TRANE®

Rooftop Air Handlers

IntelliPak™ II Air Handlers

Casing A-C, 16000-45000 CFM—60 Hz

November 2007

RT-PRC031-EN

Introduction

IntelliPak™ II Rooftop Air Handlers Designed For Today, Tomorrow and Beyond

Built on the legacy of Trane's industry leading IntelliPak, the IntelliPak II Air Handler platform is designed for the future. Expanded features and benefits, controls enhancements and world class energy efficiencies make the IntelliPak II the right choice for demanding applications today, and tomorrow.

Trane's Unit Control Module (UCM), an innovative, modular microprocessor control design, coordinates the actions of the IntelliPak II Air Handler for reliable and efficient operation and allows for standalone operation of the unit.

Access to the unit controls, via a Human Interface Panel, provides a high degree of control, superior monitoring capability, and unmatched diagnostic information.

Optionally, for centralized building control on-site, or from a remote location, IntelliPak II can be configured for direct communication with a Trane Tracer™ or a 3rd party building management system using LonTalk®. With either of these systems, the IntelliPak II operating status data and control adjustment features can be conveniently monitored from a central location.

The IntelliPak II has the technology and flexibility to bring total comfort to every building space.

Table of Contents

Features and Benefits

Standard Features

- 16000-45000 CFM (Casings A, B, C) industrial/ commercial Rooftop Air Handlers
- ASHRAE 90.1 - 2010 Efficiency Compliant
- IBC (International Building Code) Seismic compliance
- UL and CSA approval on standard options

Controls

- Fully integrated, factory installed/commissioned microelectronic controls
- Unit mounted Human Interface Panel with a 2 line x 40 character English display and a 16 function keypad that includes Custom, Diagnostics, and Service Test mode menu keys.
- CV or VAV control
- Daytime Warm-up (Occupied mode) on VAV models and Morning Warm-up operation on all units with heating options
- Freeze Stat coil frost protection on chilled water coil
- Supply air static over-pressurization protection on units with inlet guide vanes and VFD's.
- Supply airflow proving
- Exhaust/return airflow proving on units with exhaust or return fan options
- Supply air tempering control
- Supply air heating control on VAV units with heat: modulating gas, electric, steam and hot water
- Emergency stop input
- Mappable sensors and setpoint sources
- Occupied/Unoccupied switching
- Timed override activation

Cabinet

- Solid double wall construction with foam injected insulation

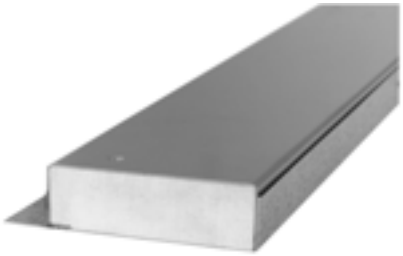


Figure 1. Solid Double Wall

- Single point latching, hinged access doors on control panel, filter, supply and exhaust/return fan section as well as gas heat section

Figure 2. Latching Access Door

- Flexible downflow and horizontal discharge/return paths
- Double sloped galvanized drain pans
- Extended casing, cooling only models
- Pitched roof
- Heavy-gauge, continuous construction base rails
- Meets salt spray testing in accordance to ASTM B117 Standard

Mechanical

- Airfoil supply fan—standard CFM
- Stainless steel flue stack on gas heat units
- Two-inch spring fan isolation standard

Figure 3. Spring Isolation

- Two-inch high efficiency throwaway filters Optional Features

Optional Features

Controls

- Demand control ventilation (energy saving CO_2 economizer control)
- Twinning of up to four units for applications on common supply and return ducts
- Variable frequency drive (VFD) control of supply/exhaust/return fan motor

Figure 4. Variable Frequency Drive

- Inlet guide vanes on airfoil supply fans (VAV only)
- Choose from three economizer control options: comparative enthalpy, reference enthalpy, dry bulb control
- LonTalk® Communication Interface module
- Generic BAS interfaces—0-5 VDC, and 0-10 VDC
- Remote Human Interface Panel (controls up to 4 units)
- Five ventilation override sequences
- High duct temperature thermostats

Chilled Water Cooling

- 2 to 8 row 5/8" OD chilled water coils
- 80, 108, 144, and 168 fin spacing options
- Galvanized steel coil casing
- Header drain and vent connections
- Fully drainable coils
- 1.5", 2.0", 2.5", or 3.0" water modulating valve with actuator and linkage
- External piping enclosure

Cabinet

- Blank Section Options
  - Four foot blank—cooling only
  - Eight foot blank—cooling and heating
- Single Point access doors on both sides of the unit
- Belt guards for supply and exhaust/return fans
- Burglar Bars on select configured units

Mechanical

- Airfoil plenum return fan—standard CFM
- Modulating plenum return fan with Statitrac™ direct space sensing building pressurization control
- Forward curved exhaust fan—standard and low CFM
- 100 percent modulating exhaust
- 100 percent modulating exhaust with Statitrac™ direct space sensing building pressurization control
- Outside air CFM compensation on VAV units with IGV (or VFD) and economizer
- The Trane air quality (Traq™) fresh air measurement damper system

Figure 5. Traq Damper

- 0-100 percent modulating fresh air economizer
- 0-25 percent motorized fresh air damper
- Low and ultra low leak dampers

Filtration

- Pre-Evaporator Coil Filter Options
  - Filter rack only (no filters)
  - Two-inch Throwaway filters
  - 90-95 percent bag filters
  - 90-95 percent cartridge filters
- Final filters
  - Bag filters
  - Standard and high temperature cartridge filters
  - Standard and high temperature HEPA filters

Heat Options

- Electric, gas, steam or hot water
- Gas heat options:
  - 10:1 Modulating Gas Heat 850 MBH
  - 20:1 Modulating Gas Heat 1100 and 1800 MBH
  - 10 year limited warranty on Modulating Gas Heat

Electrical

- Unit Withstand Rating of 65000 Amp (480V) and 25000 Amp (600V)
- High efficiency totally enclosed fan-cooled supply and exhaust/return fan motors
- Standard efficiency supply and exhaust/return fan motors
- Marine lights in serviceable compartments
- Electrical convenience outlet
- Through the door non-fused disconnect with external handle

Field Installed Accessories

- Roof curbs
- Wireless zone sensor
- Programmable sensors with night setback—CV and VAV
- Sensors without night setback—CV and VAV
- Remote zone sensors—used for remote sensing with remote panels
- ICS zone sensors used with Tracer™ system for zone control
- Outdoor temperature sensor for units without economizers
- Remote minimum position control for economizer
- Module kits available for field upgrade of controls

Features Summary

IntelliPak™ II air handler features make installation and servicing easy and operation extremely reliable.

Installation and Service

- Microprocessor unit controls coordinate the operation of the air handler with quality, industry-accepted components for service ease.
- Supply and return piping for the chilled water coil are easily accessed through the external piping enclosure
- Controls are factory installed/ commissioned for ease of start up
- Full unit points access—no field wiring of required points
- Modularity of unit control design
- Individual replaceable functional boards
- Unit mounted Human Interface Panel standard
  - User-friendly keypad edit parameters
  - Dedicated Human Interface access panel
  - Start up adjustments
  - Advanced diagnostics
- Unit mounted and remote interface panel key pads are identical
- Single twisted wire pair communication for ICS interface
- Sturdy, double wall, foam injected, hinged access doors with height adjustable single point latches on main compartments for service ease
- Main control box conveniently located on end of air handler for layout flexibility in tight spaces
- Built in optional features like high withstand rated breakers, belt guards and burglar bars contribute to safety
- Convenience outlet and marine lights for enhanced service capability

Figure 6. Convenience Outlet

- Unit mounted lifting lugs facilitate installation and can be used as unit tie-down points

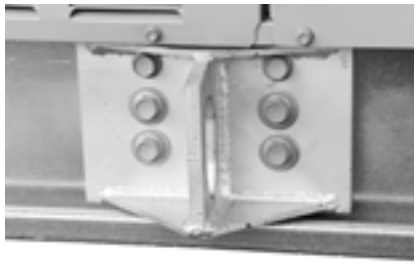


Figure 7. Lifting Lugs

Reliability

- Advanced diagnostics
- Microprocessor controls
- Built-in safeties
- Modular control design
- UL/CSA approval as standard
- All supply, exhaust, and return fans are factory balanced
- Fully insulated floor, roof, panels, and gasketed interfaces reduce ambient air infiltration.
- Fixed-speed supply, exhaust/ return drives for smooth fan operation and belt durability.
- 200000 average life fan bearings enhance unit durability.
- Gas heater with free-floating stainless steel heat exchanger relieves the stresses of expansion and contraction. Stainless steel provides corrosion resistance through the entire material thickness.
- Factory-wired and commissioned controls assure efficient and reliable air handler operation.
- Roll-formed construction enhances cabinet integrity and assures a leak-proof casing.
- Trane industrial quality hot water, steam and chilled water coils are factory pressure and leak tested to ensure dependability

Application Flexibility

- Chilled water or no cooling alternatives
- A variety of chilled water coil offerings to meet a diverse range of capacity requirements
- Multiple downflow and horizontal air path options
- An array of heating options are available, including Electric, Natural Gas, Steam and Hot Water. The Gas Heating option provides a choice of two-stage gas heat, as well as full modulating gas heat. Electric heating options provide four to six steps of capacity. Hot water and steam coils have two steaps of capacity.
- Indoor Air Quality (IAQ)
  - Traq Damper System for precise fresh air measurement
  - Demand Control Ventilation for CO_2 economizer control
  - Compensated outdoor air control
  - Statitrac™ direct space building pressure control
  - Multiple factory installed filter types, pre evaporator and final filters
  - Humidification control output
  - Comparative enthalpy, Reference enthalpy, or Dry bulb control for economizers
- Superior Building Automation interface through LonTalk
- Generic BAS interfaces
- Unit mounted or Remote Human Interface panels
  - All parameters are editable from the Human Interface Panel
- Five factory preset ventilation override sequences which can be redefined in the field
- Variable Frequency Drives (VFD) included With or Without Bypass Control for Supply and Exhaust/ Return Fans.
- CV controls stage heat based on space requirements.

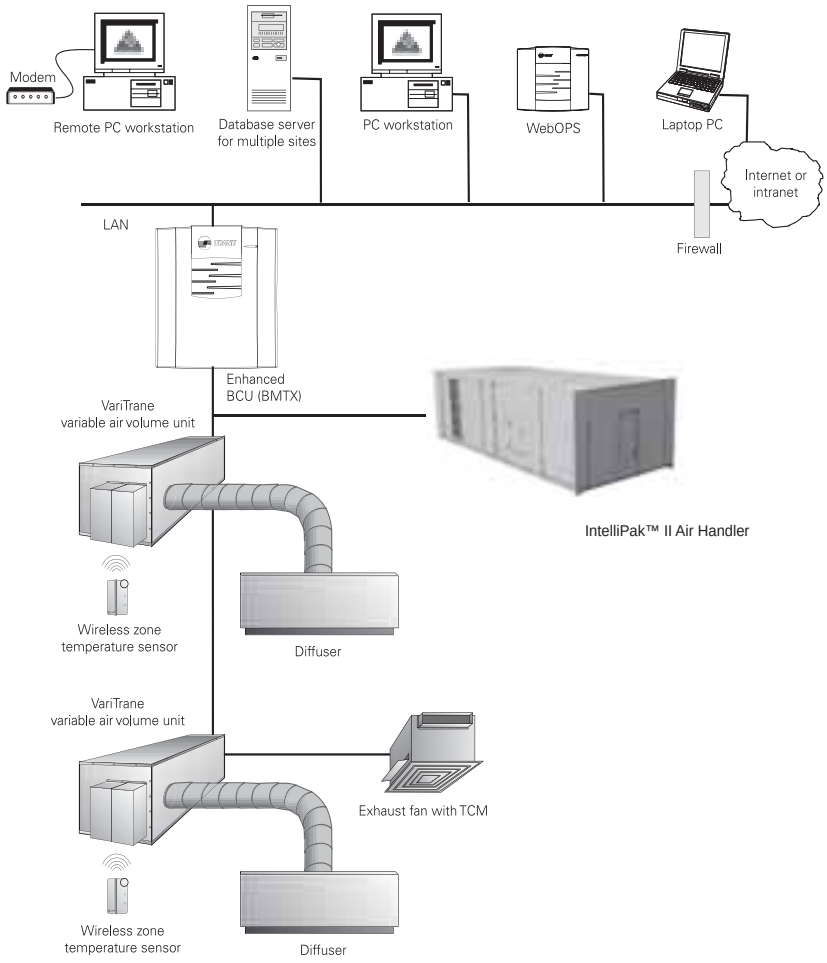


Figure 8. Trane Complete Comfort System

Integrated Comfort with Trane Tracer™ LCI

The Tracer Integrated Comfort™ System (ICS) improves job profit and increases job control by combining Trane rooftop air handler units with the Trane Tracer building management system. This integrated system provides total building comfort and control. Some of the primary motivations for building owners/managers in deciding to purchase a HVAC controls system are energy savings, cost control, and the convenience of facility automation.

Simplifying the Comfort System

Trane technology and innovation brings more capabilities, more flexibility, and offers equipment and systems that are easy to use, easy to install, commission and service. The Tracer Integrated Comfort system saves time and money by simplifying system design and system installation.

When used with Trane DDC/VAV terminals (or VariTrane™), system balancing almost goes away because each VAV box is commissioned and tested before it leaves the factory.

All the status information and editing data from the air handler units, VAV terminals, lighting, exhaust and other auxiliary equipment is available from Tracer for facility control, monitoring and service support. Tracer, a family of building automation products from Trane, is designed with robust, application specific software

packages to minimize custom programming requirements and enable system setup and control through simple editing of parameters in the standard applications software.

When selecting an Integrated Comfort system for a facility, the accountability for equipment, automation and controls is Trane's, Trane's, and Trane's!

In addition to high quality, high performance, packaged air handler, Trane provides precise air delivery management with VariTrane VAV terminals.

Wireless zone sensors minimize the installation costs of the VariTrane terminals and the packaged air handler system in general.

The IntelliPak™ II air handler, as a part of an Integrated Comfort system, provides powerful maintenance monitoring, control and reporting capabilities. The Tracer places the air handler in the appropriate operating mode for: system on/off, night setback, demand limiting, setpoint adjustment based on outside parameters and much more.

Many different unit diagnostic conditions can be monitored through Tracer: sensor failures and loss of supply airflow. Further, the addition of Building Management Network software offers remote scanning, automatic receipt of alarms, and easy dial-up access to over 100 various Tracer sites across town or across the country.

IntelliPak™ II Air Handler monitoring points available through Tracer

- all active Air Handler diagnostics
- history of last 20 unit diagnostics
- all system setpoints
- system sensor inputs
- supply fan mode and status
- inlet guide vane position/VFD speed
- unit heat/cool mode
- exhaust/return fan status
- exhaust/return damper position
- economizer position, minimum position setpoint, economizing setpoint
- electric heat stage status
- ventilation override mode status

Tracer control points for IntelliPak II Air Handlers

- sensor calibration offsets cooling and heating setpoints
- zone setpoint offsets for use with demand limiting
- VAV discharge air setpoints
- supply air pressure setpoint

Figure 9. Tracer™

- space pressure setpoint
- zone and outdoor temperature values
- cooling and heating enable/disable
- economizer enable/disable
- economizer setpoint
- economizer minimum position
- activation of ventilation override modes
- diagnostics reset
- unit priority shutdown

IntelliPak II Air Handler setup and configuration information through Tracer

- supply fan mode
- configuration of supply air reset
- ventilation override mode configuration
- default system setpoint values

Interoperability

Trane Tracer LonTalk Control Interface (LCI) for IntelliPak II offers a building automation control system with outstanding interoperability benefits.

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

Interoperability allows application or project engineers to specify the best products of a given type, rather than one individual supplier's entire system. It reduces product training and installation costs by standardizing communications across products. Interoperable systems allow building managers to monitor and control IntelliPak II equipment with a Trane Tracer Summit or a 3rd party building automation system.

It enables integration with many different building controls such as access/intrusion monitoring, lighting, fire and smoke devices, energy management, and a wide variety of sensors (temperature, pressure, light, humidity, occupancy, CO_2 and air velocity). For more information on LonMark, visit www.lonmark.org or Echelon, www.echelon.com.

Optimum Building Comfort Control

The modular control design of the UCM allows for greater application flexibility. Customers can order exactly the options required for the job, rather than one large control package. Unit features are distributed among multiple field replaceable printed circuit boards. The Trane UCM can be setup to operate under one of three control applications:

1. standalone

2. interface with Trane Tracer™ building management system
3. interface with a generic (non-Trane) building management system. All setup parameters are preset from the factory, requiring less start-up time during installation.

The unit mounted Human Interface and the Remote Human Interface Panels' functions are identical, with the exception of the Service mode which is not available on the Remote Human Interface Panel. This common interface feature requires less time for building maintenance personnel to learn to interact with the unit.

All air handler control parameters are adjustable and can be setup through the Remote Human Interface Panel such as, but not limited to: system on/off, demand limiting type, night setback setpoints, and many other setpoints. No potentiometers are required for setpoint adjustment, all adjustments are done through the Remote Human Interface keypad.

Up to 56 different air handler diagnostic points can be monitored through the human interfaces such as: sensor failures and loss of supply airflow. No special tools are required for servicing the unit. All diagnostic displays are available in clear English at the Remote Human Interface and will be held in memory, so that the operator/service person can diagnose the root cause of failures.

Figure 10. Statitrac

Statitrac™ Direct Space Building Pressurization Control

Trane Statitrac™ control is a highly accurate and efficient method of maintaining building pressure control with a large air handler.

Building space pressurization control is achieved with a 100 percent modulating exhaust system that features a single forward curved fan, with modulating discharge dampers that operates only when needed or a 100% modulating plenum return fan with airfoil wheel that operates continuously with the supply fan. Most of the operating hours of the 100 percent modulating exhaust system are at part load, resulting in energy savings.

Statitrac, with the 100 percent modulating exhaust system, provides comfort and economy for buildings with large air handler systems. Statitrac, with the 100% modulating plenum return fan provides comfort and space pressure control in more demanding applications with high return static pressure, and applications requiring duct returns.

Statitrac control with exhaust fan is simple! The space pressure control turns the exhaust fans on and off as required and modulates exhaust dampers, or VFD speed, to maintain space pressure within the space pressure deadband. Economizer and return air dampers are modulated based on ventilation control and economizer cooling request.

The unit mounted Human Interface Panel can be used to:

1. adjust space pressure setpoint
2. adjust space pressure deadband
3. measure and read building static pressure

The modulating exhaust system maintains the desired building pressure, while saving energy and keeping the building at the right pressure. Proper building pressurization eliminates annoying door whistling, doors standing open, and odors from other zones. The Statitrac™ direct space building control sequence will also be maintained when a variable frequency drive is used.

Statitrac Control with Plenum Return Fan is State of the Art!

Other manufacturers utilize a fan tracking control scheme whereby the return fan speed tracks the supply fan speed in a linear fashion. This scheme works well at minimum and maximum CFM airflow. However, due to the dissimilar performance characteristics of the supply and return fan, building pressure is difficult to control at points between minimum and maximum CFM airflow.

The Trane return fan/building pressurization control system eliminates the effects of dissimilar supply/return fan characteristics experienced in a linear tracking control system by modulating the exhaust dampers based on space pressure, the return/economizer dampers based on ventilation requirements, and the return fan speed based on return plenum static pressure. The supply fan, return fan, exhaust damper, and return/economizer damper systems act independently from one another to maintain comfort and building pressure.

The return fan operates whenever the supply fan is in operation. The unit exhaust dampers are modulated in response to the space pressure signal to maintain space pressure within the space pressure deadband. The unit economizer and return air dampers are modulated based on ventilation control, minimum outside air economizer position, and economizer cooling request. The return fan speed is modulated based on a return duct static pressure deadband control. Using the unit mounted Human Interface Panel you can:

1. adjust space pressure setpoint
2. adjust space pressure deadband
3. measure and read building space pressure
4. measure and read return duct static pressure.

Proper building pressurization eliminates annoying door whistling, doors standing open, and odors from other zones.

Supply Fans with Inlet Guide Vanes

Trane airfoil 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 result in superior part load performance.

Variable Frequency Drives (VFD)

Variable Frequency Drives are factory installed and tested to provide supply/exhaust/return fan motor speed modulation. VFD's, as compared to inlet guide vanes or discharge dampers, are quieter, more efficient, and may be 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.

Controls
Variable Air Volume (VAV) Only

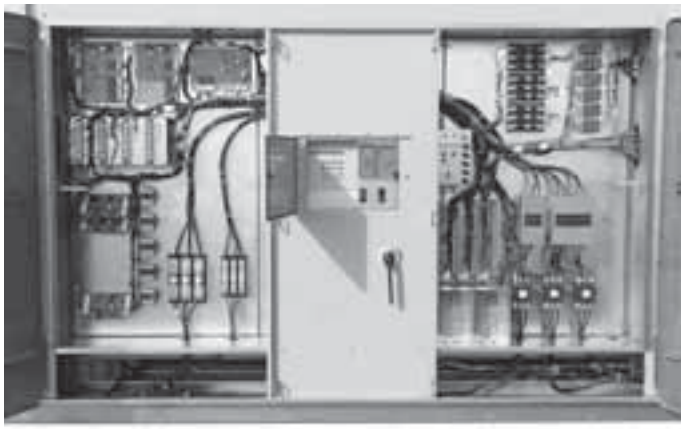


Figure 11. IntelliPak™ II Control Panel

VAV Units Only

Note: *When noted in this sequence "Human Interface Panel," the reference is to both the unit mounted and remote mounted Human Interface Panel. All setpoint adjustments can be accomplished at the unit or Remote Human Interface Panel.*

Supply Air Pressure Control

Inlet Guide Vanes Control

Inlet guide vanes are driven by a modulating 0-10 vdc signal from the Rooftop Module (RTM). 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 the Human Interface Panel or BAS/Network.

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, except during night setback.

Variable Frequency Drive (VFD) Control

Variable frequency drives are driven by a modulating 0-10 vdc signal from the Rooftop Module (RTM). 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 the Human Interface Panel or BAS/Network.

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 will reduce its output frequency to maintain operation.

Bypass control is offered to provide full nominal airflow in the event of drive failure.

Supply Air Static Pressure Limit

The opening of VAV terminals, and the amount of supply air provided by the inlet guide vanes, or variable frequency drive are coordinated during start up and transition to/from Occupied/Unoccupied modes to prevent over pressurization of the supply air ductwork.

However, if for any reason the supply air pressure exceeds the user-defined supply air static pressure limit that was set at the Human Interface Panel, the supply fan/VFD is shut down and the inlet guide vanes (if included) are closed.

The unit is then allowed to restart three times. If the over pressurization condition occurs on the third time, the unit is shut down and a manual reset diagnostic is set and displayed at the Human Interface Panel and BAS/Network.

Supply Air Temperature Controls

Cooling/Economizer

During Occupied cooling mode of operation, the economizer (if available) and cooling are used to control the supply air temperature. The supply air temperature setpoint and deadband are user-defined at the Human Interface Panel.

The supply air temperature setpoint may be user-defined from the BAS/Network. If the conditions of the outside air is appropriate to use "free cooling," the economizer will be used first to attempt to satisfy the supply air setpoint; then if required the hydronic valve will be modulated to maintain supply air temperature 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 supply air

temperature from setpoint, i.e., the further away from setpoint, the faster the fresh air damper will open.

