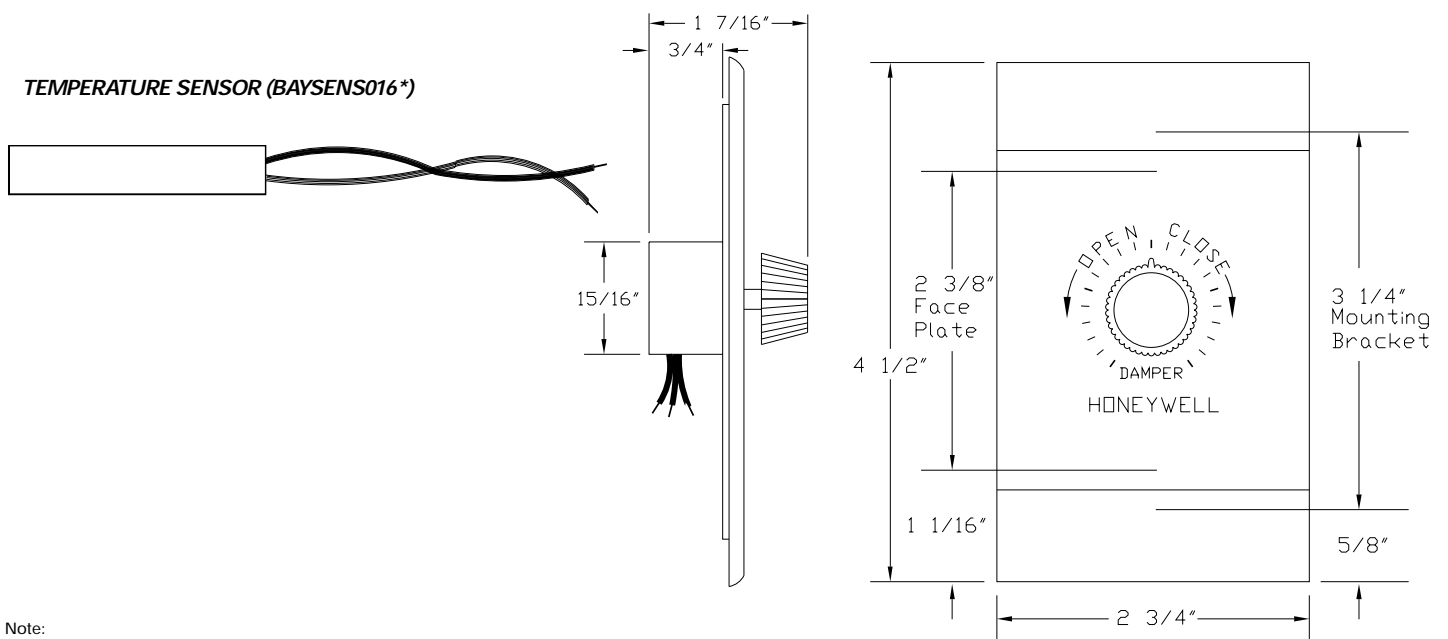
Integrated Comfort™ System Sensors

ZONE TEMPERATURE SENSOR W/TIMED OVERRIDE BUTTON AND LOCAL SETPOINT ADJUSTMENT (BAYSENS014)*

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



REMOTE MINIMUM POSITION POTENTIOMETER CONTROL (BAYSTAT023*)



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



Weights

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

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

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-2 — Point Loading Average Weight¹

A	B	C	D	E	F
1196	1159	673	710	673	710
1209	1171	680	718	680	718
1238	1199	696	735	696	735
1242	1203	699	737	699	737
1265	1226	712	751	712	751
1269	1230	714	754	714	754
1527	1480	859	907	859	907
1532	1485	862	910	862	910
1598	1549	899	949	899	949
1602	1553	902	951	902	951

Note:

1. 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.

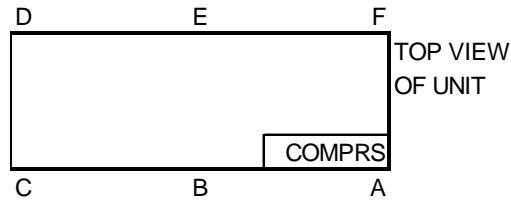


Table W-3 — Component Weights

Unit Model	Weights of Optional Components												Roof Curb Weights	
	Barometric Relief	Power Exhaust	Hi-Static/Hi-Eff Supply Fan Motors (2)	0-25% Manual Damper	Econo	Inlet Guide Vanes	Variable Frequency Drives (VFD's)		Service Valves	Thru-the-Base Electric	Non-Fused Disconnect Switch	Factory GFI with Disconnect Switch	Lo	Hi
**D330	110	165	120	50	260	55	85	115	11	6	30	85	310	330
**H330	145	200	120	50	285	55	85	115	11	6	30	85	310	330
**D360	110	165	120	50	260	55	85	115	11	6	30	85	310	330
**H360	145	200	120	50	285	55	85	115	11	6	30	85	310	330
**D420	110	165	120	50	260	55	115	150	11	6	30	85	310	330
**H420	145	200	120	50	285	55	115	150	11	6	30	85	310	330
**D480	110	165	125	50	290	70	115	150	18	6	30	85		365
**H480	145	200	125	50	300	70	115	150	18	6	30	85		365
**D600	110	165	125	50	290	70	115	150	18	6	30	85		365
**H600	145	200	125	50	300	70	115	150	18	6	30	85		365

Table W-4 — Minimum Operating Clearances for Unit Installation

	Econo/Exhaust End	Condenser Coil ² End / Side	Service Side Access
Single Unit ¹	6 Feet	8 Feet / 4 Feet	4 Feet
Multiple Unit ^{1,3}	12 Feet	16 Feet / 8 Feet	8 Feet

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 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 $\frac{3}{8}$ " copper tubes mechanically bonded to lanced aluminum plate fins. Evaporator coils shall be $\frac{1}{2}$ " 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 unitary control processor (UCP). 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 using corrosion resistant steel components. 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. Microprocessor controls shall be provided for all 24 volt control functions. The resident control algorithms shall



Mechanical Specifications

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. A centralized microprocessor 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 microprocessor. 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 2-10VDC signal from the unit microprocessor 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.

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.

LonTalk Communication Interface

Available either field or factory-installed for constant volume units. When installed on a constant volume unit, this LonTalk board will allow the unit to communicate as a Trane Comm5 device or directly with generic LonTalk Network Building Automation System Controls.

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.

Mechanical Specifications

Accessories

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.

Trane Communication Interface (TCI)

Shall be provided to interface with the Trane Integrated Comfort™ System and shall be available 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:

UCP 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 UCP
- 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

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

Zone Sensors

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

Conventional Thermostat Interface (CTI)

This field installed circuit board shall provide interface with electromechanical thermostats or automation systems. Not available with VAV system control.

Differential Pressure Switches

This field installed option allows dirty filter indication. The dirty filter switch will light the Service LED on the zone sensor and will allow continued unit operation.

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.



Mechanical Specifications

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.

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* & 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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