Note: *The economizer is only allowed to function freely if one of the following conditions is met. For dry bulb economizer control the ambient temperature must be below the dry bulb temperature control setting. For reference enthalpy economizer control, outdoor air enthalpy must be below the enthalpy control setting. For comparative enthalpy economizer control, outdoor air enthalpy must be below the enthalpy of the return air.*

The outdoor air dampers may be set for a maximum of 25 percent outdoor air, through the unit mounted Human Interface Panel or a signal from the BAS/network, if the air handler is equipped with 0 to 25 percent motorized fresh air dampers.

A temperature sensor, located on the entering air side of the chilled water coil, will send a signal to the hydronic valve to drive it full open when a potential freeze condition is detected. The supply fan is then turned off and the fresh air damper is closed.

Heating

Modulating Gas

Upon a call for heating, the HEAT module closes the heating contacts, beginning the firing sequence. First, the heat exchanger combustion blower begins operation. Upon positive proving of combustion airflow, a 60 second pre-purge cycle is executed. Then the ignition sequence takes place.

If ignition is not proven, the safety control locks out and must be manually reset. As long as there is a call for heat, the safety control can be reset, which starts another purge cycle and try for ignition.

Once ignited, as additional heat is required, the combustion air damper opens, increasing the firing rate.

During heating operation, an electronic flame safety control provides continuous flame supervision. If combustion should become unstable for any reason, heating will automatically shut down and be locked out until reset at the unit mounted Human Interface panel.

As the heating requirement is satisfied, the HEAT module will modulate the combustion air damper closed and the firing rate will lower to maintain the desired outlet temperature. When the requirement is fully satisfied, the heating contacts are opened, de-energizing the heat. The specific sequence of operation of the gas heat will depend on the size of the heat exchanger.

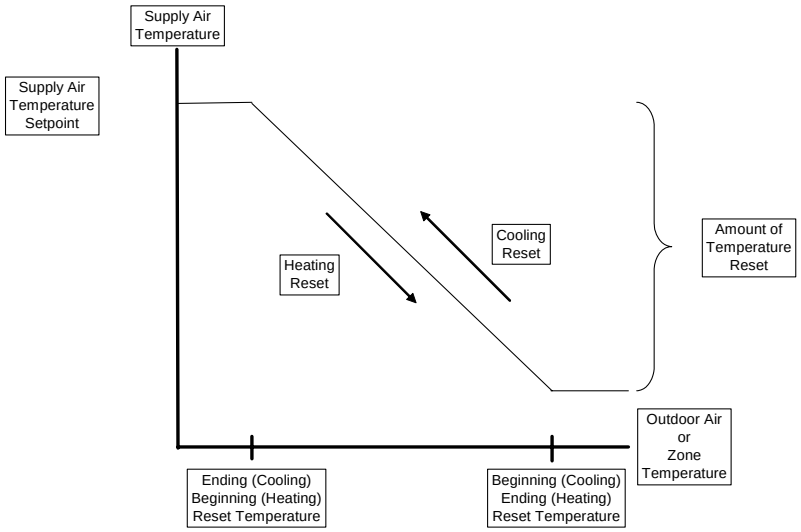


Figure 12. Supply Air Temperature Reset

Electric Heating

The individual stages of electric heat will be sequenced on the zone demand. The number of available stages will depend on the unit size and heat capacity selected.

Hot Water or Steam

On units with hot water or steam heating, the supply air temperature can be controlled to a heating setpoint during the Occupied mode. The supply air temperature heating setpoint and deadband are user-defined at the Human Interface Panel. VAV Occupied heating on hot water and steam heat units is enabled by closing a field-supplied switch or contacts connected to an changeover input on the RTM.

Supply Air Setpoint Reset

Supply air setpoint reset can be used to adjust the supply air temperature setpoint on the basis of a zone temperature or on outdoor air temperature. Supply air setpoint reset adjustment is available from the Human Interface Panel for supply air heating and supply air cooling control.

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, thus savings in mechanical cooling kw, but an increase in supply fan kw may occur.

Outdoor air heating reset is the inverse of cooling, with the same principles applied.

For both outdoor air cooling reset and heating reset, there are three user-defined parameters that are adjustable through the Human Interface Panel.

- beginning reset temperature
- ending reset temperature
- amount of temperature reset

Zone reset is applied to the zone(s) in a building that tend to over cool or

overheat. The supply air temperature setpoint is adjusted based on the temperature of the critical zone(s). 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. See Figure 12, p. 12

Supply Air Tempering

Modulating gas, electric, hot water and steam heat units only—When supply air temperature falls below the supply air temperature deadband low end, the heat valve will be modulated to maintain the set minimum supply air temperature.

Zone Temperature Control

Unoccupied Zone Heating and Cooling

During Unoccupied mode, the unit is operated as a CV unit. Inlet guide vanes are driven full open, VFDs operate at 100%, and VAV boxes are driven full open. The unit controls zone temperature within the Unoccupied zone cooling and heating (heating units only) setpoints.

Daytime warm-up

This feature is available on all types of heating units. During Occupied mode, if the zone temperature falls to a preset, user-defined zone low limit temperature setpoint, the unit is put into Unoccupied mode and Daytime Warm-up is initiated. The system changes over to CV heating (full unit airflow), the VAV boxes are fully opened and full heating capacity is provided until the Daytime Warm-up setpoint is reached. The unit is then returned to normal Occupied mode.

Fresh Air Measurement

Trane air quality (TRAQ™) fresh air measurement damper system utilizes velocity pressure sensing rings. Based on unit design CFM, the ventilation control module (VCM) monitors and controls the quantity of fresh outside air entering the unit. The outside airflow can be calibrated to accommodate for altitude.

a. An optional temperature sensor may be connected to the ventilation control module to enable it to control a field-installed pre-heater.
b. An optional CO_2 sensor may be connected to the ventilation control module to control fresh air based on CO_2 Demand Control Ventilation (DCV).

Outside Air CFM Compensation

As the supply fan (IGV or VFD) modulates, this function proportionally adjusts the economizer minimum position to compensate for the change in total airflow, in order to maintain a constant percent of outside air. The modified economizer minimum position is computed as a linear function, based on IGV or VFD position, given the two endpoints,

a. Minimum Position with IGV/VFD @ 0%
b. Minimum Position with IGV/VFD @ 100%

which are user adjustable at the Human Interface Panel.

Controls Constant Volume (CV) Only

CV Units Only

Occupied Zone Temperature Control

Cooling/Economizer

During Occupied cooling mode, the economizer (if provided) and mechanical cooling are used to control zone temperature. The zone temperature cooling setpoint is user-defined at the Human Interface Panel or from the BAS/Network.

If the conditions 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 if required the hydronic valve will be modulated to maintain supply air temperature 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 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: *The economizer is only allowed to function freely if one of the following conditions is met: For dry bulb economizer control, the ambient temperature must be below the dry bulb temperature control setting. For reference enthalpy economizer control, outdoor air enthalpy must be below the enthalpy control setting. At outdoor air conditions above the enthalpy control setting, mechanical cooling only is used and the outdoor air dampers remain at minimum position. For comparative enthalpy economizer control, outdoor air enthalpy must be below the enthalpy of the return air.*

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

The outdoor air dampers may be set for a maximum of 25 percent outdoor air, through the unit mounted Human Interface Panel or a signal from the BAS/network, if the air handler is equipped with 0 to 25 percent motorized fresh air dampers.

A temperature sensor, located on the entering air side of the chilled water coil, will send a signal to the hydronic valve to drive it full open when a potential freeze condition is detected. The supply fan is then turned off and the outside air damper is closed.

Heating

Gas Heating: Two-Stage

Upon a call for heating, the HEAT module closes the first stage heating contacts beginning the firing sequence. First, the heat exchanger combustion blower begins operation. Upon positive proving of combustion airflow, a 60 second pre-purge cycle is executed. Then the ignition sequence takes place.

If ignition is not proven, the safety control locks out and must be manually reset. As long as there is a call for heat, the safety control can be reset, which starts another purge cycle and try for ignition.

As additional heat is required, the HEAT module will close the second stage heating contacts and depending on heat module size, will open either the second stage of the gas valve, or a second stage gas valve.

During heating operation, an electronic flame safety control provides continuous flame supervision. If combustion should become unstable for any reason, heating will automatically shut down. On the low heat and medium heat for all units, after a one minute delay, plus another 60 second pre-purge cycle the ignition cycle begins.

On all other heat sizes the heating section will be shutdown and locked out until manually reset at the ignition module and unit mounted Human Inferface Panel after the first shutdown due to flame instability.

As the heating requirement is satisfied, the HEAT module will open the second stage heating relay, de-energizing the second stage of heat. When the requirement is fully satisfied, the first stage contacts are opened, de-energizing the first stage of heat.

Gas Heating: Modulating Gas

Upon a call for heating, the HEAT module closes the heating contacts, beginning the firing sequence. First, the heat exchanger combustion blower begins operation. Upon positive proving of combustion airflow, a pre-purge cycle is executed. Then the ignition sequence takes place.

If ignition is not proven, the safety control locks out and must be manually reset. As long as there is a call for heat, the safety control can be reset, which starts another purge cycle and try for ignition.

Once ignited, as additional heat is required, the combustion air damper opens, increasing the firing rate.

During heating operation, an electronic flame safety control provides continuous flame supervision. If combustion should become unstable for any reason, heating will automatically shut down and be blocked out until reset at the unit mounted Human Interface panel.

As the heating requirement is satisfied, the HEAT module will modulate the combustion air damper closed, and the firing rate will lower to maintain the desired outlet temperature. When the requirement is fully satisfied, the heating contacts are opened, de-energizing the heat. The specific sequence of operation of the gas heat will depend on the size of the heat exchanger.

Electric Heating

The individual stages of electric heat will be sequenced on the zone demand. The number of available stages will depend on the unit size and heat capacity selected.

Hot Water or Steam Heating

Upon a call for heat, the UCM will send a varying voltage signal to the valve actuator. The valve will modulate to meet building demand as indicated by the voltage signal. When heating is satisfied, the valve will modulate closed. A temperature sensor is located on the coldest section of the coil. When it senses an impending freeze condition, a signal is sent to the hydronic valve to drive it full open. If the supply fan is on, or if the outside air damper is open when this freezing condition is sensed, the supply fan is turned off and the fresh air damper is closed.

Supply Air Tempering

For staged gas and electric heat units in the occupied Heating 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 turned off if the supply air temperature rises to 10°F above the Occupied zone heating temperature setpoint.

On units with hot water or steam heating, if the supply air temperature drops below 48°F, the heating valve is modulated to maintain 50°F supply air temperature with a 4°F deadband.

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

Cooling and/or heating modes can be selected to maintain Unoccupied zone temperature setpoints. For Unoccupied periods, heating, economizer operation or primary cooling operation can be selectively locked out at the Human Interface Panels.

Controls VAV and CV

Common to VAV and CV Units

Space Pressure Control - Statitrac™

A pressure transducer is used to measure and report direct space (building) static pressure. The user-defined control parameters used in this control scheme are space static pressure setpoint, space pressure deadband and exhaust enable point.

As the economizer opens, the building pressure rises and once above the exhaust enable point, enables the exhaust fan and dampers or exhaust VFD. The exhaust dampers or VFD then modulate to maintain space pressure within the deadband.

Morning Warm-up Options

This feature may be enabled on all types of factory installed heat units as well as cooling only units configured as "External Heat" (for example, VAV boxes with reheat).

At the conclusion of Unoccupied mode, while the economizer (if supplied) is kept closed, the selected zone is heated to the user-defined Morning Warm-up setpoint. The unit is then released to Occupied mode. There are two types of Morning Warm-up: full capacity or cycling capacity.

Full Capacity Morning Warm-up (MWU)

Full capacity Morning Warm-up uses full heating capacity, and heats the zone up as quickly as possible. Full heating capacity is provided until the Morning Warm-up setpoint is met. At this point, the unit is released to occupied mode.

Cycling Capacity Morning Warm-up (MWU)

Cycling capacity Morning Warm-up provides a more gradual heating of the zone. Normal zone temperature control with varying capacity is used to raise the zone temperature to the MWU zone temperature setpoint. This method of warm-up is used to overcome the "building sink" effect. Cycling capacity MWU will operate until the MWU setpoint is reached or for 60 minutes, then the unit switches to Occupied mode.

A control algorithm is used to increase or decrease the amount of heat in order to achieve the MWU zone temperature setpoint.

Note: *When using the Morning Warm-up option in a VAV heating/cooling air handler, airflow must be maintained through the air handler unit. This can be accomplished by electrically tying the VAV boxes to the VAV box output relay contacts on the Rooftop Module (RTM) or by using changeover thermostats. Either of these methods will assure adequate airflow through the unit and satisfactory heating of the building.*

Emergency Override

When a LonTalk communication module is installed, the user can initiate from the Trane Tracer Summit or 3rd party BAS one of five (5) predefined, not available to configure, Emergency Override sequences. The Humidification output is deenergized for any Emergency Override sequence. Each Emergency Override sequence commands the unit operation as follows:

1. PRESSURIZE_EMERG:
   - Supply Fan - On
   - Supply Fan IGV / Supply Fan VFD Open/Max (if so equipped)
   - Exhaust Fan - Off; Exhaust Dampers Closed (if so equipped)
   - OA Dampers - Open; Return Damper - Closed
   - Heat - All heat stages off; Mod Heat output at 0 vdc
   - Occupied/Unoccupied/VAV box output - Energized
   - VOM Relay - Energized (if so equipped)
   - Preheat Output - Off
   - Return Fan - Off; Exhaust Dampers - Closed (if so equipped)
   - Return VFD - Min (if so equipped)
2. EMERG_DEPRESSURIZE:
   - Supply Fan - Off
   - Supply Fan IGV / Supply Fan VFD - Closed/Min (if so equipped)
   - Exhaust Fan - On; Exhaust Dampers Open/Max (if so equipped)
   - OA Dampers - Closed; Return Damper - Open
   - Heat - All heat stages off; Mod Heat output at 0 vdc
   - Occupied/Unoccupied/VAV box output - Energized
   - VOM Relay - Energized (if so equipped)
   - Preheat Output - Off
   - Return Fan - On; Exhaust Dampers - Open (if so equipped)
   - Return VFD - Max (if so equipped)
3. EMERG_PURGE:
   - Supply Fan - On
   - Supply Fan IGV / Supply Fan VFD - Open/Max (if so equipped)
   - Exhaust Fan - On; Exhaust Dampers Open (if so equipped)
   - OA Dampers - Open; Return Damper - Closed
   - Heat - All heat stages off; Mod Heat output at 0 vdc
   - Occupied/Unoccupied/VAV box output - Energized
   - VOM Relay - Energized (if so equipped)
   - Preheat Output - Off
   - Return Fan - On; Exhaust Dampers - Open (if so equipped)

- Return VFD - Max (if so equipped)

4. EMERG_SHUTDOWN:
   - Supply Fan - Off
   - Supply Fan IGV / Supply Fan VFD - Closed/Min (if so equipped)
   - Exhaust Fan - Off; Exhaust Dampers Closed (if so equipped)
   - OA Dampers - Closed; Return Damper - Open
   - Heat - All heat stages off; Mod Heat output at 0 vdc
   - Occupied/Unoccupied/VAV box output - Energized
   - VOM Relay - Energized (if so equipped)
   - Preheat Output - Off
   - Return Fan - Off; Exhaust Dampers - Closed (if so equipped)
   - Return VFD - Min (if so equipped)
5. EMERG_FIRE - Input from fire pull box/system:
   - Supply Fan - Off
   - Supply Fan IGV / Supply Fan VFD - Closed/Min (if so equipped)
   - Exhaust Fan - Off; Exhaust Dampers Closed (if so equipped)
   - OA Dampers - Closed; Return Damper - Open
   - Heat - All heat stages off; Mod Heat output at 0 vdc
   - Occupied/Unoccupied/VAV box output - Energized
   - VOM Relay - Energized (if so equipped)
   - Preheat Output - Off
   - Return Fan - Off; Exhaust Dampers - Closed (if so equipped)
   - Return VFD - Min (if so equipped)

Ventilation Override Module (VOM)

The user can customize up to five (5) different override sequences for purposes of ventilation override control. If more than one VOM sequence is being requested, the sequence with the highest priority is initiated first. Sequence hierarchy is the sequence "A" (UNIT OFF) is first, with sequence "E" (PURGE with Duct Pressure Control) last.

The factory default definitions for each mode are as follows:

1. UNIT OFF sequence "A"

When complete system shutdown is required the following sequence can be used.

- Supply Fan - Off
- Supply Fan IGV / Supply Fan VFD - Closed/Min (if so equipped)
- Exhaust Fan - Off; Exhaust Dampers Closed (if so equipped)
- OA Dampers - Closed; Return Damper - Open
- Heat - All heat stages off; Mod Heat output at 0 vdc
- Occupied/Unoccupied/VAV box output - Deenergized
- VOM Relay - Energized
- Preheat Output - Off
- Return Fan - Off; Exhaust Dampers - Closed (if so equipped)
- Return VFD - Min (if so equipped)
- OA Bypass Dampers - Open (if so equipped)
- Exhaust Bypass Dampers - Open (if so equipped)

2. PRESSURIZE sequence "B"

Perhaps a positively pressurized space is desired instead of a negatively pressurized space. In this case, the supply fan should be turned on with inlet guide vanes open/VFD at 100% speed and exhaust fan should be turned off.

- Supply Fan - On
- Supply Fan IGV / Supply Fan VFD - Max (if so equipped)
- Exhaust Fan - Off; Exhaust Dampers Closed (if so equipped)
- OA Dampers - Open; Return Damper - Closed
- Heat - All heat stages off; Mod Heat output at 0 vdc
- Occupied/Unoccupied/VAV box output - Energized
- VOM Relay - Energized
- Preheat Output - Off
- Return Fan - Off; Exhaust Dampers - Closed (if so equipped)
- Return VFD - Min (if so equipped)
- OA Bypass Dampers - Open (if so equipped)
- Exhaust Bypass Dampers - Open (if so equipped)

3. EXHAUST sequence "C"

With only the exhaust fans running (supply fan off), the space that is conditioned by the air handler would become negatively pressurized. This is desirable for clearing the area of smoke from the now-extinguished fire, possibly keeping smoke out of areas that were not damaged.

- Supply Fan - Off
- Supply Fan IGV / Supply Fan VFD - Closed/Min (if so equipped)
- Exhaust Fan - On; Exhaust Dampers Open (if so equipped)
- OA Dampers - Closed; Return Damper - Open
- Heat - All heat stages off; Mod Heat output at 0 vdc
- Occupied/Unoccupied/VAV box output - Deenergized
- VOM Relay - Energized
- Preheat Output - Off
- Return Fan - On; Exhaust Dampers - Open (if so equipped)
- Return VFD - Max (if so equipped)
- OA Bypass Dampers - Open (if so equipped)
- Exhaust Bypass Dampers - Open (if so equipped)

4. PURGE sequence "D"

Possibly this sequence could be used for purging the air out of a building before coming out of Unoccupied mode of operation on VAV units or for the purging of smoke or stale air if required after a fire.

- Supply Fan - On

- Supply Fan IGV/ Supply Fan VFD - Max (if so equipped)
- Exhaust Fan - On; Exhaust Dampers Open (if so equipped)
- OA Dampers - Open; Return Damper - Closed
- Heat - All heat stages off; Mod Heat output at 0 vdc
- Occupied/Unoccupied/VAV box output - Energized
- VOM Relay - Energized
- Preheat Output - Off
- Return Fan - On; Exhaust Dampers - Open (if so equipped)
- Return VFD - Max (if so equipped)
- OA Bypass Dampers - Open (if so equipped)
- Exhaust Bypass Dampers - Open (if so equipped)

5. PURGE with duct pressure control sequence “E”

This sequence can be used when supply air control is required for smoke control.

- Supply Fan - On
- Supply Fan IGV / Supply Fan VFD - (If so equipped) Controlled by Supply Air Pressure Control function; Supply Air Pressure High Limit disabled
- Exhaust Fan - On; Exhaust Dampers Open (if so equipped)
- OA Dampers - Open; Return Damper - Closed
- Heat - All heat stages off; Mod Heat output at 0 vdc
- Occupied/Unoccupied/VAV box output - Energized
- VOM Relay - Energized
- Preheat Output - Off
- Return Fan - On; Exhaust Dampers - Open (if so equipped)
- Return VFD - Max (if so equipped)
- OA Bypass Dampers - Open (if so equipped)
- Exhaust Bypass Dampers - Open (if so equipped)

Figure 13. Human Interface Panel (HI)

Human Interface Panel (HI)

The Human Interface (HI) Panel provides a 2 line X 40 character clear English liquid crystal display and a 16 button keypad for monitoring, setting, editing and controlling. The Human Interface Panel is mounted in the unit's main control panel and is accessible through an independent door. See Figure 13, p. 18

The optional remote mount version of the Human Interface (RHI) Panel has all the functions of the unit mount version except Service Mode. To use a RHI the unit must be equipped with an optional Inter-Processor Communications Bridge (IPCB) module. The RHI can be located up to 1000 feet from the unit. A single RHI can be used to monitor and control up to four (4) air handlers, each containing an IPCB.

Human Interface Panel Main Menu

- STATUS - used to monitor all temperatures, pressures, humidities, setpoints, input and output status.
- CUSTOM - allows the user to create a custom status menu consisting of up to four (4) screens of the data available in the Status menu.
- SETPOINTS - used to review and/or modify all the factory preset Default setpoints and setpoint source selections.
- DIAGNOSTICS - used to review active and historical lists of diagnostic conditions. Over one hundred different diagnostics can be read at the Human Interface Panel. The last 20 unique diagnostics can be held in an active history buffer log.
- SETUP - Control parameters, sensor source selections, function enable/disable, output definitions, and numerous other points can be edited in this menu. All points have factory preset values so unnecessary editing is kept to a minimum.
- CONFIGURATION - Preset with the proper configuration for the unit as it ships from the factory, this information would be edited only if certain features were physically added or deleted from the unit. For example, if a field supplied Ventilation Override Module was added to the unit in the field, the unit configuration would need to be edited to reflect that feature.
- SERVICE - used to selectively control outputs (for fans, damper position, etc.) for servicing or troubleshooting the unit. This menu is accessible only at the unit mounted Human Interface Panel.

Generic Building Automation System Module (GBAS 0-5 vdc)

The Generic Building Automation System Module (GBAS 0-5vdc) is used to provide broad control capabilities for building automation systems other than Trane's Tracer™ system. The following inputs and outputs are provided:

Analog Inputs - Four analog inputs, controlled via a field provided potentiometer or a 0-5 vdc signal, that can be configured to be any of the following:

1. Occupied Zone Cooling Setpoint (CV only)
2. Unoccupied Zone Cooling Setpoint (CV only)
3. Occupied Zone Heating Setpoint (CV only)
4. Unoccupied Zone Heating Setpoint (CV only)
5. Supply Air Cooling Setpoint (VAV only)
6. Supply Air Heating Setpoint (VAV only)
7. Space Static Pressure Setpoint

8. Supply Air Static Pressure Setpoint
9. Minimum Outside Air Flow Setpoint
10. Morning Warm Up Setpoint
11. Economizer Dry Bulb Enable Setpoint
12. Supply Air Reheat Setpoint
13. Minimum Outside Air Position Setpoint
14. Occupied Dehumidification Setpoint
15. Unoccupied Dehumidification Setpoint
16. Occupied Humidification Setpoint
17. Unoccupied Humidification Setpoint

Binary Outputs - each of the five (5) relay outputs can be mapped to any/all of the available diagnostics.

Binary Input - the single binary input can initiate or terminate the Demand Limit mode of operation via a field supplied switch or contact closure.

Generic Building Automation System Module (GBAS 0-10 vdc)

The Generic Building Automation System Module (GBAS 0-10vdc) is used to provide broad control capabilities for building automation systems other than Trane's Tracer™ system. The following inputs and outputs are provided:

Analog Inputs—Four analog inputs, controlled via a field provided potentiometer or a 0-10 vdc signal, that can be configured to be any of the following:

1. Occupied Zone Cooling Setpoint (CV only)
2. Unoccupied Zone Cooling Setpoint (CV only)
3. Occupied Zone Heating Setpoint (CV only)
4. Unoccupied Zone Heating Setpoint (CV only)
5. Supply Air Cooling Setpoint (VAV only)
6. Supply Air Heating Setpoint (VAV only)
7. Space Static Pressure Setpoint
8. Supply Air Static Pressure Setpoint
9. Minimum Outside Air Flow Setpoint
10. Morning Warm Up Setpoint
11. Economizer Dry Bulb Enable Setpoint
12. Supply Air Reheat Setpoint
13. Minimum Outside Air Position Setpoint
14. Occupied Dehumidification Setpoint
15. Unoccupied Dehumidification Setpoint
16. Occupied Humidification Setpoint
17. Unoccupied Humidification Setpoint

Analog Outputs—Four analog outputs that can be configured to be any of the following:

1. Outdoor Air Temperature
2. Zone Temperature
3. Supply Air Temperature (VAV only)
4. Supply Air Pressure (VAV only)
5. Space Pressure
6. Space Relative Humidity
7. Outdoor Air Relative Humidity
8. Space CO_2 Level
9. Heat Staging (%)
10. Outdoor Air Damper Position
11. Outdoor Airflow

Binary Output - the single relay output can be mapped to any/all of the available diagnostics.

Binary Input - the single binary input can initiate or terminate the Demand Limit mode of operation, via a field supplied switch or contact closure.

Chilled Water Coil - Freeze Stat

A low limit thermostat, mounted on the entering air side of the coil, is used to help prevent the chilled water coil from freezing during periods of low ambient temperature. If the temperature falls below a predetermined value the low limit thermostat will trip, the hydronic valve will be fully opened, the supply fan will shut off, and the fresh air dampers will close.

Steam and Hot Water Coil - Freeze Avoidance

Freeze Avoidance is a feature which helps prevent freezing of steam or hot water heat coils during periods of unit inactivity and low ambient temperatures. Whenever the unit supply fan is off, the outdoor air temperature is monitored. If the temperature falls below a predetermined value, the heating valve is opened to a position selected at the unit mounted Human Interface to allow a minimum amount of steam or hot water to flow through the coil and avoid freezing conditions.

Applications with Chilled Water Coil

Occupied/Unoccupied Switching

Description - 3 ways to switch Occupied/Unoccupied:

1. Night Setback (NSB) Panel
2. Field-supplied contact closure (hard wired binary input to RTM)
3. TRACER (or 3rd Party BAS with LCI module)

Night Setback Sensors

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

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 depending on setup parameters.

As the building load changes, the night setback sensor energizes the air handler heating/cooling (if enabled)

function and the supply fan. The air handler 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 air handler, airflow must be maintained through the air handler unit. This can be accomplished by electrically tying the VAV boxes to the VAV Box output relay contacts on the Rooftop Module (RTM) or by using changeover thermostats. Either of these methods will assure adequate airflow through the unit and satisfactory temperature control of the building.

Occupied/Unoccupied input on the RTM

This input accepts a field supplied switch or contacts closure such as a time clock.

Trane Tracer™ or BAS System

The Trane Tracer System or a 3rd party BAS (with LCI module) can control the Occupied/Unoccupied status of the air handler.

Timed Override Activation - ICS

This function is operational when the RTM is selected as the Zone Temperature Sensor source at the Human Interface Panel. When this function is initiated by the push of a override button on the ICS sensor, the 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

This function is active whenever the RTM is selected as the Zone Temperature Sensor source at the Human Interface Panel. When this function is initiated by the push of an override button on the 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

An optional Comparative Enthalpy system is used to control the operation of the economizer, and measures the temperature and humidity of both return air and outside air to determine which source has lower enthalpy. This system allows true comparison of outdoor air and return air enthalpy by measurement of outdoor air and return air temperatures and humidities.

Reference Enthalpy Control of Economizer

The optional reference enthalpy compares outdoor air temperature and humidity to the economizer enthalpy control setpoint. If outdoor air temperature and humidity are below the economizer enthalpy control setpoint, the economizer will operate freely. This system provides more sophisticated control where outdoor air humidity levels may not be acceptable for building comfort and indoor air quality.

Dry Bulb Temperature Control of Economizer

The optional dry bulb system measures outdoor temperature comparing it to the economizer control temperature setpoint. If the outdoor temperature is below the economizer dry bulb temperature control setpoint, the economizer will operate freely. This system is best suited for arid regions where the humidity levels of fresh air would not be detrimental to building comfort and indoor air quality.

Emergency Stop Input

A binary input is provided on the Rooftop Module (RTM) for installation of field provided switch or contacts for immediate shutdown of all unit functions.

High Duct Temp Thermostat

Two manual reset, high temperature limit thermostats are provided. One is located in the discharge section of the unit set at 240°F and the other in the return air section of the unit set at 135°F. If either setpoint is reached, the air handler unit is shut down.

CO_2 Control - Demand Control Ventilation (DCV)

A ventilation reset function that provides the necessary ventilation for occupants and reduces energy consumption by minimizing the outdoor air damper position (or the OA flow setpoint with TRAQs) below the Building Design Minimum, while still meeting the ASHRAE Std 62.1-2004 ventilation requirements.

If the space CO_2 level is greater than or equal to the CO_2 Design Setpoint, the outdoor air damper will open to the Design Min Outdoor Air Damper (or OA Flow) Setpoint. If there is a call for economizer cooling, the outdoor air damper may be opened further to satisfy the cooling request.

If the space CO_2 level is less than or equal to the CO_2 Minimum Setpoint, the outdoor air damper will close to the DCV Minimum Outdoor Air Damper (or OA Flow) Setpoint.

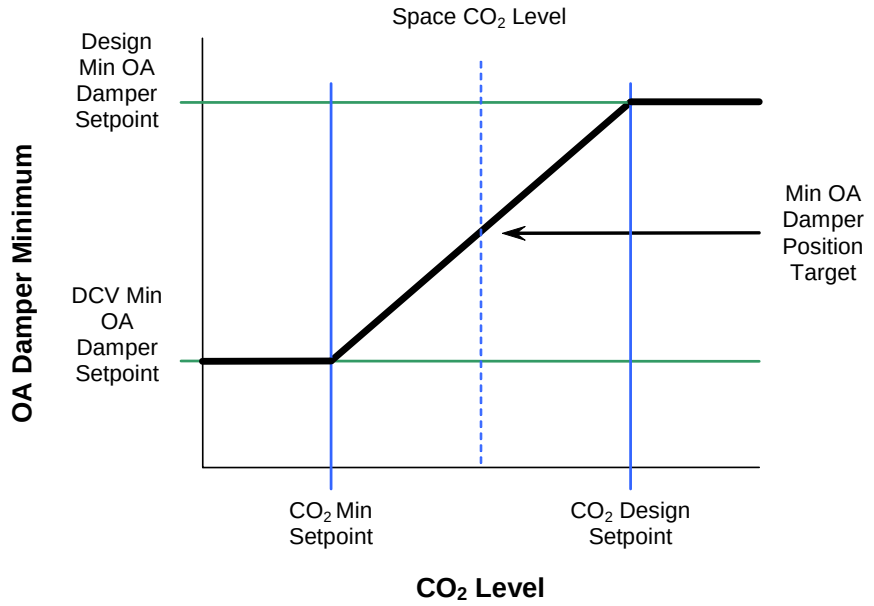


Figure 14. CO_2 Control

If there is a call for economizer cooling, the outdoor air damper may be opened further to satisfy the cooling request.

If the space CO_2 level is greater than the CO_2 Minimum Setpoint and less than the CO_2 Design Setpoint, the outdoor air damper position is (or OA flow) modulated proportionally to the Space CO_2 level relative to a point between the CO_2 Min Setpoint and the CO_2 Design Setpoint. If there is a call for economizer cooling, the outdoor air damper may be opened further to satisfy the cooling request. See Figure 14, p. 21

Humidification Control

A relay output is provided to control an externally connected, field supplied humidifier. Logic is provided for Occupied and Unoccupied humidification control with safeguards to prevent cycling between humidification and dehumidification

Return Fan Control

A return fan reduces the load on the supply fan motor or can allow a unit to operate at a higher static pressure.

The return fan VFD is modulated independently to maintain desired return air plenum pressure. In all other cases the return fan is turned on or off with the supply fan.

LonTalk® Building Automation System

The LonTalk Communication Interface for IntelliPak II (LCI-I) controller expands communications from the unit UCM network to a Trane Tracer Summit or a 3rd party building automation system, utilizing LonTalk, and allows external setpoint and configuration adjustment and monitoring of status and diagnostics. The LCI-I utilizes an FTT-10A Free Topology transceiver, which supports non-polarity sensitive, free topology wiring, which allows the system installer to utilize star, bus, and loop architectures.This controller works in standalone mode, peer-to-peer with one or more other units, or when connected to a Trane Tracer Summit or a 3rd party building automation system that supports LonTalk. The LCI-I controller is available as a factory or field-installed kit.

Twinning

Twinning is a Master Unit and one, or more, similarly configured Slave Unit(s) operating cooperatively, as a group, to provide higher capacity and/or redundancy at partial capacity.

Twinning requires an LCI module installed in each unit and is accomplished by binding variables between unit communication modules, communicating common setpoints and conditions (temperatures, pressures, fan speeds, damper positions, occupancy, states, etc.) and allowing each unit to run independent algorithms.

Twinned units must share a common supply and return duct network.

Twinned units operate:

a. as part of a Trane ICS™ installation, with Tracer Summit

b. on an interoperable project with a 3rd party LonTalk

c. as an independent group (bound via Rover® or 3rd party tool).

Applications Considerations

Exhaust/Return Fan 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.

The goal is to exhaust approximately 10 percent less air than the amount of outside air going into the building. This maintains a slightly positive building pressure.

The reason for applying either a return, or exhaust fan is to control building pressure. The Trane 100 percent modulating exhaust system with Statitrac is an excellent choice for controlling building pressure in the majority of applications.

For more demanding applications, Trane's 100 percent modulating return fan system with Statitrac is an excellent choice for systems with high return static pressure losses, or duct returns. Both systems employ direct digital control technology to maintain building pressure. Either return or exhaust fan systems with Statitrac may be used on any air handler application that has an outdoor air economizer.

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

With an exhaust fan system, the supply fan motor and drives must be sized to overcome the total system static pressure, including return losses, and pull return air back to the unit during non-economizer operation.

However, a supply fan can typically overcome return duct losses more efficiently than a return air fan system.

Essentially, one large fan by itself is normally more efficient than two fans in series because of only one drive loss, not two as with return fan systems.

In a return fan system, the return fan is in series with the supply fan, and operates continuously whenever the supply fan is operating to maintain return air volume. The supply fan motor and drives are sized to deliver the design CFM based on internal and discharge static pressure losses only.

The return fan motor and drives are sized to pull the return CFM back to the unit based on return duct static. Therefore, with a return fan system, the supply fan ordinarily requires less horsepower than a system with an exhaust fan

IntelliPak™ II Rooftop Air Handler Unit Offers Four Types of Exhaust/Return Fan Systems:

1

100 percent modulating exhaust with Statitrac™ direct space sensing building pressurization control (with or without exhaust variable frequency drives)

2

100 percent modulating exhaust without Statitrac

3

100 percent modulating plenum return airfoil fan with Statitrac direct space sensing building pressurization control with variable frequency drive

4

100 percent modulating plenum return airfoil fan without Statitrac

Drivers for applying either return or exhaust fan systems range from economy, to building pressure control, to code requirements, to generally accepted engineering practices

Application Recommendations

100 Percent Modulating Exhaust with Statitrac Control, Constant Volume and VAV Units

For both CV and VAV air handlers, the 100 percent modulating exhaust discharge dampers (or VFD) are modulated in response to building pressure. A differential pressure control system, Statitrac, uses a differential pressure transducer to compare indoor building pressure to atmospheric pressure.

The FC exhaust fan is turned on when required to lower building static pressure to setpoint. The Statitrac control system then modulates the discharge dampers (or VFD) to control the building pressure to within the adjustable, specified deadband that is set at the Human Interface Panel.

Economizer and return air dampers are modulated independent of the exhaust dampers (or VFD) based on ventilation control and economizer cooling requests.

Advantages:

- The exhaust fan runs only when needed to lower building static pressure.
- Statitrac compensates for pressure variations within the building from remote exhaust fans and makeup air units.
- The exhaust fan discharges in a single direction resulting in more efficient fan operation compared to return fan systems.
- When discharge dampers are utilized to modulate the exhaust airflow, the exhaust fan may be running unloaded whenever the economizer dampers are less than 100 percent open.

The Trane 100 percent modulating exhaust system with Statitrac provides efficient control of building pressure in most applications simply because 100 percent modulating exhaust discharge dampers (or VFD) are controlled directly from building pressure, rather than from an indirect indicator of building pressure, such as outdoor air damper position.

100 Percent Modulating Exhaust System without Statitrac, Constant Volume Units Only

This fan system has performance capabilities equal to the supply fan. The FC exhaust fans are started by the economizer's outdoor air damper position and the exhaust dampers track the economizer outdoor air damper position. The amount of air exhausted by this fan is controlled by modulating discharge dampers at the fan outlet. The discharge damper position is controlled by a signal that varies with the position of the economizer dampers. When the exhaust fans start, the modulating discharge dampers are fully closed, and exhaust airflow is 15 to 20 percent of total exhaust capabilities.

Advantages:

- The exhaust fan runs only when the economizer reaches the desired exhaust enable point.
- Exhaust dampers are modulated based on the economizer position.
- The exhaust fan discharges in a single direction resulting in more efficient fan operation compared to return fan systems.
- When discharge dampers are utilized to modulate the exhaust airflow, the exhaust fan may be running unloaded whenever the economizer dampers are less than 100 percent open.

The Trane 100 percent modulating exhaust system provides excellent linear control of building exhaust in most applications where maintaining building pressure is not important.

100 Percent Modulating Return Fan Systems with Statitrac™ Control, Constant Volume and VAV units

For both CV and VAV applications, the IntelliPak II air handler offers 100 percent modulating return fan systems. A differential pressure control system, Statitrac, uses a differential pressure transducer to compare indoor building pressure to atmospheric pressure. The return fan exhaust dampers are modulated, based on space pressure, to control the building pressure to within the adjustable, specified deadband that is set at the Human Interface Panel. A VFD modulates the return fan speed based on return duct static pressure. Economizer and return air dampers are modulated independent of the exhaust dampers based on ventilation control and economizer cooling requests.

Advantages:

- The return fan operates independently of the supply fan to provide proper balance throughout the airflow envelope.
- Statitrac compensates for pressure variations within the building from remote exhaust fans and makeup air units.
- The return fan acts as both exhaust and return fan based on operation requirements.

The Trane 100 percent modulating return system with Statitrac provides efficient control of building pressure in applications with higher return duct static pressure and applications requiring duct returns.

Exhaust discharge dampers are controlled directly from building pressure, return fan VFD is controlled from return static pressure, and return/economizer dampers are controlled based on ventilation control and economizer cooling requests. 100 Percent Modulating Return Fan without Statitrac™ Control, Constant Volume Units Only

The exhaust discharge dampers are modulated in response to building pressure. The return fan runs continuously while the supply fan is energized.

Economizer and return air dampers are modulated independent of the exhaust dampers based on ventilation control, and economizer cooling requests.

Advantages:

- The exhaust dampers are modulated as needed through a space pressure sensor input to maintain building pressure.
- The return fan discharges in two directions, thereby balancing exhaust and unit return air volumes.

Supply and Return Airflow Configurations

The typical air handler installation has both the supply and return air paths routed through the roof curb and building roof. However, many air handler installations require horizontal supply and/or return from the air handler because of a building's unique design or for acoustic considerations.

With IntelliPak II, there are several ways to accomplish horizontal supply, see Table 1, p. 24 and/or return, see Table 2, p. 24.

Table 1 Supply Airflow Configuration

Cabinet Configuration	Supply Airflow Discharge Direction	Type	Acceptable Application	With Bag Final Filters	With Cartridge Final Filters	With HEPA Final Filters
Standard Length	Downflow - Standard Option	Cooling Only	Yes	No	No	No
Standard Length	Horizontal - Right Side - Standard Option	Cooling Only	Yes	No	No	No
Standard Length	Horizontal - Left Side - Field Convertible	Cooling Only	Field Convert	No	No	No
Standard Length	Downflow - Standard Option	Gas, Electric, Steam, Hot Water Heat	Yes	No	No	No
Standard Length	Horizontal - Right Side - Standard Option	Gas, Electric, Steam, Hot Water Heat	Yes	No	No	No
Standard Length	Horizontal - Left Side - Field Convertible	Gas, Electric, Steam, Hot Water Heat	No	No	No	No
Four Foot Blank Section	Downflow - Standard Option	Cooling Only	Yes	Yes	Yes	Yes
Four Foot Blank Section	Horizontal - Right Side - Standard Option	Cooling Only	Yes	Yes	Yes	Yes
Four Foot Blank Section	Horizontal - Left Side - Field Convertible	Cooling Only	Field Convert	Yes	Yes	Yes
Four Foot Blank Section	Downflow - Standard Option	Gas, Electric, Steam, Hot Water Heat	No	No	No	No
Four Foot Blank Section	Horizontal - Right Side - Standard Option	Gas, Electric, Steam, Hot Water Heat	No	No	No	No
Four Foot Blank Section	Horizontal - Left Side - Field Convertible	Gas, Electric, Steam, Hot Water Heat	No	No	No	No
Eight Foot Blank Section	Downflow - Standard Option	Cooling Only, Steam Heat, Hot Water Heat	Yes	Yes	Yes	Yes
Eight Foot Blank Section	Horizontal - Right Side - Standard Option	Cooling Only, Steam Heat, Hot Water Heat	Yes	Yes	Yes	Yes
Eight Foot Blank Section	Horizontal - Left Side - Field Convertible	Cooling Only, Steam Heat, Hot Water Heat	Field Convert	Yes	Yes	Yes
Eight Foot Blank Section	Downflow - Standard Option	Gas* or Electric	Yes	No	High Temperature	High Temperature
Eight Foot Blank Section	Horizontal - Right Side - Standard Option	Gas* or Electric	Yes	No	High Temperature	High Temperature
Eight Foot Blank Section	Horizontal - Left Side - Field Convertible	Gas* or Electric	Field Convert	No	High Temperature	High Temperature

Table 2 Return Airflow Configuration

AirflowConfig	Exhaust Fan VFD	Exhaust Fan No VFD	Return Fan VFD	Return Fan No VFD
Vertical	Yes	Yes	Yes	Yes
Horizontal - Right	Yes	Yes	Yes	Yes
Horizontal - Left	No	Field Convert	No	No
Horizontal - End	Yes	Yes	No	No

When using an IntelliPak II Air Handler for horizontal supply and/or return, an additional pressure drop must be added to the supply external static to account for the 90 degree turn the air is making. This additional pressure drop depends on airflow and air handler size, but a range of 0.10 inches to 0.30 inches can be expected. The openings on the air handler all have a one inch lip around the perimeter to facilitate ductwork attachment.

Corrosive Atmospheres

Trane's IntelliPak II Air Handlers are designed and built to industrial standards and will perform to those standards for an extended period depending on the hours of use, the quality of maintenance performed, and the regularity of that maintenance. One factor that can have an adverse effect on unit life is its operation in a corrosive environment.

Because copper is more resistant to corrosion than aluminum, coil life expectancy is greatly increased.

Ventilation Override Sequences

One of the benefits of using an exhaust fan rather than a return fan, in addition to the benefits of lower energy usage and improved building pressurization control, is that the air handler can be used as part of a ventilation override system. Several types of sequences can be easily done when exhaust fans are a part of the air handling system.

What would initiate the ventilation override control sequence? Typically, a manual switch is used and located near the fire protection control panel. This enables the fire department access to the control for use during or after a fire. It is also possible to initiate the sequence from a field-installed automatic smoke detector. In either case, a contact closure begins the ventilation override control sequence.

⚠CAUTION!

The ventilation override system should not be used to signal the presence of smoke caused by a fire.

Trane can provide five (5) different ventilation override sequences on both CV and VAV IntelliPak II Air Handlers. For convenience, the sequences are factory preset but are fully field edited from the Human Interface Panel or Tracer™. Any or all five sequences may be "locked" in by the user at the Human Interface Panel.

The user can customize up to five (5) different override sequences for purposes such as smoke control. The following parameters within the unit can be defined for each of the five sequences:

- Supply Fan - on/off
- Inlet Guide Vanes - open/closed/controlling
- Variable Frequency Drives - on (60 Hz)/off (0 Hz)/controlling
- Exhaust/Return Fan - on/off
- Exhaust Dampers - open/closed
- Economizer dampers - open/closed
- Heat - off/controlling (output for) VAV Boxes - open/controlling

Factory preset sequences include unit Off, Exhaust, Purge, Purge with duct pressure control, and Pressurization. Any of the user-defined Ventilation Override sequences can be initiated by closing a field supplied switch or contacts connected to an input on the Ventilation Override Module. If more than one ventilation override sequence is being requested, the sequence with the highest priority is initiated. Refer to the Ventilation Override Module (VOM) page 17 in the Control section of this catalog for more details on each override sequence.

Natural Gas Heating Considerations

Trane uses heavy gauge 304 L stainless steel throughout the construction of its natural gas drum and tube heat exchangers for the IntelliPak II product. These heat exchangers can be applied with confidence, particularly with full modulation control, when mixed air temperatures are below 50°F, and low ambient temperatures can cause condensation to form on the heat exchanger. IntelliPak II natural gas heat exchangers are not recommended for applications with mixed air conditions entering the heat exchanger below 30°F to insure adequate leaving air heating temperature.

For airflow limitations and temperature rise across the heat exchanger information, see Table 27, p. 70.

Acoustical Considerations

The ideal time to make provisions to reduce sound transmission to the space is during the project design phase. Proper placement of air handler equipment is critical to reducing transmitted sound levels to the building. The most economical means of avoiding an acoustical problem is to place any air handler equipment away from acoustically critical areas. If possible, air handling equipment should not be located directly above areas such as: offices, conference rooms, executive office areas and classrooms. Ideal locations are above corridors, utility rooms, toilet facilities, or other areas where higher sound levels are acceptable.

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

1

Locate the unit's center of gravity close to or over a column or main support beam to minimize roof deflection and vibratory noise.

2

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

3

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 transmission. The ASHRAE publication "A Practical Guide to Noise and Vibration Control for HVAC Systems" also provides valuable information.

There are several other sources of unit sound, i.e., supply fan, exhaust/return fans, and aerodynamic noise generated at the duct fittings. Refer to the ASHRAE Applications Handbook, Chapter 47, 2003 edition for guidelines for minimizing the generation of aerodynamic noise associated with duct fittings. A good source of information on general acoustical considerations for air handlers is the 2000 ASHRAE Journal article titled, "Controlling Noise from Large Rooftop Units".

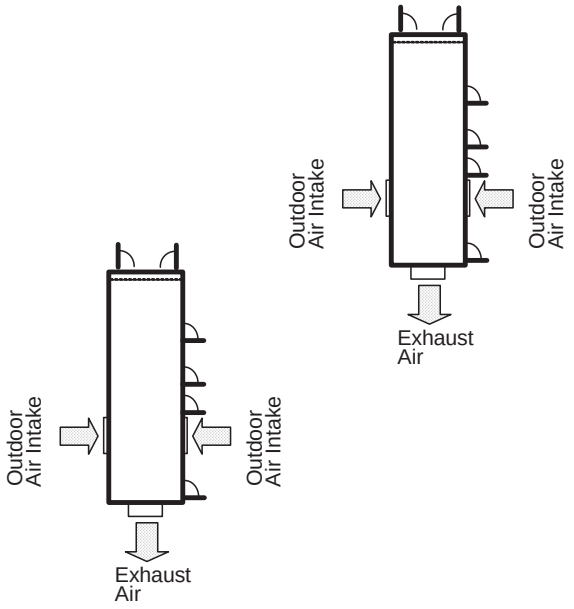
The Trane Acoustic Program (TAP) allows complete modeling of air handler acoustical installation parameters. The software models airborne sound from supply and return ducts, as well as duct breakout and roof transmission sound, so that the designer can identify potential sound problems and make design alterations before equipment installation. Output of the program shows the resulting NC (or RC) level for any point in the occupied space. TAP is also capable of modeling the effect of outdoor sound on the surrounding area. This program is available from Trane's Customer Direct Service Network™ (C.D.S.), ask your local Trane representative for additional information on this program.

Clearance Requirements

The recommended clearances identified in Figure 31, p. 85 should be maintained to assure adequate service capability, maximum capacity and peak operating efficiency. 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 coils?
- Do the clearances available allow for proper outside air intake and exhaust air removal?
- If screening around the unit is being used, is there a possibility of air recirculation from the exhaust to the outside air intake?

Figure 15. Unit Placement



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, see Figure 15, p. 26, 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 air handler can be met only if the air handler 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 air handler 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 air handler 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 air handler outlet should be directed at the outside radius of the elbow rather than the inside as illustrated in Figure 16, p. 27.

Protecting Hydronic Coils From Freezing

Taking in outdoor air to satisfy Standard 62's ventilation requirement increases the likelihood of air stratification. If a layer of air below freezing moves through the air handler, it can damage unprotected hydronic cooling and heating coils.

When a dangerously low air temperature is detected by the low-limit thermostat on the entering-air side of the coil, it will trip. That triggers the water valve to fully open, the supply fan to stop, the outdoor air damper to close and ultimately degrades the building's indoor air quality.

Two options that can be implemented to continue taking in outdoor air and avoid coil damage or tripping the low-limit thermostat include:

- Draining the coils
- Adding glycol to the cooling system water to lower its freezing point

External Piping Enclosure

Space inside the piping enclosure limits the ability to house control valves and actuators along with coil supply and return piping.

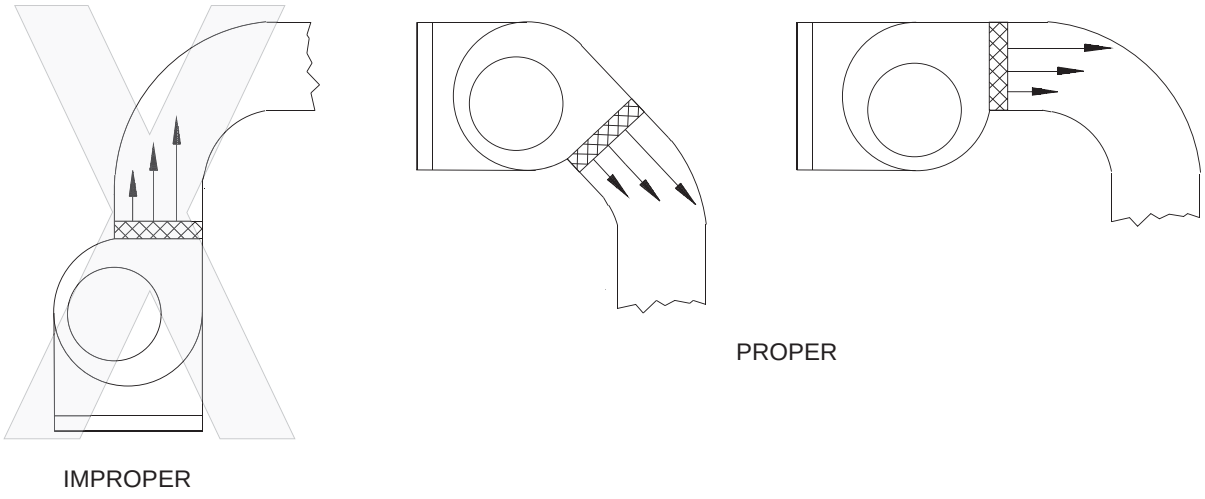


Figure 16. Duct Design

Selection Procedure

This section outlines a step-by-step procedure that may be used to select a Trane air handler. The sample selection is based on the following conditions:

Summer Design:

- Summer outdoor design conditions - 95 DB/76 WB ambient temperature
- Summer room design conditions -78 DB/65 WB
- Total cooling load - 980 MBH (81.6 tons)
- Sensible cooling load - 735 MBH (61.25 tons)
- Outdoor air ventilation load - 154.0 MBH (12.8 tons)
- Return air temperature - 78 DB/65 WB

Winter Design:

- Winter outdoor design condition is 0°F.
- Total return air temperature is 70°F.
- Total heating load - 720 MBH
- Winter outdoor air ventilation load - 288.6 MBH
- Total winter heating load - 1008.6 MBH

Air Delivery Data:

- Supply fan CFM - 36000 CFM
- Supply duct static pressure - 1.86 2.2 in wg
- Minimum outdoor air ventilation - 3600 CFM
- Exhaust fan CFM - 36000 CFM
- Return air duct negative static pressure - 0.3 in wg

Electrical Characteristics:

- Voltage/cycle/phase - 460/60/3

Unit Accessories:

- Gas fired heat exchanger - High Heat
- Downflow supply and upflow return
- High Efficiency Throwaway filters
- Economizer
- Modulating 100 percent exhaust

Cooling Capacity Selection:

Step 1 - Coil and Fan Selection

A summation of the peak cooling load and the outside air ventilation load shows: 980 MBH + 154.0 MBH = 1134.0 MBH required unit capacity.

The supply fan air flow requirement is 36,000 cfm.

From Table 10, p. 39, a 4 row W coil with 144 fpf (fins per foot) and no turbulators at 80 DB/67 WB and 36000 supply air cfm has a total cooling capacity of 1336 MBH and sensible cooling capacity of 969 MBH. With chilled water coil capacity data at 80 DB/67 WB only, TOPSS is required for an accurate selection at other conditions. TOPSS is also required to select the correct water control valve for proper flow control, in this case a 2 ½ "or 3" valve.

Table 3, p. 34 - General Data shows that air handler "C" can provide 36000 total supply CFM.

Thus air handler "C" with a 4 row 144 fpf W coil having no turbulators at 45°F entering water and a 10°F rise with a 2 ½" valve is selected. The coil water flow rate is 266 GPM and water side pressure drop is 13.7 ft of water.

Step 2 - Cooling Coil Entering Conditions

Mixed air dry bulb temperature determination:

Using the minimum percent of OA (3600 CFM ÷ 36000 CFM = 10 percent), determine the mixture dry bulb to the cooling coil.

RADB + % OA (OADB - RADB) = 78 + (0.10) (95 - 78) = 78 + 1.5 = 79.5°F

Approximate wet bulb mixture temperature:

RAWB + % OA (OAWB - RAWB) = 65 + (0.10) (76 - 65) = 65 + 1.1 = 66.1°F

Step 3 - Determine Supply Fan Motor Heat Gain

Having selected air handler casing "C" with a 4 row 144 fpf W coil and no turbulators, the supply fan BHP can be calculated.

The supply fan motor heat gain must be considered in final determination of unit capacity.

Supply Air Fan

Determine unit total static pressure at design supply CFM:

Supply Duct Static Pressure	2.2"
Chilled Water Coil Table 33, p. 72	0.64"
Return Duct Negative Static Pressure	0.30"
Heat Exchanger Table 34, p. 72	0.03"
Throwaway Filter Table 35, p. 73	0.26"
Return Damper Table 34, p. 72	0.34"
Economizer Damper[(i)] Table 34, p. 72	0.57"
Unit Total Static Pressure	4.0"

[(i)] Add either the economizer damper value or return damper value, depending on which static pressure is greater. (Do not use both.)

Using total of 36000 CFM and total static pressure of 4.0 inches, enter Table 17, p. 48. The table shows 40.4

BHP with 1097 rpm required for the 36" supply fan.

From Figure 17, p. 30 supply fan motor heat gain = 109.0 MBH, or 109.0 MBH x 1000 ÷ (36000 CFM x 1.085) = 2.8°F supply fan motor heat

Step 4 - Determine Total Required Cooling Capacity

Required capacity = Total peak load + OA load + supply air fan motor heat

Required capacity = 980.0 + 154.0 + 109.0 = 1243.0 MBH

Step 5 - Determine Unit Capacity

The coil entering air conditions of 79.5 DB/66.1 WB are close to the capacity data table at 80 DB/67 WB used for the original selection. The unit capacity with the 4 row 144 fpf W coil with no turbulators at 45°F entering water a 10°F rise, 36000 cfm supply air flow and 10% outside air

at 95°F is approximatly 1336 MBH total cooling and 969 MBH sensible cooling capacity.

Step 6 - Determine Leaving Air Temperature

Unit sensible heat capacity corrected for supply air fan motor heat = 969 MBH Sensible - 109.0 MBH Motor

Heat = 860 MBH.

Supply air dry bulb temperature difference =

Sensible MBH X 1000/1.085 x Supply CFM

Sensible Btu = 860 MBH x 1000 ÷ (1.085 x 36000 CFM) = 22°F

Supply air dry bulb = 79.5 DB - 22 = 57.5°F Leaving the cooling coil

Supply air wet bulb temperature difference = (need in RTU catalog too)

Total MBH x 1000 ÷ 4.5 x Supply CFM =

Unit enthalpy difference = 1336 MBH x 1000 ÷ (4.5 x 36000 CFM) = 8.25 Btu/lb.

Leaving enthalpy = h (ent WB) - h (diff). From Table 6, p. 37, p. 40 h (ent WB) =

30.9 Btu/lb.

Leaving enthalpy = 30.9 Btu/lb. - 8.25

Btu/lb. = 22.65 Btu/lb.

Supply air wet bulb = 54.0 Leaving the cooling coil.

Leaving air temperature = 57.5 DB/ 54.0 WB

Heating Capacity Selection

Step 1 - Determine Air Temperature Entering Heating Module

Mixed air temperature = RADB + % OA (OADB - RADB) = 70 + (0.10) (0 - 70) = 63°F

Supply air fan motor heat temperature rise = 109000 Btu ÷ (1.085 x 36000 CFM) = 2.8°F

Air temperature entering heating module = 63.0 + 2.8 = 65.8°F

Step 2 - Determine Total Winter Heating Load

Total winter heating load = peak heating load + ventilation load - supply fan motor heat = 720 + 288.6 - 109.0 = 899.6 MBH

Electric Heating System

Unit operating on 460/60/3 power supply.

From Table 29, p. 70, kw may be selected for a nominal 105 ton air handler "C" unit operating at 460-volt power. The 265 kw heat module (904.4 MBH) will satisfy the winter heating load of 899.6 MBH.

Table 28, p. 70 shows an air temperature rise of 23.2°F for 36000 CFM through the 265 kw heat module.

Unit supply temperature at design heating conditions = mixed air temperature + air temperature rise = 65.8°F + 23.2°F = 89.0°F.

Gas Heating System (Natural Gas)

From Table 27, p. 70 select the high heat module (1440 MBH output) to satisfy winter heating load of 899.6 MBH at unit CFM.

Table 27, p. 70 also shows an air temperature rise of 37.0°F for 36000 CFM through the heating module.

Unit supply temperature at design heating conditions = mixed air temperature + air temperature rise = 65.8°F + 37.0°F = 102.8°F.

Hot Water Heating System

Using a hot water supply temperature of 190°F and an entering

coil temperature of 65.8°F.

Subtract the mixed air temperature from the hot water temperature to determine the ITD (initial temperature difference).

ITD = 190°F - 65.8°F = 124.2°F. Divide the winter heating load by ITD = 1008.6 MBH ÷ 124.2°F = 8.12 Q/ ITD.

From Table 30, p. 71, select the low heat module. By interpolation, a Q/ ITD of 8.12 can be obtained at a gpm of 41. Water pressure drop at 41 gpm is 0.34 ft. of water.

Heat module temperature rise is determined by:

Total Btu = 1.085 x CFM x Air temperature rise, °F 1008600 / 1.085 / 36000 = 25.8°F

Unit supply air temperature = mixed air temperature + air temperature rise = 65. 8 + 25.8 = 91.6°F.

Steam Heating System

Using a 15 psig steam supply. From Table 31, p. 71, the saturated temperature steam is 250°F. Subtract mixed air temperature from the steam temperature to determine ITD.

ITD = 250°F - 65.8°F = 184.2°F.

Divide winter heating load by ITD = 1008.6 MBH ÷ 184.2°F = 5.48 Q/ITD.

Table 31, p. 71, select the low heat module. The low heat module at 36000 cfm has a Q/ITD = 7.44

Heat module capacity, Q = ITD x Q/ ITD = 185°F x 7.44Q/ITD = 1376 MBH

Heat module air temperature rise is determined by:

Total Btu = 1.085 x CFM x Air temperature rise, °F 1376000 / 1.085 / 36000 = 35.2°F

Unit supply temperature at design conditions = mixed air temperature + air temperature rise = 65.8°F + 35.2°F = 100.1°F.

Air Delivery Procedure

Supply fan performance tables include internal resistance of air handler.

For total static pressure determination, system external static must be added to appropriate component static pressure drop cooling coil, filters, optional economizer, optional exhaust fan, optional heating system, optional cooling only extended casing).

Supply Fan Motor Sizing

The supply fan motor selected in the cooling capacity determination was 40.4 BHP and 1097 RPM. Thus, a 40 HP supply fan motor is selected.

Enter Table 39, p. 77 to select the proper drive. For anair handler "C" with 40 HP motor, a drive letter A - 1100 RPM is selected.

Exhaust Fan Motor Sizing

The exhaust/return fan is selected based on total return system negative static pressure and exhaust fan CFM. Return system negative static includes return duct static, and any other job site applicable static pressure drop.

Return duct static pressure = 0.30 inches.

Total return system negative static pressure = 0.30 inches.

Exhaust fan CFM = 36000 CFM

From Table 39, p. 77 the required BHP is 21.44 BHP at 400 RPM. Thus, the exhaust fan motor selected is 25 HP.

To select a drive, enter Table 37, p. 75 for a 25 HP motor and air handler "C". Drive selection number 4 - 400 RPM.

Return Fan Motor Sizing

The same static pressure and CFM considerations must be taken for return fan size, horsepower, and drive selection as are required for exhaust fan sizing. However, since the return fan runs continuously the sensible heat generated by the return fan motor must be included in the entering evaporator coil mixed air temperature equation.

In this selection, if the return motor BHP is equal to the exhaust motor BHP, 21.44 BHP = 58.1 MBH x 1000÷ (1.085 x 36000 Return CFM) = 1.5°F added to the return air temperature. Where altitudes are significantly above sea level, use Table 6, p. 37, Table 7, p. 37 and Table 8, p. 37 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 section of this catalog.

Altitude Corrections

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

Figure 18, p. 37 shows the air density ratio at various temperatures and elevations.

The procedure to use when selecting a supply or exhaust/return fan at elevations and

temperatures other than standard is as follows:

1. First, determine the air density ratio using Figure 18, p. 37.
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 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 an air handler"C" that is to deliver 32000 actual CFM at 3-inches total static pressure (tsp), 55°F leaving air temperature, at an elevation of 5000 ft.

1. From Figure 18, p. 37, the air density ratio is 0.86.
2. Tsp = 3.0-inches / 0.86 = 3.49 inches tsp.
3. From fan performance Table 17, p. 48 air handler"C" (without inlet vanes) will deliver 32000 CFM at 3.49 inches TSP at 997 RPM and 30.27 BHP.
4. The RPM is correct as selected - 997 RPM.
5. BHP = 30.27 x 0.86 = 26.3 BHP actual.

Cooling coil MBH should be calculated at standard and then converted to actual using the correction factors in Table 6, p. 37, Table 7, p. 37, Table 8, p. 37. Apply these factors to the capacities selected at standard CFM so as to correct for the reduced mass flow rate across the condenser.

Heat selections other than gas heat will not be affected by altitude. Nominal gas capacity (output) should be multiplied by the factors given in Table 8, p. 37 before calculating the heating supply air temperature.

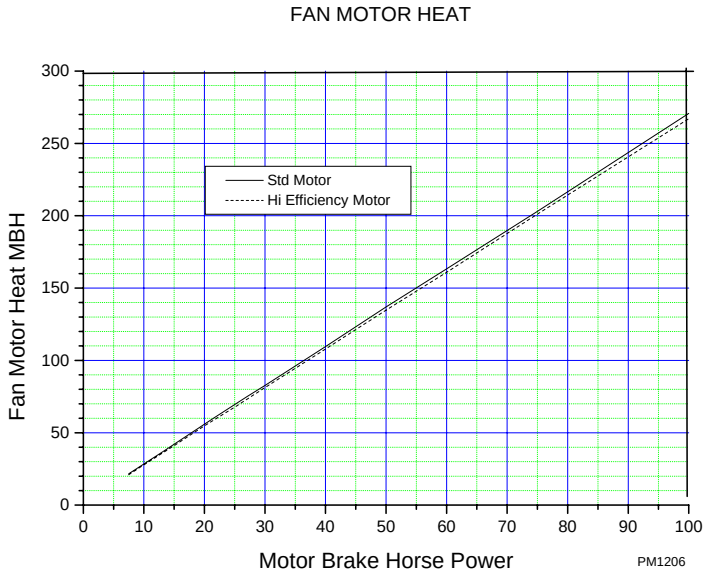


Figure 17. Fan Motor Heat

Model Number Description

W	E	H	C	A00	4	0	A	0	4	1	1	F	7	0	0	0	1	A	0	0	0	0	A	0	D	0	A	0	0	0	0	0	0	0	0
1	2	3	4	567	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38

DIGIT 1 — UNIT TYPE

W Self-Contained (Packaged Air Handler)

DIGIT 2 — UNIT FUNCTION

E Electric Heat
F Natural Gas Heat
L Hot Water Heat
S Steam Heat
X No Heat

DIGIT 3 — SYSTEM TYPE

H Single Zone

DIGIT 4 — DEVELOPMENT SEQUENCE

C Third

DIGIT 5 — UNIT SIZE

A 16,000 - 31,000 CFM
B 20,000 - 38,000 CFM
C 20,000 - 45,000 CFM

DIGIT 6 — COOLING COIL

0 No Cooling Coil
2 2 Row Chilled Water
4 4 Row Chilled Water
6 6 Row Chilled Water
8 8 Row Chilled Water

DIGIT 7 — CHILLED WATER COIL FIN SERIES

0 No Chilled Water Coil
A Series 80 without Turbulators
B Series 80 with Turbulators
C Series 108 without Turbulators
D Series 108 with Turbulators
E Series 144 without Turbulators
F Series 144 with Turbulators
G Series 168 without Turbulators
H Series 168 with Turbulators

DIGIT 8 — VOLTAGE SELECTION

4 460/60/3 XL
5 575/60/3 XL

DIGIT 9 — HEAT CAPACITY SELECTION

0 No Heat
1 Electric Heat 90 kW
2 Electric Heat 140 kW
3 Electric Heat 265 kW
4 Electric Heat 300 kW
A Low Gas Heat - 2 stage
B Medium Gas Heat - 2 stage
C High Gas Heat - 2 stage
D Low Gas Heat - Modulating
E Medium Gas Heat - Modulating
F High Gas Heat - Modulating

Low Heat Options

H Low Heat - 1.25 in. (32mm) Valve
J Low Heat - 1.5 in. (38mm) Valve
K Low Heat - 2.0 in. (50mm) Valve
L Low Heat - 2.50 in. (64mm) Valve
M Low Heat - 3.0 in. (76mm) Valve

High Heat Options

P High Heat - 1.25 in.(32mm) Valve
Q High Heat - 1.5 in. (38mm) Valve
R High Heat - 2.0 in. (50mm) Valve
T High Heat - 2.50 in. (64mm) Valve
U High Heat - 3.0 in. (76mm) Valve

DIGIT 10 & 11— DESIGN SEQUENCE

AO

DIGIT 12 — UNIT CONFIGURATION SELECTION

4 1 Piece Unit - without Blank Section
5 1 Piece Unit with 4 ft. Blank Section
6 1 Piece Unit with 8 ft. Blank Section

DIGIT 13 — AIRFLOW DIRECTION

1 Downflow Supply/Upflow Return
2 Downflow Supply/Horizontal End Return
3 Downflow Supply/Horizontal Right Return
4 Right Side Horizontal Supply/ Upflow Return
5 Right Side Horizontal Supply/ Horizontal End Return
6 Right Side Horizontal Supply/ Horizontal Right Return

DIGIT 14 — FAN MOTOR SELECTION

1 Standard Efficiency Motor(s)
2 High Efficiency Motor(s)
3 TEFC High Efficiency Motor(s)

DIGIT 15 — SUPPLY FAN MOTOR SELECTION

F 15 Hp
G 20 Hp
H 25 Hp
J 30 Hp
K 40 Hp
L 50 Hp
M 60 Hp
N 75 Hp

DIGIT 16 — SUPPLY FAN RPM SELECTION

7 700
8 800
9 900
A 1000
B 1100
C 1200
D 1300
E 1400
F 1500
G 1600
H 1700
J 1800
K 1900
L 2000

DIGIT 17 — EXHAUST/RETURN FAN OPTIONS

0 None
1 High CFM Exhaust w/o Statitrac CV Only
2 Low CFM Exhaust w/o Statitrac CV Only
3 High CFM Exhaust w/o VFD w/ Statitrac
4 Low CFM Exhaust w/o VFD w/ Statitrac
5 High CFM Exhaust w/ VFD w/ Bypass w/ Statitrac
6 Low CFM Exhaust w/ VFD w/ Bypass w/ Statitrac
7 High CFM Exhaust w/ VFD w/o Bypass w/ Statitrac
8 Low CFM Exhaust w/ VFD w/o Bypass w/ Statitrac

A Return w/o Statitrac CV Only
C Return w/ VFD w/ Bypass w/ Statitrac
E Return w/ VFD w/o Bypass w/ Statitrac

DIGIT 18 — EXHAUST/RETURN FAN MOTOR SELECTION

0 None
D 7.5 Hp
E 10 Hp
F 15 Hp
G 20 Hp
H 25 Hp
J 30 Hp
K 40 Hp
L 50 Hp
M 60 Hp

DIGIT 19 — EXHAUST/RETURN RPM SELECTION

0 None
3 300
4 400
5 500
6 600
7 700
8 800
9 900
A 1000
B 1100
C 1200
D 1300
E 1400

DIGIT 20 — SYSTEM CONTROL SELECTION

1 Constant Volume (Zone Temperature Control)
2 VAV w/o Inlet Guide Vanes (Discharge Air Control)
3 VAV w/ Inlet Guide Vanes (Discharge Air Control)
4 VFD Supply w/o Bypass (Discharge Air Control)
5 VFD Supply w/Bypass (Discharge Air Control)

DIGIT 21 — FRESH AIR AND ECONOMIZER OPTIONS/ CONTROLS

A 0 - 25 % Motorized Damper
B Econ w/Dry Bulb
C Econ w/Reference Enthalpy
D Econ w/Comparative Enthalpy
E Econ w/Fresh Air Measure /Dry Bulb
F Econ w/ Fresh Air Measure /Ref Enth
G Econ w/Fresh Air Measure /Comp Enth
H Econ w/DCV /Dry Bulb
J Econ w/DCV /Ref Enth
K Econ w/DCV /Comp Enth

DIGIT 22 — DAMPER OPTION

0 Standard
1 Low Leak
2 Ultra Low Leak

DIGIT 23 — PRE COOLING COIL FILTER SELECTION

0 2" High Efficiency Throw Away
1 2" Throw Away Rack / Less Filters
2 90 - 95%, Bag Filters w/ Pre Filters
3 Bag Filter Rack / Less Filters
4 90 - 95%, Cartridge Filters w/ Pre Filters
5 Cartridge Rack / Less Filters
6 90 - 95% Low PD Cartridge w/ Pre Filters
7 Low PD Cartridge Rack / Less Filters

DIGIT 24 — BLANK SECTION APPLICATION OPTIONS

0 None
A 90 - 95% Bag w/Pre Filters
B 90 - 95% Low PD Cartridge w/ Pre Filters
C 90 - 95%, Cartridge Filters w/ Pre Filters
D 90 - 95% Hi Temp Cartridge w/ Pre Filters
E HEPA w/Pre Filters
F Hi Temp HEPA w/Pre Filters

DIGIT 25 — FUTURE DEVELOPMENT

0

DIGIT 26 — UNIT MOUNTED POWER CONNECTION SELECTION

A Terminal Block
B Non Fused Disconnect
C Non Fused Disconnect w/ Pwrd conv outlet
D Circuit Breaker w/ SCWR
E Ckt Brkr w/ SCWR/ Pwrd conv outlet

DIGIT 27 — (FUTURE DEVELOPMENT)

0 None

DIGIT 28 — COIL/DRAIN PAN

D No Drain Pan
E Galvanized Drain Pan
F Cooling Coil - Galv DP
G Cooling Coil - Stnls Steel DP

DIGIT 29 — CHILLED WATER COIL VALVE

0 None
A 1.5" Cooling Valve
B 2" Cooling Valve
C 2.5" Cooling Valve
D 3" Cooling Valve

DIGIT 30 — (FUTURE DEVELOPMENT)

0 None

DIGIT 31 — (FUTURE DEVELOPMENT)

0 None

DIGIT 32 — HIGH DUCT TEMPERATURE THERMOSTAT

0 None
1 High Duct Temp Thermostat

DIGIT 33 — REMOTE HUMAN INTERFACE

0 None
1 RHI & IPCB
2 IPCB

DIGIT 34 — MODULE OPTIONS

0 None
A 0-5 Volt GBAS
B 0-10 Volt GBAS
C 0-5 / 0-10 Volt GBAS
F LCI
D Ventilation Override
G 0-5 Volt GBAS / Ventilation Override
H 0-10 Volt GBAS / Ventilation Override
J 0-5 / 0-10 V GBAS / Ventilation Override
L LCI / Ventilation Override

DIGIT 35 — ZONE SENSOR OPTION

0 None
A Dual Setpoint w/Man/Auto Changeover
B Dual Stpt w/Man/Auto Chgovr & Sys Lights
C Room Sensor w/Timed Override & Cancel
D Room Snsr w/TO & Cancel & Local Stpt Adj
E CV Programmable Night Setback
F VAV Programmable Night Setback
G VAV w/System Lights

DIGIT 36 — AGENCY APPROVAL OPTION

0 None
1 UL/CSA

DIGIT 37 — SERVICE ENHANCEMENTS

0 Single Side Access Doors
A Dual Side Access Doors
B Single Side Access Doors / Marine Lights
C Dual Side Access Doors / Marine Lights

DIGIT 38 — BELT GUARDS/ BURGLAR BARS/MARINE LIGHTS

0 None
1 Belt Guards
2 Burglar Bars
3 Belt Guards / Burglar Bars

General Data

Table 3 General Data (All dimensions in inches)

	Casing A	Casing B	Casing C
Supply Fans Std CFM			
Number/Size/Type	1/25/ DW AF	1/32/ DW AF	1 / 36 DW AF
Number of Motors	1	1	1
HP Range	15 - 50	15 - 60	15 - 75
CFM Range/CFM at Max SP	16000-31000/22000	20000-38000/32000	23000-45000/40000
Total SP Range-(In. WG)	7.5	7.5	7.5
Exhaust Fans Std CFM			
Number/Size/Type	1/25/ DW FC	1/28/ DW FC	1 / 32 DW FC
Number of Motors	1	1	1
HP Range	7.5 - 25 hp	7.5 - 50 hp	15 - 60 hp
CFM Range/CFM at Max SP	10000-28000/24000	13000-35000/30000	23000-40000/40000
ESP Range-(In. WG)	2.5	2.5	2.5
Exhaust Fans Low CFM			
Number/Size/Type	-	1/25/ DW FC	1/28/ DW FC
Number of Motors	-	1	1
HP Range	-	7.5 - 25 hp	7.5 - 50 hp
CFM Range/CFM at Max SP	-	10000-28000/24000	13000-35000/30000
ESP Range-(In. WG)	-	2.5	2.5
Return Fans Std CFM			
Number/Size/Type	1/36/ Plenum	1 / 40 Plenum AF	1 / 44.5 Plenum AF
Number of Motors	1	1	1
HP Range	7.5 - 40 hp	10 - 40 hp	10 - 40 hp
CFM Range/CFM at Max SP	16000-31000	20000-38000	23000- 44000/39000
ESP Range-(In. WG)	2.5	2.5	2.5
Electric Heat (60 Hz)			
kw	90-265	90-300	140-300
Circuit Capacity Steps	30 - 37.5 kW	30 - 37.5 kW	35 - 37.5 kW
Natural Gas Heat			
2-Stage Gas Heat			
Low Heat Input (MBH)	850	850	850
Mid Heat Input/Output (MBH)	1100	1100	1100
High Heat Input/Output (MBH)	1800	1800	1800
Standard Heating Capacity Steps	2	2	2
Fully Modulating Steps			
Low Heat Input (MBH)	10:1	10:1	10:1
Mid Heat Input (MBH)	20:1	20:1	20:1
High Heat Input (MBH)	20:1	20:1	20:1
Heat Exchanger Material	Stainless Steel	Stainless Steel	Stainless Steel
Chilled Water Coil			
Size (inches)	42 x 115	42 x 115	42 x 115
Rows	2, 4, 6, or 8	2, 4, 6, or 8	2, 4, 6, or 8
Quantity	2	2	2
Type	5W, W, or WD	5W, W, or WD	5W, W, or WD
Fin Series	80, 108, 144, or 168	80, 108, 144, or 168	80, 108, 144, or 168
Turbulators	Turbulators Available	Turbulators Available	Turbulators Available
Hot Water Coil			
Size	33 x 88 x 2 rows	33 x 88 x 2 rows	33 x 88 x 2 rows
Quantity	2	2	2
Type	5W, PrimaFlo	5W, PrimaFlo	5W, PrimaFlo
High Heat (fins/ft)	122	122	122
Low Heat (fins/ft)	80	80	80
Steam Coil			
Size	33 x 88 x 1 row	33 x 88 x 1 row	33 x 110 x 1 row
Quantity	2	2	2
Type	NS, SigmaFlo	NS, SigmaFlo	NS, SigmaFlo
High Heat (fins/ft)	112	112	112
Low Heat (fins/ft)	62	62	62

Table 3 General Data (All dimensions in inches)

	Casing A	Casing B	Casing C
Filters			
Standard 2" High Efficiency Throwaway Filters			
Number/Size	21 - 20X24X2 5 - 12X24X2	21 - 20X24X2 5 - 12X24X2	21 - 20X24X2 5 - 12X24X2
Face area (Ft^2)	80	80	80
90-95% Bag Filters w/Prefilters			
Number/Size	21 - 20X24X19 5 - 12X24X19	21 - 20X24X19 5 - 12X24X19	21 - 20X24X19 5 - 12X24X19
Face area (Ft^2)	80	80	80
Prefilters	21 - 20X24X2	21 - 20X24X2	21 - 20X24X2
Number/Size	5 - 12X24X2	5 - 12X24X2	5 - 12X24X2
90-95% Cartridge Filters w/ Prefilters			
Number/Size	21 - 20X24X2 5 - 12X24X2	21 - 20X24X2 5 - 12X24X2	21 - 20X24X2 5 - 12X24X2
Face area (Ft^2)	80	80	80
Prefilters	21 - 20X24X2	21 - 20X24X2	21 - 20X24X2
Number/Size	5 - 12X24X2	5 - 12X24X2	5 - 12X24X2
90-95% Low Pressure Drop Cartridge Filters w/Prefilters			
Number/Size	21 - 20X24X2 5 - 12X24X2	21 - 20X24X2 5 - 12X24X2	21 - 20X24X2 5 - 12X24X2
Face area (Ft^2)	80	80	80
Prefilters	21 - 20X24X2	21 - 20X24X2	21 - 20X24X2
Number/Size	5 - 12X24X2	5 - 12X24X2	5 - 12X24X2
Final Filters			
90-95% Low Pressure Drop Cartridge Filters w/Prefilters[i]			
Number/Size	15 - 24X24X12 7 - 12X24X12	15 - 24X24X12 7 - 12X24X12	15 - 24X24X12 7 - 12X24X12
Face area (Ft^2)	74	74	74
Prefilters	15 - 24X24X4	15 - 24X24X4	15 - 24X24X4
Number/Size	7 - 12X24X4	7 - 12X24X4	7 - 12X24X4
90-95% Bag Filters w/Prefilters[ii]			
Number/Size	15 - 24X24X19 7 - 12X24X19	15 - 24X24X19 7 - 12X24X19	15 - 24X24X19 7 - 12X24X19
Face area (Ft^2)	74	74	74
Prefilters	15 - 24X24X2	15 - 24X24X2	15 - 24X24X2
Number/Size	7 - 12X24X2	7 - 12X24X2	7 - 12X24X2
Final Filters			
90-95% Cartridge Filters[ii]			
Number/Size	15 - 24X24X12 7 - 12X24X12	15 - 24X24X12 7 - 12X24X12	15 - 24X24X12 7 - 12X24X12
Face area (Ft^2)	74	74	74
Prefilters	15 - 24X24X2	15 - 24X24X2	15 - 24X24X2
Number/Size	7 - 12X24X2	7 - 12X24X2	7 - 12X24X2
90-95% High Temp Cartridge Filters[iii]			
Number/Size	15 - 24X24X12 7 - 12X24X12	15 - 24X24X12 7 - 12X24X12	15 - 24X24X12 7 - 12X24X12
Face area (Ft^2)	74	74	74
Prefilters	15 - 24X24X2	15 - 24X24X2	15 - 24X24X2
Number/Size	7 - 12X24X2	7 - 12X24X2	7 - 12X24X2
HEPA Filters[ii] w/Prefilters			
Number/Size	15 - 24X24X12 7 - 12X24X12	15 - 24X24X12 7 - 12X24X12	15 - 24X24X12 7 - 12X24X12
Face area (Ft^2)	74	74	74
Prefilters	15 - 24X24X2	15 - 24X24X2	15 - 24X24X2
Number/Size	7 - 12X24X2	7 - 12X24X2	7 - 12X24X2
Final Filters			
High Temp HEPA Cartridge Filters w/ Prefilters[iii]			
Number/Size	15 - 24X24X12 7 - 12X24X12	15 - 24X24X12 7 - 12X24X12	15 - 24X24X12 7 - 12X24X12
Face area (Ft^2)	74	74	74
Prefilters	15 - 24X24X2	15 - 24X24X2	15 - 24X24X2
Number/Size	7 - 12X24X2	7 - 12X24X2	7 - 12X24X2

(i) High Airflow Applications of Cooling only/Steam and Hot Water Units require 4" High Efficiency Throw Away Prefilters with the 90-95% Low PD Cartridge Filter Option.

(ii) Standard Airflow Applications of Cooling only/Steam and Hot Water Units include 2" High Efficiency Throw Away Prefilters with the 90-95% Bag and HEPA Filter Options.

(iii) Gas/Electric Units require 2" High Efficiency High Temperature Rated Throwaway Prefilters with High Temperature Rated 90-95% Cartridge and HEPA filter options.

Table 4 Gas Heat Inputs/Input Ranges

TWO-STAGE GAS HEAT			
Standard Gas Heat Input (MBH)	**Low Gas Heat Inputs (MBH)**	**High Fire Heat Input (MBH)**	**Modulating Gas Heat Range (MBH)**
850	425	850	85-850
1100	550	1100	55-1100
1800	900	1800	90-1800

Table 5 Economizer Outdoor Air Damper Leakage (at rated airflow)[(i)]

Standard Damper	20
Optional “Low Leak" Damper	10 (Class 2 AMCA 511-99)
Optional “Ultra Low Leak” Damper	4 (Class 1 AMCA 511-99)

(i) Leakage/ft^2 at 1.0 in WC pressure difference

Table 6 Enthalpy of Saturated Air

Wet Bulb Temperature	Btu per Pound
41	15.70
43	16.66
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

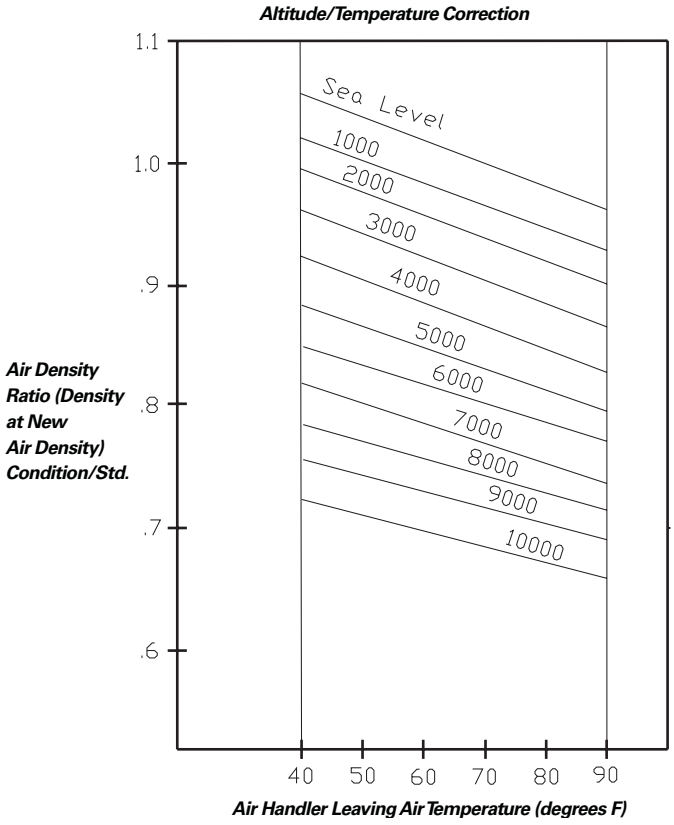


Figure 18. Air Density Ratios

Table 7 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
Sensible Heat Ratio Correction Multiplier	1.00	.98	.95	.93	.91	.89	.87	.85

Table 8 Gas Heating Capacity Altitude Correction Factors

	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

Performance Data—Chilled Water Coil Capacities

Table 9 Chilled Water Coil Capacities—2 Row 5W

		Entering Dry Bulb / Wet Bulb 80 / 67 F											
		Entering Water 45 F											
		Water Temperature Rise F 10 F											
		Without Turbulators						With Turbulators					
Air Flow CFM	FPF	Total capacity (MBH)	Sensible capacity (MBH)	Leaving DB (F)	Leaving WB (F)	Water Flow GPM	Water PD (ft H_2O)	Total Capacity (MBH)	Sensible Capacity (MBH)	Leaving DB (F)	Leaving WB (F)	Water Flow GPM	Water PD (ft H_2O)
16000	80	179	179	69.9	63.7	35.7	0.2	333	253	65.7	60.7	66.4	1.8
	108	308	275	64.4	61.2	61.3	0.6	425	320	61.9	58.8	84.7	2.6
	144	428	351	60.1	58.7	85.4	1.1	540	395	57.6	56.3	107.7	3.8
	168	472	375	58.8	57.7	94.1	1.3	587	420	56.2	55.2	117.0	4.3
20000	80	256	250	68.7	63.2	51.0	0.4	380	296	66.6	61.3	75.8	2.2
	108	372	332	65.0	61.4	74.1	0.8	486	375	63.0	59.5	96.8	3.2
	144	503	421	60.9	59.2	100.3	1.4	618	465	58.9	57.3	123.2	4.7
	168	555	451	59.6	58.3	110.7	1.7	676	498	57.4	56.3	134.7	5.5
23000	80	294	283	68.8	63.2	58.6	0.5	412	327	67.1	61.6	82.1	2.5
	108	413	370	65.4	61.6	82.3	1.0	526	413	63.7	60.0	104.9	3.6
	144	552	469	61.5	59.6	110.0	1.7	670	514	59.7	57.9	133.6	5.4
	168	610	504	60.1	58.8	121.6	2.1	736	552	58.2	56.9	146.7	6.4
28000	80	348	333	69.2	63.3	69.4	0.7	460	375	67.9	62.1	91.7	2.9
	108	473	430	66.1	61.9	94.2	1.3	587	473	64.7	60.6	117.1	4.3
	144	623	543	62.4	60.2	124.2	2.1	748	590	60.9	58.7	149.1	6.5
	168	690	586	61.0	59.4	137.5	2.6	825	638	59.3	57.8	164.5	7.8
33000	80	394	379	69.6	63.5	78.4	0.9	503	419	68.5	62.4	100.3	3.4
	108	525	485	66.7	62.2	104.6	1.6	641	529	65.5	61.1	127.8	5.0
	144	684	612	63.2	60.7	136.4	2.5	816	661	61.8	59.4	162.7	7.6
	168	759	663	61.8	59.9	151.3	3.1	904	717	60.3	58.5	180.2	9.1
38000	80	433	421	70.0	63.6	86.4	1.1	542	461	69.0	62.7	108.1	3.8
	108	571	536	67.2	62.5	113.8	1.8	690	581	66.1	61.5	137.6	5.7
	144	739	676	63.9	61.1	147.3	2.9	878	727	62.6	59.9	174.9	8.6
	168	-	-	-	-	-	-	-	-	-	-	-	-
43000	80	469	461	70.3	63.8	93.5	1.3	578	500	69.4	63.0	115.2	4.2
	108	612	585	67.7	62.7	122.0	2.1	735	630	66.7	61.9	146.4	6.3
	144	-	-	-	-	-	-	-	-	-	-	-	-
	168	-	-	-	-	-	-	-	-	-	-	-	-
45000	80	482	476	70.4	63.8	96.2	1.3	591	515	69.6	63.1	117.9	4.4
	108	628	603	67.8	62.8	125.1	2.2	751	649	66.9	62.0	149.8	6.6
	144	-	-	-	-	-	-	-	-	-	-	-	-
	168	-	-	-	-	-	-	-	-	-	-	-	-

Table 10 Chilled Water Coil Capacities—4 Row W

		Entering Dry Bulb / Wet Bulb 80 / 67 F											
		Entering Water 45 F											
		Water Temperature Rise F 10 F											
		Without Turbulators						With Turbulators					
Air Flow CFM	FPF	Total capacity (MBH)	Sensible capacity (MBH)	Leaving DB (F)	Leaving WB (F)	Water Flow GPM	Water PD (ft H_2O)	Total Capacity (MBH)	Sensible Capacity (MBH)	Leaving DB (F)	Leaving WB (F)	Water Flow GPM	Water PD (ft H_2O)
16000	80	523	378	58.6	56.6	104.3	2.5	577	400	57.3	55.4	115.1	7.4
	108	634	443	54.9	54.1	126.4	3.5	689	466	53.6	52.9	137.3	10.0
	144	746	500	51.6	51.5	148.7	4.7	802	525	50.3	50.1	159.8	13.0
	168	785	518	50.6	50.5	156.4	5.2	840	542	49.3	49.2	167.4	14.1
20000	80	615	452	59.5	57.3	122.6	3.3	674	476	58.4	56.3	134.3	9.6
	108	746	531	55.9	55.0	148.7	4.7	810	558	54.7	53.8	161.5	13.2
	144	885	604	52.6	52.4	176.3	6.4	952	632	51.3	51.1	189.7	17.5
	168	937	628	51.5	51.4	186.8	7.1	1005	658	50.2	50.1	200.2	19.3
23000	80	677	504	60.1	57.8	134.9	4.0	740	530	59.1	56.8	147.5	11.3
	108	823	593	56.6	55.5	164.1	5.6	894	622	55.5	54.4	178.1	15.7
	144	981	678	53.3	53.0	195.5	7.7	1055	709	52.0	51.8	210.3	21.1
	168	1044	707	52.1	52.0	208.0	8.7	1119	740	50.8	50.7	223.1	23.4
28000	80	771	586	61.0	58.4	153.6	5.0	841	614	60.1	57.6	167.6	14.1
	108	941	692	57.6	56.3	187.6	7.2	1021	724	56.5	55.3	203.4	19.9
	144	1128	795	54.3	53.9	224.8	10.0	1214	830	53.1	52.8	241.9	27.0
	168	1208	833	53.0	52.8	240.9	11.3	1296	870	51.8	51.6	258.3	30.4
33000	80	856	664	61.8	59.0	170.6	6.0	932	694	60.9	58.2	185.8	16.9
	108	1048	785	58.4	57.0	208.9	8.7	1136	820	57.5	56.0	226.4	24.0
	144	1262	906	55.1	54.6	251.6	12.3	1357	945	54.0	53.6	270.5	33.1
	168	1360	953	53.8	53.6	271.0	14.1	1457	994	52.7	52.4	290.4	37.6
38000	80	934	737	62.4	59.4	186.1	7.1	1016	769	61.7	58.7	202.5	19.7
	108	1147	873	59.2	57.5	228.5	10.3	1241	911	58.3	56.7	247.3	28.2
	144	1386	1011	55.9	55.3	276.2	14.6	1488	1053	54.9	54.3	296.6	39.0
	168	-	-	-	-	-	-	-	-	-	-	-	-
43000	80	1006	806	63.0	59.8	200.6	8.1	1093	840	62.3	59.1	217.9	22.4
	108	1238	958	59.8	58.0	246.7	11.8	1338	997	59.0	57.2	266.7	32.2
	144	-	-	-	-	-	-	-	-	-	-	-	-
	168	-	-	-	-	-	-	-	-	-	-	-	-
45000	80	1034	833	63.2	60.0	206.0	8.5	1123	867	62.5	59.3	223.7	23.5
	108	1272	990	60.0	58.2	253.6	12.5	1375	1030	59.2	57.4	274.0	33.8
	144	-	-	-	-	-	-	-	-	-	-	-	-
	168	-	-	-	-	-	-	-	-	-	-	-	-

Table 11 Chilled Water Coil Capacities—6 Row WD

		Entering Dry Bulb / Wet Bulb 80 / 67 F											
		Entering Water 45 F											
		Water Temperature Rise F 10 F											
		Without Turbulators						With Turbulators					
Air Flow CFM	FPF	Total capacity (MBH)	Sensible capacity (MBH)	Leaving DB (F)	Leaving WB (F)	Water Flow GPM	Water PD (ft H_2O)	Total Capacity (MBH)	Sensible Capacity (MBH)	Leaving DB (F)	Leaving WB (F)	Water Flow GPM	Water PD (ft H_2O)
16000	80	561	413	56.6	55.8	111.9	1.1	635	443	54.9	54.1	126.6	2.3
	108	676	470	53.4	53.2	134.7	1.6	739	497	51.8	51.7	147.3	2.9
	144	777	515	50.8	50.7	154.9	2.1	832	539	49.5	49.4	165.8	3.5
	168	809	528	50.0	49.9	161.2	2.2	860	552	48.7	48.6	171.5	3.7
20000	80	692	510	56.9	56.0	137.8	1.6	762	538	55.6	54.7	151.8	3.0
	108	826	578	53.8	53.5	164.6	2.3	890	605	52.6	52.3	177.3	3.9
	144	950	634	51.2	51.1	189.4	3.0	1008	659	50.1	50.0	200.9	4.9
	168	993	652	50.4	50.3	197.8	3.3	1048	677	49.3	49.2	208.9	5.2
23000	80	780	577	57.2	56.2	155.4	2.1	849	605	56.1	55.1	169.2	3.6
	108	929	655	54.2	53.9	185.2	2.9	995	682	53.1	52.8	198.2	4.8
	144	1070	719	51.6	51.5	213.3	3.8	1131	746	50.6	50.5	225.5	6.0
	168	1121	742	50.8	50.7	223.5	4.1	1181	768	49.7	49.6	235.3	6.4
28000	80	913	684	57.8	56.7	181.9	2.8	983	712	56.9	55.8	195.9	4.7
	108	1086	776	54.9	54.4	216.5	3.9	1156	805	53.9	53.5	230.4	6.2
	144	1255	856	52.3	52.2	250.1	5.1	1323	885	51.3	51.2	263.7	7.9
	168	1321	883	51.4	51.3	263.2	5.6	1388	913	50.4	50.3	276.7	8.6
33000	80	1032	784	58.5	57.1	205.7	3.5	1105	813	57.7	56.4	220.2	5.7
	108	1229	891	55.5	55.0	244.9	4.9	1304	921	54.7	54.2	259.8	7.7
	144	1423	985	52.9	52.8	283.7	6.5	1499	1017	52.1	52.0	298.8	9.9
	168	1504	1019	52.0	51.9	299.7	7.2	1581	1052	51.1	51.0	315.0	10.9
38000	80	1141	879	59.0	57.6	227.5	4.3	1217	908	58.3	56.9	242.5	6.8
	108	1359	1000	56.1	55.5	270.9	5.9	1439	1032	55.4	54.8	286.9	9.2
	144	1578	1108	53.6	53.4	314.6	7.9	1663	1143	52.7	52.6	331.5	12.0
	168	-	-	-	-	-	-	-	-	-	-	-	-
43000	80	1242	969	59.6	58.0	247.4	5.0	1320	1000	58.9	57.3	263.1	7.9
	108	1479	1104	56.7	56.0	294.8	7.0	1566	1138	56.0	55.3	312.0	10.7
	144	-	-	-	-	-	-	-	-	-	-	-	-
	168	-	-	-	-	-	-	-	-	-	-	-	-
45000	80	1279	1004	59.8	58.1	255.0	5.3	1359	1035	59.1	57.5	270.9	8.3
	108	1525	1144	56.9	56.2	303.9	7.4	1614	1180	56.2	55.5	321.7	11.3
	144	-	-	-	-	-	-	-	-	-	-	-	-
	168	-	-	-	-	-	-	-	-	-	-	-	-

Table 12 Chilled Water Coil Capacities—8 Row WD

		Entering Dry Bulb / Wet Bulb 80 / 67 F											
		Entering Water 45 F											
		Water Temperature Rise F 10 F											
		Without Turbulators						With Turbulators					
Air Flow CFM	FPF	Total capacity (MBH)	Sensible capacity (MBH)	Leaving DB (F)	Leaving WB (F)	Water Flow GPM	Water PD (ft H_2O)	Total Capacity (MBH)	Sensible Capacity (MBH)	Leaving DB (F)	Leaving WB (F)	Water Flow GPM	Water PD (ft H_2O)
16000	80	712	483	52.6	52.3	141.9	2.0	795	519	50.6	50.3	158.5	4.9
	108	803	526	50.2	50.1	160.1	2.5	876	559	48.3	48.2	174.5	5.8
	144	877	559	48.3	48.2	174.9	3.0	936	587	46.7	46.6	186.6	6.5
	168	899	569	47.7	47.6	179.1	3.1	953	594	46.3	46.2	189.9	6.7
20000	80	866	592	53.1	52.8	172.6	2.9	954	630	51.4	51.1	190.1	6.7
	108	981	647	50.6	50.5	195.5	3.7	1060	683	49.0	48.9	211.4	8.1
	144	1077	690	48.7	48.6	214.6	4.4	1145	721	47.3	47.2	228.2	9.2
	168	1107	704	48.1	48.0	220.7	4.6	1171	733	46.7	46.6	233.3	9.6
23000	80	973	671	53.6	53.1	194.0	3.6	1065	710	52.0	51.6	212.3	8.2
	108	1106	735	51.0	50.9	220.4	4.6	1192	773	49.5	49.4	237.5	9.9
	144	1219	785	49.1	49.0	242.9	5.5	1295	820	47.7	47.6	258.2	11.5
	168	1257	802	48.4	48.3	250.5	5.9	1329	835	47.1	47.0	264.8	12.0
28000	80	1139	795	54.3	53.8	227.1	4.9	1239	837	52.9	52.4	247.0	10.7
	108	1300	874	51.7	51.6	259.1	6.3	1399	917	50.3	50.2	278.8	13.2
	144	1442	936	49.7	49.6	287.3	7.6	1534	978	48.3	48.2	305.8	15.6
	168	1493	960	48.9	48.8	297.6	8.1	1582	1000	47.6	47.5	315.3	16.5
33000	80	1291	912	54.9	54.3	257.4	6.2	1401	958	53.7	53.1	279.3	13.3
	108	1479	1006	52.3	52.2	294.9	8.0	1593	1055	51.0	50.9	317.4	16.7
	144	1651	1082	50.3	50.2	329.0	9.8	1760	1131	48.9	48.8	350.7	20.0
	168	1717	1112	49.4	49.3	342.3	10.6	1823	1160	48.1	48.0	363.3	21.3
38000	80	1432	1025	55.5	54.9	285.4	7.5	1552	1074	54.4	53.7	309.4	15.9
	108	1648	1133	53.0	52.7	328.4	9.8	1774	1187	51.7	51.5	353.7	20.3
	144	1849	1223	50.8	50.7	368.4	12.2	1973	1278	49.5	49.4	393.3	24.6
	168	-	-	-	-	-	-	-	-	-	-	-	-
43000	80	1563	1132	56.1	55.3	311.5	8.9	1694	1186	55.0	54.2	337.6	18.7
	108	1806	1256	53.5	53.3	360.0	11.7	1946	1315	52.3	52.0	387.8	24.0
	144	-	-	-	-	-	-	-	-	-	-	-	-
	168	-	-	-	-	-	-	-	-	-	-	-	-
45000	80	1613	1174	56.3	55.5	321.5	9.4	1748	1230	55.2	54.4	348.5	19.8
	108	1868	1304	53.7	53.4	372.2	12.4	2012	1365	52.5	52.2	401.0	25.5
	144	-	-	-	-	-	-	-	-	-	-	-	-
	168	-	-	-	-	-	-	-	-	-	-	-	-

Performance Data — Supply Fan without Inlet Guide Vanes (with or without Variable Frequency Drive)

Table 13 Supply Fan Performance STANDARD CFM — Casing A (25")

CFM	Total Static Pressure															
Std.	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
16000	1030[i]	6.16	1062	6.81	1095	7.52	1126	8.14	1152	8.58	1177	9.05	1205	9.67	1234	10.38
17000	1090	7.30	1121	7.99	1152	8.74	1182	9.46	1208	9.98	1232	10.47	1256	10.99	1282	11.66
18000	1151	8.57	1180	9.31	1209	10.07	1238	10.86	1265	11.57	1288	12.05	1311	12.57	1333	13.13
19000	1211	9.99	1239	10.77	1266	11.55	1294	12.41	1321	13.20	1345	13.82	1367	14.34	1388	14.89
20000	1272	11.57	1299	12.39	1325	13.20	1351	14.08	1377	14.96	1402	15.76	1423	16.31	1444	16.87
21000	1333	13.30	1359	14.16	1383	15.02	1408	15.91	1433	16.85	1458	17.74	1480	18.48	1500	19.04
22000	1394	15.21	1419	16.11	1443	17.01	1466	17.90	1490	18.90	1513	19.85	1536	20.76	1556	21.42
23000	1455	17.28	1479	18.23	1502	19.17	1524	20.11	1547	21.12	1570	22.14	1592	23.11	1613	24.02
24000	1516	19.55	1539	20.54	1561	21.52	1583	22.49	1604	23.50	1626	24.58	1648	25.64	1669	26.63
25000	1578	22.01	1600	23.04	1621	24.07	1642	25.09	1662	26.09	1683	27.22	1705	28.33	1725	29.42
26000	1639	24.67	1660	25.74	1681	26.81	1701	27.87	1721	28.93	1741	30.04	1762	31.22	1781	32.36
27000	1701	27.54	1721	28.66	1741	29.77	1760	30.88	1780	31.97	1798	33.06	1818	34.29	1838	35.51
28000	1762	30.62	1782	31.78	1801	32.94	1820	34.09	1838	35.22	1857	36.35	1876	37.58	1895	38.83
29000	1824	33.94	1843	35.14	1861	36.34	1880	37.53	1898	38.71	1915	39.88	1933	41.08	1952	42.41
30000	1885	37.48	1904	38.73	1922	39.96	1939	41.19	1957	42.42	1974	43.64	1991	44.86	2009	46.19
31000	1947	41.27	1965	42.56	1982	43.83	2000	45.11								

CFM	Total Static Pressure															
Std.	2.25		2.50		2.75		3.00		3.25		3.50		3.75		4.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
16000	1262[ii]	11.09	1289	11.80	1315	12.50	1341	13.22	1366	13.95	1391	14.67	1415	15.41	1438	16.13
17000	1309	12.40	1337	13.18	1362	13.92	1388	14.68	1412	15.45	1435	16.20	1459	17.00	1481	17.74
18000	1359	13.87	1385	14.67	1410	15.48	1435	16.28	1459	17.08	1481	17.86	1505	18.68	1527	19.49
19000	1410	15.51	1433	16.28	1458	17.13	1482	17.97	1506	18.84	1528	19.65	1551	20.50	1573	21.36
20000	1464	17.45	1484	18.09	1507	18.92	1530	19.80	1554	20.70	1577	21.62	1599	22.50	1619	23.34
21000	1519	19.63	1539	20.26	1558	20.94	1579	21.79	1602	22.73	1623	23.63	1645	24.58	1667	25.53
22000	1576	22.03	1594	22.65	1612	23.31	1631	24.00	1652	24.92	1672	25.86	1694	26.83	1714	27.80
23000	1632	24.63	1650	25.27	1668	25.93	1685	26.61	1703	27.34	1722	28.23	1742	29.23	1763	30.28
24000	1688	27.48	1706	28.13	1724	28.79	1740	29.47	1757	30.19	1775	30.97	1792	31.86	1811	32.87
25000	1745	30.41	1763	31.23	1780	31.89	1796	32.59	1813	33.31	1828	34.03	1845	34.85	1863	35.76
26000	1801	33.44	1820	34.48	1836	35.23	1853	35.94	1868	36.66	1884	37.41	1899	38.16	1916	39.02
27000	1857	36.66	1876	37.79	1893	38.83	1909	39.58	1925	40.30	1940	41.05	1956	41.84	1970	42.62
28000	1913	40.07	1931	41.26	1949	42.42	1967	43.48	1982	44.22	1996	44.95				
29000	1970	43.70	1987	44.93	2005	46.18										

CFM	Total Static Pressure															
Std.	4.25		4.50		4.75		5.00		5.25		5.50		5.75		6.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
16000	1461	16.88	1484	17.60	1508	18.39	1530	19.15	1551	19.86	1575	20.69	1598	21.47	1620	22.29
17000	1504	18.52	1527	19.34	1549	20.13	1569	20.86	1591	21.67	1613	22.46	1633	23.25	1656	24.12
18000	1548	20.29	1571	21.14	1591	21.94	1613	22.78	1633	23.61	1655	24.47	1674	25.26	1694	26.08
19000	1595	22.23	1615	23.05	1636	23.91	1656	24.77	1676	25.66	1698	26.58	1717	27.44	1737	28.32
20000	1640	24.22	1661	25.15	1681	26.02	1701	26.94	1722	27.89	1741	28.77	1760	29.69	1779	30.64
21000	1687	26.43	1707	27.37	1727	28.31	1746	29.23	1766	30.18	1786	31.18	1804	32.10	1823	33.05
22000	1736	28.82	1755	29.78	1774	30.73	1793	31.71	1813	32.73	1831	33.67	1849	34.64	1867	35.65
23000	1782	31.26	1803	32.35	1822	33.35	1841	34.34	1859	35.37	1878	36.43	1895	37.40	1913	38.40
24000	1831	33.92	1851	35.02	1869	36.03	1889	37.15	1908	38.24	1926	39.31	1943	40.33	1960	41.39
25000	1880	36.77	1899	37.87	1918	38.96	1936	40.08	1954	41.17	1973	42.37	1991	43.46	2007	44.51
26000	1932	39.88	1949	40.93	1967	42.08	1985	43.21	2003	44.37						
27000	1985	43.44	2000	44.30												

Table 13 Supply Fan Performance STANDARD CFM — Casing A (25")

CFM	Total Static Pressure															
Std.	6.25		6.50		6.75		7.00		7.25		7.50		7.75		8.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
16000	1644	23.14	1665	23.93	1687	24.77	1710	25.65	1733	26.56	1754	27.40	1776	28.28	1798	29.18
17000	1676	24.92	1697	25.75	1719	26.62	1741	27.52	1762	28.41	1784	29.33	1805	30.23	1826	31.17
18000	1714	26.94	1735	27.82	1755	28.69	1775	29.58	1794	30.44	1814	31.34	1835	32.27	1855	33.23
19000	1755	29.18	1775	30.07	1793	30.92	1812	31.81	1831	32.72	1851	33.67	1871	34.65	1888	35.51
20000	1797	31.50	1816	32.45	1836	33.43	1853	34.30	1871	35.21	1890	36.21	1907	37.10	1925	38.01
21000	1841	34.03	1859	34.98	1878	35.96	1895	36.90	1914	37.94	1930	38.85	1947	39.79	1964	40.76
22000	1886	36.69	1904	37.71	1921	38.67	1938	39.67	1956	40.70	1974	41.76	1991	42.76	2008	43.79
23000	1930	39.43	1948	40.50	1967	41.61	1983	42.58	2000	43.68						
24000	1978	42.49	1995	43.54												

CFM	Total Static Pressure							
Std.	8.25		8.50		8.75		9.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
16000	1820	30.13	1843	31.11	1863	31.99	1887	33.04
17000	1846	32.07	1867	33.02	1887	33.92	1910	35.00
18000	1877	34.22	1895	35.11	1914	36.04	1935	37.08
19000	1909	36.55	1927	37.47	1946	38.43	1965	39.41
20000	1944	39.03	1962	40.00	1980	40.99	1997	41.93
21000	1982	41.75	2000	42.77				

Notes:

1. Supply fan performance table includes internal resistance of air handler. For total static pressure determination, system external static pressure must be added to appropriate component sp drops (chilled water coil, filters, optional economizer, optional heating system).
2. Maximum SP leaving the air handler is 5.5" H_20 positive.

(i) Outlined area indicates nonstandard BHP or RPM selections. Contact a local Trane representative for more information.
(ii) Outlined area indicates nonstandard BHP or RPM selections. Contact a local Trane representative for more information.

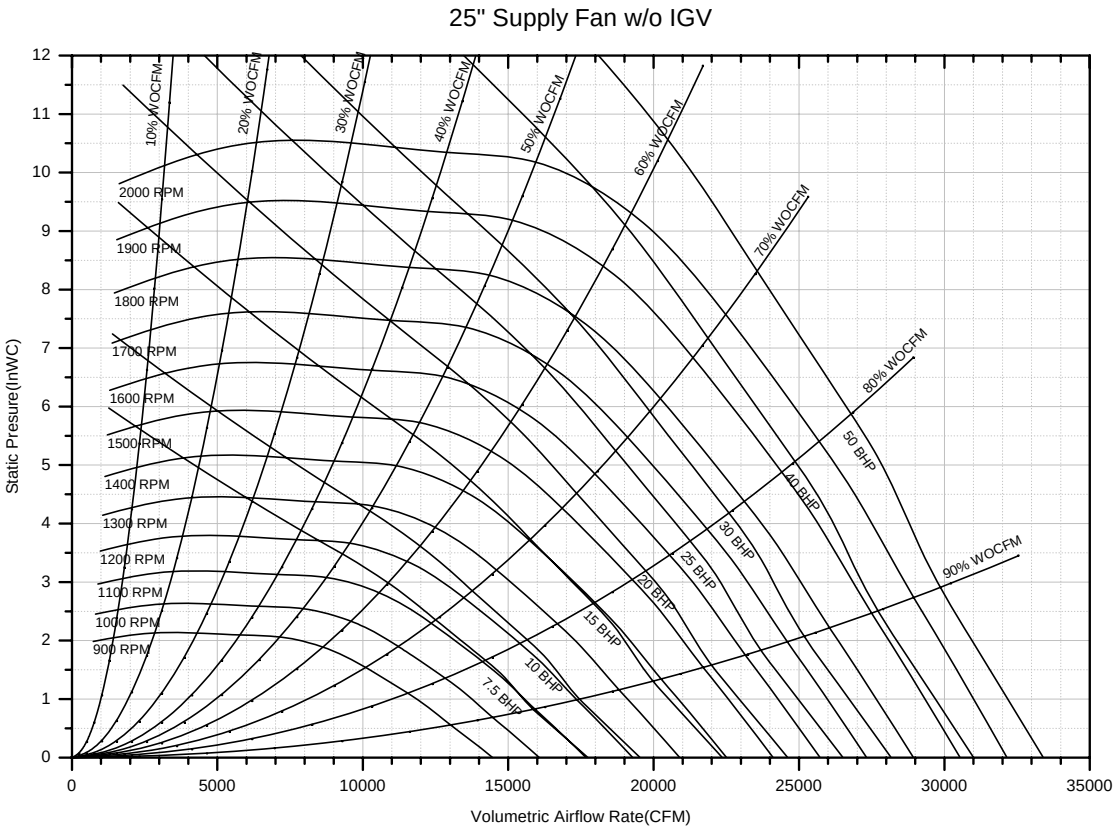


Table 14 Supply Fan Performance STANDARD CFM — Casing A (25")

Table 15 Supply Fan Performance STANDARD CFM —Casing B (32")

CFM	Total Static Pressure															
Std.	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
23000	752[(i)]	7.51	781	8.48	809	9.46	832	10.14	854	10.82	879	11.73	904	12.74	928	13.77
24000	782	8.45	809	9.44	837	10.49	861	11.29	882	11.98	904	12.78	929	13.82	953	14.90
25000	813	9.46	839	10.47	865	11.59	889	12.53	910	13.22	931	13.98	953	14.95	977	16.08
26000	843	10.56	868	11.62	894	12.76	918	13.85	939	14.57	958	15.31	978	16.19	1000	17.30
27000	874	11.73	898	12.84	922	14.01	946	15.16	967	16.03	986	16.79	1005	17.61	1025	18.64
28000	904	13.00	928	14.14	951	15.34	975	16.57	996	17.60	1014	18.35	1033	19.18	1051	20.08
29000	935	14.35	957	15.54	980	16.75	1003	18.04	1024	19.23	1043	20.04	1061	20.86	1078	21.76
30000	965	15.80	987	17.03	1009	18.26	1031	19.61	1052	20.86	1072	21.86	1089	22.67	1106	23.56
31000	996	17.35	1018	18.62	1038	19.89	1060	21.27	1081	22.61	1100	23.77	1117	24.61	1134	25.48
32000	1027	19.00	1048	20.31	1068	21.62	1089	23.01	1109	24.42	1129	25.73	1146	26.66	1162	27.53
33000	1057	20.75	1078	22.11	1098	23.46	1117	24.85	1138	26.34	1157	27.72	1174	28.84	1190	29.74
34000	1088	22.61	1108	24.00	1127	25.40	1146	26.81	1166	28.35	1185	29.78	1203	31.16	1219	32.07
35000	1119	24.58	1138	26.02	1157	27.44	1176	28.86	1195	30.45	1214	31.98	1231	33.40	1248	34.54
36000	1150	26.66	1169	28.14	1187	29.60	1205	31.07	1223	32.66	1242	34.25	1259	35.76	1276	37.13
37000	1181	28.86	1199	30.38	1217	31.90	1235	33.40	1252	35.00	1271	36.66	1288	38.26	1305	39.74
38000	1212	31.17	1230	32.74	1247	34.30	1264	35.85	1281	37.42	1299	39.14	1316	40.83	1333	42.40
39000	1243	33.61	1260	35.22	1277	36.82	1294	38.40	1311	40.00	1328	41.77	1345	43.47	1361	45.13
40000	1274	36.17	1291	37.82	1308	39.48	1324	41.10	1340	42.73	1357	44.49	1373	46.27	1390	48.02
41000	1305	38.87	1321	40.56	1338	42.25	1354	43.91	1370	45.59	1386	47.37	1402	49.20	1418	50.98
42000	1336	41.70	1352	43.44	1368	45.17	1384	46.89	1399	48.58	1415	50.36	1431	52.26	1446	54.12
43000	1367	44.66	1383	46.44	1398	48.21	1414	49.97	1429	51.72	1444	53.48	1459	55.41	1475	57.34
44000	1398	47.77	1413	49.60	1429	51.40	1444	53.20	1459	55.00	1473	56.77	1488	58.70		
45000	1429	51.01	1444	52.88	1459	54.73	1474	56.58	1488	58.40						

CFM	Total Static Pressure															
Std.	2.25		2.50		2.75		3.00		3.25		3.50		3.75		4.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
23000	952	14.80	974	15.81	995	16.85	1017	17.93	1037	18.95	1058	20.03	1078	21.09	1097	22.13
24000	975	15.97	997	17.01	1018	18.07	1039	19.18	1060	20.29	1079	21.36	1099	22.49	1118	23.58
25000	999	17.18	1021	18.28	1042	19.41	1062	20.50	1082	21.64	1102	22.80	1121	23.95	1140	25.11
26000	1023	18.47	1045	19.65	1065	20.76	1086	21.95	1105	23.11	1124	24.29	1144	25.50	1162	26.68
27000	1047	19.82	1069	21.06	1089	22.24	1109	23.42	1128	24.63	1147	25.83	1165	27.05	1184	28.34
28000	1072	21.27	1092	22.50	1113	23.79	1133	25.03	1152	26.27	1171	27.52	1188	28.75	1207	30.05
29000	1097	22.82	1117	24.09	1137	25.36	1157	26.67	1176	27.97	1194	29.24	1212	30.52	1229	31.82
30000	1123	24.49	1142	25.75	1161	27.05	1181	28.38	1200	29.74	1218	31.08	1235	32.37	1253	33.72
31000	1150	26.42	1168	27.54	1186	28.86	1205	30.22	1224	31.60	1242	33.00	1259	34.35	1276	35.71
32000	1178	28.47	1194	29.50	1211	30.71	1229	32.08	1248	33.53	1265	34.94	1284	36.43	1301	37.85
33000	1206	30.67	1222	31.68	1237	32.77	1254	34.10	1272	35.56	1290	37.04	1307	38.53	1325	40.02
34000	1234	33.03	1249	34.00	1264	35.06	1280	36.27	1297	37.68	1314	39.17	1331	40.73	1348	42.21
35000	1263	35.48	1277	36.47	1292	37.52	1306	38.60	1322	39.98	1339	41.47	1356	43.03	1372	44.59
36000	1291	38.10	1306	39.10	1320	40.13	1334	41.25	1348	42.39	1364	43.88	1380	45.44	1396	46.99
37000	1320	40.85	1334	41.87	1348	42.91	1362	44.00	1375	45.12	1390	46.42	1405	47.98	1421	49.60
38000	1348	43.78	1362	44.78	1376	45.83	1390	46.93	1403	48.02	1416	49.25	1431	50.64	1446	52.24
39000	1377	46.73	1391	47.84	1404	48.90	1418	49.98	1431	51.09	1444	52.29	1457	53.57	1472	55.12
40000	1405	49.66	1420	51.09	1433	52.13	1446	53.24	1459	54.36	1471	55.52	1484	56.75	1497	58.06
41000	1434	52.74	1449	54.38	1462	55.55	1474	56.64	1487	57.76	1500	58.95				
42000	1462	55.91	1477	57.62	1490	59.11										
43000	1490	59.21														

Table 15 Supply Fan Performance STANDARD CFM —Casing B (32")

CFM	Total Static Pressure															
Std.	4.25		4.50		4.75		5.00		5.25		5.50		5.75		6.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
23000	1117	23.23	1138	24.39	1157	25.52	1177	26.71	1197	27.85	1216	29.06	1237	30.34	1255	31.57
24000	1138	24.74	1157	25.86	1175	26.99	1194	28.17	1213	29.36	1233	30.60	1251	31.78	1270	33.09
25000	1158	26.23	1177	27.41	1194	28.53	1213	29.77	1231	30.94	1250	32.24	1268	33.46	1286	34.73
26000	1180	27.86	1198	29.04	1215	30.22	1233	31.46	1250	32.69	1268	33.97	1286	35.24	1303	36.49
27000	1202	29.58	1219	30.77	1237	32.02	1254	33.31	1271	34.53	1288	35.80	1305	37.13	1321	38.35
28000	1224	31.30	1242	32.61	1259	33.92	1275	35.15	1292	36.42	1308	37.75	1325	39.05	1342	40.41
29000	1246	33.13	1263	34.43	1281	35.80	1297	37.09	1313	38.44	1330	39.83	1345	41.11	1361	42.44
30000	1270	35.09	1286	36.39	1303	37.83	1319	39.17	1336	40.58	1351	41.88	1367	43.31	1383	44.71
31000	1293	37.07	1310	38.50	1325	39.84	1341	41.25	1358	42.72	1374	44.17	1389	45.58	1404	46.95
32000	1316	39.21	1333	40.62	1348	42.02	1364	43.49	1381	45.03	1396	46.44	1411	47.92	1427	49.45
33000	1340	41.44	1357	42.92	1373	44.39	1388	45.83	1403	47.33	1418	48.81	1434	50.35	1448	51.84
34000	1365	43.77	1380	45.24	1396	46.77	1411	48.27	1427	49.84	1441	51.28	1457	52.87	1471	54.43
35000	1389	46.21	1405	47.75	1420	49.26	1435	50.83	1450	52.36	1465	53.96	1479	55.41	1494	57.12
36000	1412	48.60	1429	50.29	1444	51.86	1460	53.50	1473	55.00	1488	56.56	1503	58.28	1517	59.84
37000	1437	51.20	1452	52.86	1469	54.60	1483	56.20	1498	57.87	1512	59.38				
38000	1461	53.92	1476	55.56	1492	57.26	1507	59.04								
39000	1486	56.67	1501	58.39												
40000	1511	59.68														

CFM	Total Static Pressure															
Std.	6.25		6.50		6.75		7.00		7.25		7.50		7.75		8.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
23000	1275	32.85	1295	34.21	1313	35.47	1332	36.79	1352	38.18	1369	39.44	1390	40.95	1408	42.32
24000	1288	34.33	1308	35.71	1326	37.00	1344	38.35	1363	39.76	1380	41.05	1400	42.58	1418	43.99
25000	1305	36.07	1322	37.32	1340	38.63	1358	40.01	1376	41.45	1393	42.76	1413	44.33	1430	45.76
26000	1321	37.79	1337	39.07	1355	40.41	1373	41.80	1391	43.26	1407	44.61	1424	46.00	1441	47.46
27000	1338	39.62	1355	41.03	1371	42.32	1389	43.76	1406	45.15	1423	46.61	1440	48.03	1456	49.52
28000	1358	41.74	1373	43.03	1389	44.37	1407	45.85	1422	47.20	1438	48.60	1454	50.04	1471	51.54
29000	1377	43.83	1394	45.26	1408	46.57	1423	47.91	1440	49.40	1456	50.84	1471	52.22	1487	53.77
30000	1398	46.06	1413	47.46	1429	48.91	1444	50.31	1459	51.76	1475	53.25	1488	54.58	1505	56.17
30000	1398	46.06	1413	47.46	1429	48.91	1444	50.31	1459	51.76	1475	53.25	1488	54.58	1505	56.17
31000	1420	48.46	1434	49.82	1449	51.23	1464	52.68	1479	54.19	1493	55.63	1508	57.11		
32000	1441	50.83	1455	52.26	1470	53.72	1485	55.24	1500	56.80	1513	58.18	1528	5972		
33000	1463	53.38	1478	54.87	1492	56.41	1507	57.99	1520	59.39						
34000	1485	55.93	1499	57.47	1514	59.08										
35000	1508	58.69														

CFM	Total Static Pressure							
Std.	8.25		8.50		8.75		9.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
23000	1428	43.75	1444	45.03	1464	46.53	1488	48.30
24000	1437	45.45	1453	46.74	1473	48.32	1490	49.71
25000	1447	47.14	1464	48.58	1482	50.06	1500	51.61
26000	1459	48.97	1477	50.55	1493	51.95	1509	53.40
27000	1473	50.95	1489	52.44	1504	53.87	1523	55.59
28000	1488	53.11	1503	54.51	1519	56.08	1536	57.71
29000	1504	55.37	1518	56.78	1533	58.25		
30000	1519	57.58	1535	59.15				

Notes:

1. Supply fan performance table includes internal resistance of air handler. For total static pressure determination, system external static pressure must be added to appropriate component sp drops (chilled water coil, filters, optional economizer, optional heating system).
2. Maximum SP leaving the air handler is 5.5" H_20 positive.

(i) Outlined area indicates nonstandard BHP or RPM selections. Contact a local Trane representative for more information.

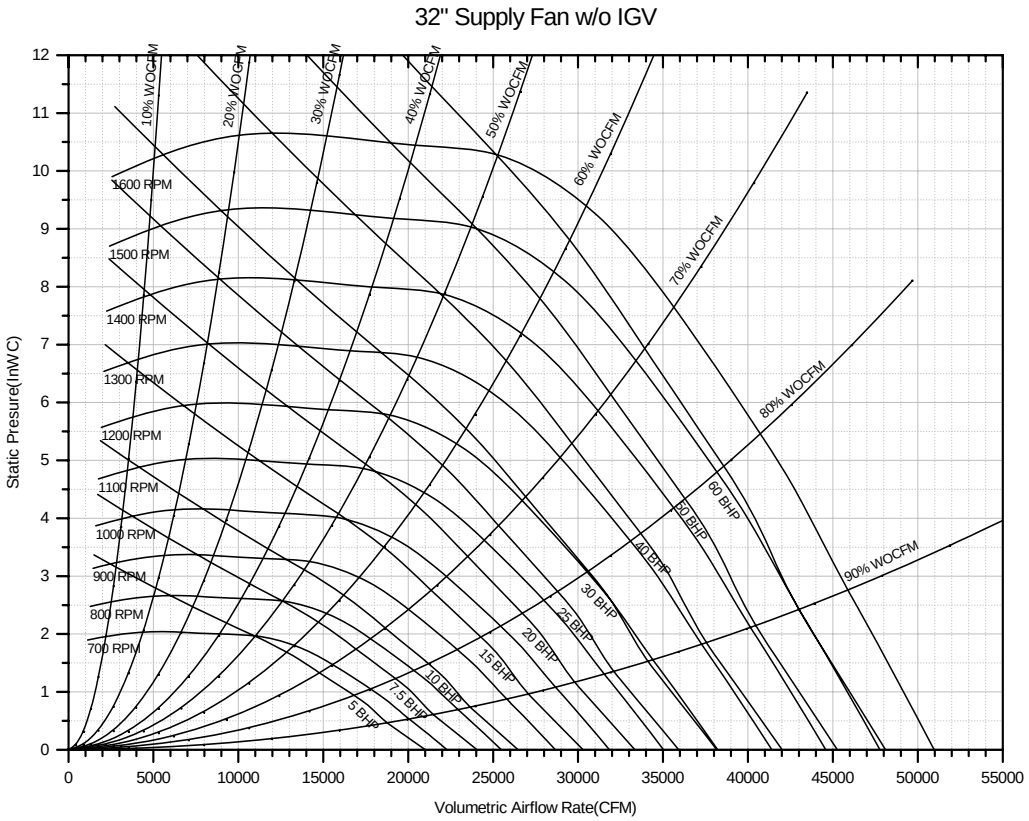


Table 16 Supply Fan Performance STANDARD CFM—Casing B (32")

Table 17 Supply Fan Performance STANDARD CFM — Casing C (36")

CFM	Total Static Pressure															
Std.	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
23000	553[i]	5.39	582	6.25	607	6.94	636	7.93	662	8.95	688	9.98	712	11.03	736	12.09
24000	574	6.04	603	6.99	627	7.68	654	8.63	680	9.71	705	10.76	729	11.86	752	12.94
25000	595	6.73	624	7.78	648	8.48	672	9.38	698	10.50	722	11.60	746	12.72	768	13.87
26000	617	7.47	645	8.59	668	9.35	691	10.20	716	11.32	740	12.50	763	13.63	785	14.79
27000	638	8.27	666	9.45	689	10.29	710	11.11	733	12.20	758	13.43	780	14.61	802	15.81
28000	660	9.14	686	10.36	710	11.30	730	12.12	752	13.15	776	14.41	798	15.67	819	16.90
29000	682	10.07	707	11.34	730	12.39	750	13.20	771	14.17	793	15.44	816	16.74	836	18.01
30000	704	11.07	728	12.37	752	13.56	771	14.37	790	15.29	812	16.54	834	17.89	854	19.20
31000	726	12.13	749	13.46	772	14.76	792	15.62	810	16.54	830	17.70	851	19.06	872	20.44
32000	748	13.25	771	14.63	793	15.99	812	16.95	830	17.86	849	18.95	869	20.32	890	21.74
33000	770	14.45	792	15.85	814	17.28	833	18.36	851	19.28	868	20.30	888	21.64	907	23.07
34000	791	15.72	813	17.15	835	18.63	854	19.86	872	20.79	888	21.80	906	23.04	925	24.50
35000	813	17.06	834	18.52	856	20.06	875	21.44	892	22.39	909	23.40	925	24.54	944	26.00
36000	836	18.48	856	19.97	877	21.56	896	23.05	913	24.07	929	25.08	945	26.18	962	27.58
37000	858	19.98	877	21.49	898	23.14	917	24.69	934	25.86	950	26.87	965	27.97	981	29.24
38000	880	21.56	899	23.09	919	24.79	938	26.41	955	27.73	970	28.76	986	29.87	1001	31.06
39000	902	23.22	921	24.80	940	26.52	958	28.21	976	29.69	991	30.74	1006	31.85	1021	33.04
40000	924	24.96	942	26.58	961	28.33	979	30.09	997	31.71	1012	32.83	1026	33.95	1041	35.13
41000	946	26.80	964	28.47	982	30.24	1000	32.04	1017	33.73	1033	35.02	1047	36.13	1061	37.31
42000	968	28.72	986	30.43	1003	32.22	1021	34.10	1038	35.86	1054	37.33	1068	38.44	1081	39.61
43000	991	30.74	1008	32.49	1025	34.31	1042	36.23	1059	38.05	1075	39.73	1089	40.87	1102	42.06
44000	1013	32.85	1030	34.64	1046	36.47	1063	38.44	1080	40.35	1095	42.11	1109	43.38	1123	44.59
45000	1035	35.06	1052	36.89	1068	38.74	1084	40.74	1101	42.71	1116	44.56	1130	46.02	1144	47.25
CFM	Total Static Pressure															
Std.	2.25		2.50		2.75		3.00		3.25		3.50		3.75		4.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
23000	758	13.15	780	14.22	803	15.34	825	16.49	847	17.68	869	18.91	891	20.17	913	21.44
24000	774	14.04	796	15.17	817	16.29	838	17.43	860	18.66	881	19.88	901	21.12	922	22.42
25000	790	15.00	811	16.18	832	17.32	852	18.48	872	19.70	893	20.92	914	22.24	934	23.57
26000	806	15.99	827	17.20	847	18.41	867	19.60	886	20.79	906	22.07	925	23.35	946	24.71
27000	823	17.04	843	18.29	863	19.53	882	20.78	902	22.03	920	23.28	939	24.61	958	25.93
28000	839	18.13	859	19.41	879	20.71	898	21.99	916	23.26	935	24.57	953	25.86	971	27.23
29000	857	19.31	876	20.61	895	21.94	914	23.28	933	24.62	951	25.94	968	27.30	985	28.62
30000	874	20.53	894	21.89	912	23.25	931	24.61	948	25.97	966	27.36	983	28.72	1000	30.10
31000	891	21.80	910	23.19	929	24.56	947	25.99	965	27.42	983	28.88	999	30.25	1016	31.69
32000	909	23.18	928	24.60	946	25.99	964	27.43	981	28.86	998	30.33	1016	31.89	1031	33.27
33000	927	24.57	945	26.02	963	27.47	980	28.92	998	30.48	1015	31.96	1031	33.46	1048	34.97
34000	945	26.04	963	27.55	981	29.03	998	30.54	1015	32.11	1031	33.59	1048	35.15	1064	36.73
35000	962	27.52	981	29.11	998	30.65	1015	32.18	1032	33.75	1049	35.35	1064	36.91	1080	38.49
36000	980	29.13	998	30.74	1016	32.36	1033	33.96	1049	35.54	1065	37.14	1081	38.76	1097	40.40
37000	999	30.82	1016	32.46	1034	34.15	1051	35.76	1067	37.41	1083	39.01	1099	40.69	1114	42.32
38000	1017	32.54	1034	34.20	1051	35.91	1069	37.65	1084	39.30	1100	40.97	1115	42.64	1130	44.33
39000	1036	34.41	1053	36.09	1070	37.81	1086	39.57	1102	41.29	1118	43.02	1133	44.77	1148	46.52
40000	1055	36.40	1071	38.02	1087	39.75	1103	41.51	1120	43.38	1135	45.10	1151	46.92	1165	48.66
41000	1075	38.58	1090	40.05	1105	41.79	1122	43.63	1138	45.49	1153	47.29	1168	49.10	1183	50.99
42000	1095	40.91	1109	42.26	1125	44.02	1140	45.78	1155	47.64	1171	49.60	1186	51.47	1200	53.25
43000	1116	43.31	1129	44.68	1143	46.20	1158	48.05	1174	49.99	1189	51.93	1203	53.79	1218	55.73
44000	1136	45.86	1149	47.17	1162	48.59	1177	50.44	1192	52.37	1207	54.30	1221	56.23	1236	58.25
45000	1156	48.50	1169	49.81	1182	51.24	1195	52.87	1210	54.79	1225	56.80	1239	58.80	1253	60.79

Table 17 Supply Fan Performance STANDARD CFM — Casing C (36")

CFM	Total Static Pressure															
Std.	4.25		4.50		4.75		5.00		5.25		5.50		5.75		6.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
23000	934	22.77	955	24.09	976	25.44	998	26.89	1019	28.31	1043	29.91	1066	31.45	1090	33.09
24000	944	23.83	964	25.13	984	26.52	1006	28.00	1026	29.45	1045	30.84	1065	32.32	1088	33.98
25000	954	24.91	974	26.24	994	27.66	1014	29.11	1033	30.52	1053	32.08	1073	33.59	1091	35.02
26000	966	26.07	984	27.43	1004	28.88	1023	30.30	1042	31.81	1061	33.26	1080	34.80	1099	36.42
27000	978	27.34	996	28.72	1015	30.13	1034	31.65	1052	33.05	1070	34.61	1088	36.10	1107	37.75
28000	990	28.63	1008	30.06	1027	31.51	1045	32.98	1062	34.40	1081	35.99	1098	37.51	1117	39.20
29000	1003	30.02	1021	31.49	1039	32.92	1057	34.43	1074	35.88	1091	37.42	1109	39.05	1126	40.60
30000	1018	31.56	1035	32.97	1052	34.45	1070	36.01	1086	37.50	1103	39.07	1119	40.56	1137	42.22
31000	1032	33.08	1049	34.55	1066	36.09	1082	37.55	1098	39.09	1115	40.71	1131	42.23	1148	43.83
32000	1048	34.79	1064	36.25	1080	37.78	1096	39.30	1112	40.81	1129	42.48	1144	44.06	1160	45.70
33000	1064	36.49	1080	38.08	1096	39.60	1111	41.10	1126	42.68	1141	44.23	1157	45.85	1173	47.54
34000	1079	38.25	1096	39.91	1110	41.41	1126	42.97	1141	44.60	1155	46.12	1171	47.80	1187	49.55
35000	1096	40.14	1111	41.72	1126	43.37	1142	44.99	1156	46.60	1170	48.18	1186	49.92	1200	51.52
36000	1112	42.04	1127	43.68	1143	45.40	1157	47.01	1172	48.68	1186	50.31	1200	52.02	1214	53.68
37000	1129	44.03	1144	45.73	1159	47.43	1173	49.10	1188	50.84	1202	52.54	1216	54.31	1230	56.03
38000	1146	46.10	1160	47.78	1175	49.54	1189	51.28	1203	52.99	1218	54.86	1232	56.59	1246	58.37
39000	1163	48.28	1177	49.93	1191	51.75	1206	53.56	1220	55.33	1234	57.17	1247	58.96	1260	60.70
40000	1180	50.47	1194	52.28	1209	54.07	1222	55.84	1236	57.67	1249	59.47	1263	61.32	1277	63.25
41000	1197	52.78	1211	54.56	1225	56.40	1239	58.23	1253	60.13	1266	61.99	1280	63.92	1293	65.79
42000	1214	55.11	1229	57.05	1242	58.86	1256	60.75	1269	62.60	1282	64.52	1296	66.51	1309	68.44
43000	1232	57.56	1246	59.46	1260	61.45	1273	63.28	1287	65.31	1299	67.18	1313	69.24	1325	71.10
44000	1250	60.14	1263	62.12	1277	64.06	1291	66.08	1304	68.05	1316	69.98	1329	71.97	1342	73.90
45000	1268	62.86	1281	64.80	1295	66.81	1308	68.78	1321	70.82	1333	72.80	1346	74.86		

CFM	Total Static Pressure															
Std.	6.25		6.50		6.75		7.00		7.25		7.50		7.75		8.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
23000	1113	34.68	1134	36.20	1156	37.81	1177	39.32	1198	40.92	1217	42.39	1237	43.95	1257	45.59
24000	1112	35.73	1133	37.25	1156	39.04	1176	40.55	1199	42.34	1217	43.81	1239	45.57	1258	47.20
25000	1112	36.70	1134	38.41	1154	40.02	1177	41.91	1197	43.50	1217	45.18	1238	46.94	1257	48.55
26000	1118	37.96	1137	39.58	1154	41.09	1177	43.01	1198	44.81	1217	46.49	1237	48.25	1258	50.10
27000	1125	39.32	1144	40.97	1161	42.51	1179	44.22	1196	45.80	1217	47.73	1237	49.50	1256	51.35
28000	1134	40.80	1151	42.39	1169	44.06	1186	45.70	1204	47.41	1222	49.21	1238	50.84	1257	52.75
29000	1143	42.23	1161	43.94	1177	45.54	1194	47.20	1211	48.95	1229	50.77	1244	52.43	1261	54.16
30000	1153	43.79	1170	45.54	1186	47.16	1203	48.86	1220	50.64	1237	52.49	1253	54.19	1269	55.95
31000	1164	45.51	1182	47.29	1197	48.95	1213	50.69	1229	52.38	1245	54.15	1260	55.87	1276	57.66
32000	1176	47.32	1192	49.02	1208	50.70	1224	52.47	1240	54.31	1255	56.00	1270	57.75	1285	59.56
33000	1187	49.11	1204	50.95	1220	52.66	1235	54.44	1250	56.08	1265	57.91	1281	59.82	1296	61.68
34000	1201	51.16	1216	52.84	1231	54.59	1247	56.41	1261	58.07	1277	60.04	1292	61.86	1307	63.75
35000	1214	53.19	1229	54.92	1244	56.72	1258	58.47	1273	60.29	1287	62.05	1302	63.87	1317	65.78
36000	1229	55.40	1243	57.19	1256	58.81	1272	60.73	1285	62.47	1299	64.28	1314	66.14	1328	68.08
37000	1244	57.71	1257	59.44	1270	61.11	1285	63.09	1299	64.88	1313	66.74	1326	68.52	1340	70.35
38000	1258	59.99	1273	61.90	1286	63.63	1299	65.42	1312	67.27	1326	69.17	1339	71.00		
39000	1274	62.49	1287	64.35	1300	66.13	1314	67.98	1327	69.89	1339	71.57				
40000	1289	64.98	1303	66.90	1316	68.75	1328	70.52	1341	72.48	1354	74.36				
41000	1306	67.72	1319	69.58	1332	71.49	1344	73.32								
42000	1322	70.45	1335	72.38	1347	74.22										
43000	1338	73.03														

Table 17 Supply Fan Performance STANDARD CFM — Casing C (36")

CFM	Total Static Pressure			
Std.	8.25		8.50	
Air	RPM	BHP	RPM	BHP
23000	1275	47.06	1294	48.70
24000	1276	48.66	1296	50.45
25000	1276	50.25	1296	52.02
26000	1276	51.80	1296	53.57
27000	1277	53.29	1295	55.06
28000	1277	54.70	1295	56.48
29000	1278	55.96	1295	57.81
30000	1285	57.78	1302	59.68
31000	1292	59.52	1308	61.45
32000	1301	61.46	1317	63.42
33000	1311	63.47	1325	65.33
34000	1320	65.43	1335	67.46
35000	1332	67.77	1345	69.54
36000	1342	69.94		

Notes:
1. Supply fan performance table includes internal resistance of air handler. For total static pressure determination, system external static pressure must be added to appropriate component sp drops (chilled water coil, filters, optional economizer, optional heating system).
2. Maximum SP leaving the air handler is 5.5" H_20 positive.

(i) Outlined area indicates nonstandard BHP or RPM selections. Contact a local Trane representative for more information.

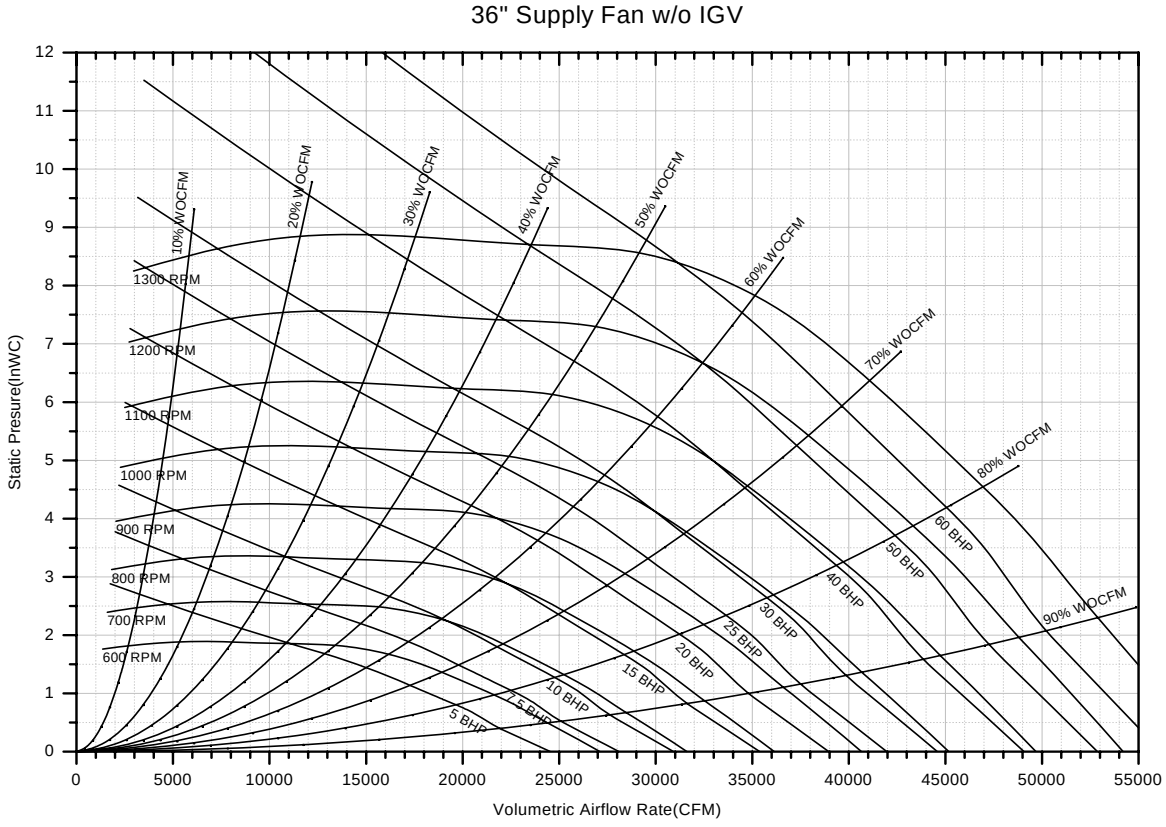


Figure 19. Supply Fan Performance STANDARD CFM —Casing C (36")

Performance Data — Supply Fan with Inlet Guide Vanes

Table 18 Supply Fan Performance STANDARD CFM — Casing A (25")

CFM	Total Static Pressure															
Std.	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
16000	1064[(i)]	7.01	1095	7.69	1125	8.35	1154	9.02	1183	9.69	1211	10.38	1240	11.10	1267	11.80
17000	1127	8.31	1157	9.04	1185	9.75	1213	10.46	1239	11.16	1266	11.88	1293	12.62	1320	13.38
18000	1190	9.77	1218	10.54	1245	11.30	1271	12.05	1297	12.79	1323	13.55	1348	14.33	1373	15.11
19000	1252	11.40	1280	12.22	1306	13.02	1331	13.81	1355	14.60	1379	15.38	1403	16.18	1428	17.02
20000	1316	13.20	1341	14.07	1366	14.92	1391	15.76	1414	16.58	1437	17.40	1460	18.23	1483	19.08
21000	1379	15.19	1404	16.10	1427	16.99	1451	17.87	1473	18.75	1496	19.62	1518	20.49	1539	21.36
22000	1442	17.37	1466	18.32	1489	19.27	1511	20.20	1533	21.11	1554	22.01	1575	22.92	1596	23.83
23000	1505	19.76	1528	20.76	1550	21.74	1572	22.71	1593	23.67	1614	24.63	1634	25.58	1654	26.53
24000	1569	22.35	1591	23.40	1612	24.43	1633	25.45	1653	26.46	1673	27.45	1693	28.44	1712	29.42
25000	1633	25.17	1654	26.27	1674	27.34	1694	28.41	1714	29.45	1733	30.50	1752	31.53	1771	32.56
26000	1696	28.22	1717	29.36	1736	30.48	1756	31.60	1775	32.70	1794	33.78	1812	34.87	1830	35.93
27000	1760	31.52	1780	32.70	1799	33.86	1817	35.01	1836	36.17	1854	37.31	1872	38.42	1890	39.56
28000	1824	35.05	1843	36.28	1861	37.50	1879	38.70	1897	39.89	1915	41.07	1932	42.23	1949	43.41
29000	1887	38.85	1906	40.12	1924	41.39	1941	42.63	1959	43.86	1976	45.10	1993	46.31	2009	47.53
30000	1951	42.92	1969	44.24	1986	45.54	2004	46.82								
31000	2015	47.26														

CFM	Total Static Pressure															
Std.	2.25		2.50		2.75		3.00		3.25		3.50		3.75		4.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
16000	1294[(ii)]	12.49	1320	13.19	1345	13.89	1368	14.53	1390	15.19	1412	15.86	1434	16.53	1456	17.21
17000	1346	14.13	1371	14.89	1395	15.61	1419	16.34	1441	17.04	1462	17.74	1484	18.45	1505	19.16
18000	1398	15.90	1422	16.69	1447	17.49	1470	18.28	1493	19.07	1514	19.81	1534	20.55	1555	21.29
19000	1452	17.86	1475	18.67	1499	19.53	1521	20.37	1544	21.21	1565	22.01	1586	22.82	1606	23.62
20000	1506	19.95	1528	20.83	1551	21.71	1573	22.59	1595	23.48	1616	24.36	1637	25.24	1658	26.12
21000	1561	22.27	1583	23.17	1605	24.11	1626	25.05	1647	25.94	1667	26.86	1689	27.82	1709	28.73
22000	1617	24.77	1637	25.69	1659	26.69	1679	27.63	1700	28.61	1720	29.58	1741	30.58	1760	31.51
23000	1674	27.50	1694	28.46	1714	29.46	1733	30.44	1753	31.46	1773	32.47	1793	33.51	1812	34.54
24000	1732	30.44	1751	31.45	1769	32.44	1788	33.47	1808	34.53	1827	35.57	1846	36.65	1864	37.70
25000	1790	33.61	1808	34.63	1826	35.69	1844	36.73	1863	37.83	1881	38.90	1899	40.01	1917	41.08
26000	1848	37.02	1866	38.08	1883	39.15	1901	40.25	1919	41.38	1936	42.48	1954	43.61	1972	44.78
27000	1907	40.66	1924	41.76	1941	42.89	1958	44.02	1975	45.15	1992	46.27				
28000	1966	44.55	1983	45.71	1999	46.87										

CFM	Total Static Pressure															
Std.	4.25		4.50		4.75		5.00		5.25		5.50		5.75		6.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
16000	1479	17.93	1502	18.68	1523	19.40	1546	20.15	1569	20.94	1592	21.77	1614	22.55	1636	23.33
17000	1526	19.90	1547	20.65	1568	21.39	1589	22.16	1609	22.92	1630	23.72	1652	24.54	1674	25.41
18000	1574	22.02	1594	22.78	1614	23.54	1634	24.33	1654	25.15	1673	25.91	1693	26.75	1714	27.62
19000	1625	24.38	1644	25.17	1663	25.94	1682	26.75	1701	27.58	1720	28.40	1739	29.25	1757	30.08
20000	1677	26.94	1696	27.80	1714	28.59	1732	29.41	1750	30.26	1767	31.03	1786	31.94	1803	32.77
21000	1728	29.62	1747	30.55	1765	31.40	1783	32.29	1801	33.15	1817	33.98	1835	34.90	1851	35.72
22000	1779	32.48	1799	33.48	1817	34.41	1835	35.36	1852	36.23	1868	37.13	1885	38.05	1903	39.00
23000	1831	35.53	1850	36.56	1868	37.55	1885	38.52	1904	39.58	1921	40.55	1937	41.47	1953	42.42
24000	1883	38.78	1901	39.83	1919	40.91	1937	41.95	1955	43.03	1972	44.06	1988	45.05	2005	46.07
25000	1935	42.19	1953	43.33	1971	44.43	1989	45.55	2006	46.63						
26000	1989	45.91	2006	47.06												

Table 18 Supply Fan Performance STANDARD CFM — Casing A (25")

CFM	Total Static Pressure															
Std.	6.25		6.50		6.75		7.00		7.25		7.50		7.75		8.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
16000	1657	24.15	1678	24.95	1697	25.68	1719	26.55	1739	27.34	1760	28.16	1780	28.98	1803	29.88
17000	1694	26.21	1715	27.05	1736	27.92	1755	28.73	1775	29.56	1795	30.43	1815	31.32	1833	32.11
18000	1734	28.48	1754	29.36	1773	30.16	1794	31.12	1813	31.98	1833	32.88	1853	33.82	1870	34.66
19000	1776	30.93	1794	31.76	1814	32.74	1833	33.62	1852	34.53	1871	35.48	1889	36.38	1908	37.32
20000	1820	33.62	1838	34.50	1856	35.41	1874	36.35	1892	37.26	1910	38.18	1929	39.21	1946	40.12
21000	1869	36.64	1885	37.52	1902	38.42	1919	39.35	1937	40.31	1954	41.30	1971	42.24	1988	43.21
22000	1918	39.84	1934	40.78	1951	41.75	1967	42.67	1983	43.61	1999	44.58				
23000	1968	43.32	1984	44.25	1999	45.20										

CFM	Total Static Pressure							
Std.	8.25		8.50		8.75		9.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
16000	1827	30.81	1849	31.71	1872	32.64	1895	33.60
17000	1853	33.00	1873	33.91	1892	34.76	1914	35.77
18000	1888	35.53	1906	36.42	1925	37.33	1944	38.28
19000	1927	38.29	1945	39.22	1962	40.11	1981	41.10
20000	1964	41.06	1983	42.11	1999	43.02		
21000	2005	44.20						

Notes:

1. Supply fan performance table includes internal resistance of air handler. For total static pressure determination, system external static pressure must be added to appropriate component sp drops (chilled water coil, filters, optional economizer, optional heating system).
2. Maximum SP leaving the air handler is 5.5" H_20 positive.

(i) Outlined area indicates nonstandard BHP or RPM selections. Contact a local Trane representative for more information.
(ii) Outlined area indicates nonstandard BHP or RPM selections. Contact a local Trane representative for more information.

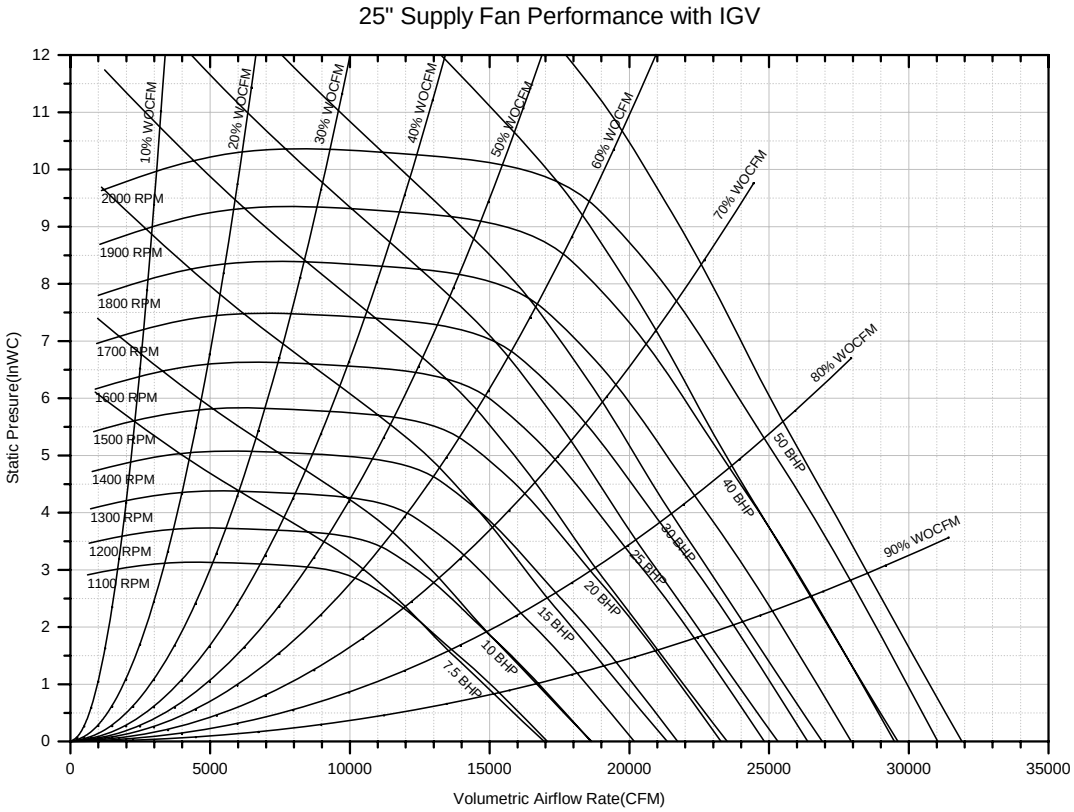


Figure 20. Supply Fan Performance STANDARD CFM—Casing A (25")

Table 19 Supply Fan Performance STANDARD CFM — Casing B (32")

CFM	Total Static Pressure															
Std.	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
20000	683[(i)]	5.82	713	6.66	742	7.48	771	8.35	799	9.25	826	10.13	851	10.98	873	11.77
21000	714	6.65	743	7.52	771	8.40	798	9.30	825	10.22	851	11.14	876	12.07	899	12.93
22000	745	7.55	773	8.47	800	9.38	826	10.31	852	11.29	877	12.25	902	13.23	925	14.16
23000	777	8.53	804	9.50	829	10.46	854	11.42	879	12.42	904	13.42	928	14.44	951	15.45
24000	808	9.61	834	10.62	859	11.61	883	12.62	907	13.65	931	14.70	954	15.74	977	16.83
25000	840	10.76	865	11.82	889	12.86	912	13.89	935	14.95	958	16.05	981	17.15	1003	18.27
26000	871	12.02	896	13.13	919	14.20	941	15.28	963	16.37	986	17.50	1007	18.63	1029	19.78
27000	903	13.37	926	14.52	949	15.65	971	16.77	992	17.89	1013	19.04	1035	20.22	1055	21.39
28000	935	14.82	957	16.01	979	17.19	1000	18.35	1021	19.52	1042	20.68	1062	21.89	1082	23.11
29000	966	16.37	988	17.62	1010	18.84	1030	20.03	1050	21.23	1070	22.44	1090	23.69	1110	24.97
30000	998	18.03	1020	19.32	1040	20.58	1060	21.84	1080	23.07	1099	24.32	1118	25.59	1137	26.88
31000	1030	19.80	1051	21.14	1071	22.45	1090	23.75	1109	25.03	1128	26.32	1146	27.59	1165	28.93
32000	1062	21.69	1082	23.08	1102	24.44	1121	25.76	1139	27.09	1157	28.41	1176	29.76	1193	31.10
33000	1094	23.70	1113	25.13	1133	26.54	1151	27.91	1169	29.28	1187	30.64	1204	32.01	1222	33.39
34000	1126	25.83	1145	27.30	1163	28.74	1182	30.18	1199	31.59	1216	32.99	1233	34.39	1250	35.81
35000	1158	28.08	1176	29.60	1194	31.10	1212	32.58	1229	34.04	1246	35.47	1263	36.91	1279	38.37
36000	1190	30.47	1208	32.04	1225	33.57	1243	35.11	1260	36.60	1276	38.07	1293	39.58	1309	41.08
37000	1222	32.99	1239	34.60	1257	36.17	1274	37.74	1290	39.31	1306	40.84	1322	42.35	1338	43.89
38000	1254	35.65	1271	37.29	1288	38.93	1305	40.56	1321	42.14	1336	43.71	1352	45.29	1367	46.85
39000	1286	38.44	1303	40.13	1319	41.81	1335	43.49	1351	45.11	1367	46.76	1382	48.37	1397	49.96
40000	1318	41.38	1334	43.12	1351	44.85	1366	46.55	1382	48.24	1397	49.91	1412	51.56	1427	53.25
41000	1350	44.47	1366	46.27	1382	48.03	1397	49.79	1413	51.52	1427	53.23	1442	54.94	1456	56.61
42000	1382	47.72	1398	49.55	1413	51.38	1429	53.17	1443	54.94	1458	56.71	1472	58.44	1486	60.17
43000	1414	51.12	1430	52.99	1445	54.86	1460	56.69	1474	58.52	1488	60.32				
44000	1446	54.68	1462	56.60	1476	58.52	1491	60.39								
45000	1479	58.40	1493	60.36												

CFM	Total Static Pressure															
Std.	2.25		2.50		2.75		3.00		3.25		3.50		3.75		4.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
20000	895	12.60	918	13.48	941	14.39	962	15.28	985	16.25	1008	17.25	1031	18.27	1051	19.22
21000	921	13.80	942	14.67	963	15.58	985	16.53	1006	17.49	1028	18.48	1049	19.51	1071	20.57
22000	947	15.08	967	15.98	987	16.90	1008	17.85	1028	18.83	1048	19.81	1070	20.89	1090	21.96
23000	973	16.43	993	17.38	1012	18.33	1032	19.31	1051	20.28	1071	21.32	1090	22.34	1110	23.42
24000	998	17.86	1019	18.87	1038	19.85	1057	20.86	1076	21.86	1094	22.88	1113	23.96	1131	25.01
25000	1024	19.35	1045	20.43	1064	21.47	1083	22.51	1100	23.53	1118	24.57	1136	25.62	1155	26.78
26000	1050	20.94	1070	22.06	1090	23.21	1109	24.28	1126	25.33	1144	26.43	1161	27.49	1178	28.61
27000	1076	22.60	1096	23.80	1116	24.95	1135	26.13	1152	27.24	1169	28.36	1186	29.49	1202	30.56
28000	1103	24.38	1122	25.59	1141	26.82	1160	28.07	1178	29.24	1195	30.43	1212	31.58	1228	32.71
29000	1129	26.24	1148	27.49	1168	28.81	1186	30.10	1204	31.34	1221	32.55	1237	33.75	1253	34.96
30000	1156	28.20	1175	29.54	1194	30.85	1212	32.16	1230	33.49	1247	34.82	1264	36.09	1279	37.30
31000	1184	30.30	1202	31.63	1220	33.03	1238	34.38	1256	35.78	1273	37.14	1290	38.48	1305	39.76
32000	1212	32.51	1229	33.88	1247	35.31	1264	36.69	1282	38.13	1299	39.56	1316	40.98	1331	42.33
33000	1239	34.79	1257	36.25	1274	37.72	1291	39.18	1308	40.65	1325	42.10	1341	43.53	1357	44.95
34000	1267	37.25	1284	38.74	1301	40.24	1318	41.73	1334	43.21	1351	44.75	1367	46.19	1382	47.69
35000	1296	39.84	1313	41.37	1329	42.89	1345	44.40	1362	45.98	1378	47.53	1393	49.06	1408	50.56
36000	1325	42.58	1340	44.07	1357	45.65	1372	47.22	1388	48.80	1404	50.37	1420	51.99	1435	53.57
37000	1353	45.41	1369	46.99	1384	48.55	1400	50.18	1415	51.77	1431	53.42	1446	55.05	1462	56.72
38000	1383	48.44	1397	50.00	1413	51.66	1428	53.29	1443	54.89	1458	56.55	1473	58.26	1488	59.93
39000	1412	51.56	1426	53.18	1441	54.85	1456	56.49	1471	58.18	1486	59.93				
40000	1441	54.87	1456	56.54	1470	58.22	1484	59.86								
41000	1471	58.33	1485	60.00												

Table 19 Supply Fan Performance STANDARD CFM — Casing B (32")

CFM	Total Static Pressure															
Std.	4.25		4.50		4.75		5.00		5.25		5.50		5.75		6.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
20000	1072	20.24	1093	21.23	1114	22.28	1136	23.36	1158	24.48	1181	25.62	1204	26.81	1229	28.07
21000	1091	21.58	1112	22.67	1132	23.72	1150	24.73	1169	25.80	1191	26.98	1212	28.11	1236	29.41
22000	1110	23.01	1131	24.12	1150	25.22	1168	26.28	1187	27.39	1207	28.56	1225	29.66	1246	30.90
23000	1130	24.52	1150	25.68	1169	26.81	1187	27.90	1206	29.06	1224	30.21	1242	31.36	1260	32.50
24000	1150	26.11	1169	27.28	1188	28.40	1207	29.64	1226	30.83	1243	31.96	1261	33.15	1279	34.40
25000	1173	27.90	1190	29.02	1208	30.19	1226	31.37	1244	32.60	1263	33.89	1281	35.12	1298	36.34
26000	1195	29.73	1213	30.91	1230	32.09	1247	33.26	1264	34.48	1282	35.76	1300	37.10	1316	38.28
27000	1219	31.75	1235	32.87	1252	34.11	1268	35.27	1285	36.55	1302	37.82	1318	39.06	1336	40.43
28000	1243	33.84	1260	35.09	1276	36.26	1291	37.48	1308	38.75	1324	40.01	1340	41.31	1355	42.58
29000	1269	36.15	1284	37.33	1300	38.56	1316	39.85	1330	41.03	1346	42.34	1362	43.71	1378	45.04
30000	1295	38.56	1309	39.74	1325	41.03	1339	42.23	1355	43.55	1369	44.84	1385	46.19	1399	47.49
31000	1321	41.09	1335	42.33	1350	43.61	1365	44.87	1379	46.18	1393	47.45	1408	48.85	1422	50.12
32000	1347	43.73	1362	45.04	1376	46.31	1390	47.63	1404	48.92	1419	50.34	1432	51.62	1446	52.95
33000	1373	46.42	1388	47.79	1402	49.13	1416	50.52	1430	51.87	1444	53.27	1457	54.62	1471	56.01
34000	1399	49.24	1414	50.69	1429	52.18	1442	53.55	1456	54.97	1469	56.34	1483	57.75	1496	59.10
35000	1424	52.11	1439	53.63	1454	55.20	1468	56.63	1482	58.11	1495	59.55				
36000	1450	55.11	1466	56.80	1480	58.36	1494	59.86								
37000	1476	58.35	1491	59.93												

CFM	Total Static Pressure															
Std.	6.25		6.50		6.75		7.00		7.25		7.50		7.75		8.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
20000	1252	29.28	1276	30.56	1298	31.78	1321	33.08	1344	34.40	1365	35.63	1388	37.02	1408	38.30
21000	1258	30.65	1278	31.82	1302	33.18	1324	34.48	1347	35.84	1369	37.11	1390	38.47	1413	39.92
22000	1265	32.06	1285	33.26	1308	34.66	1330	35.98	1349	37.20	1372	38.64	1393	39.98	1414	41.38
23000	1279	33.75	1297	34.95	1316	36.18	1337	37.54	1356	38.80	1378	40.27	1398	41.63	1418	43.05
24000	1295	35.56	1312	36.77	1330	38.02	1348	39.30	1366	40.61	1385	41.96	1405	43.36	1425	44.81
25000	1314	37.54	1331	38.80	1347	40.03	1365	41.38	1381	42.62	1397	43.88	1416	45.34	1433	46.66
26000	1334	39.66	1351	40.96	1366	42.15	1383	43.56	1399	44.84	1415	46.16	1430	47.44	1445	48.75
27000	1352	41.71	1369	43.03	1385	44.42	1402	45.78	1417	47.10	1432	48.38	1448	49.80	1463	51.16
28000	1372	43.98	1389	45.36	1404	46.70	1421	48.18	1437	49.54	1452	50.95	1466	52.21	1482	53.73
29000	1393	46.33	1408	47.67	1424	49.15	1439	50.49	1454	51.88	1470	53.32	1486	54.82	1501	56.26
30000	1414	48.84	1429	50.24	1444	51.58	1459	53.07	1475	54.51	1490	56.00	1505	57.44	1521	59.03
31000	1437	51.53	1452	52.99	1466	54.40	1480	55.75	1495	57.24	1509	58.67	1525	60.26		
32000	1460	54.32	1474	55.74	1488	57.21	1503	58.72	1516	60.06						
33000	1485	57.44	1498	58.82	1512	60.24										

CFM	Total Static Pressure							
Std.	8.25		8.50		8.75		9.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
20000	1429	39.64	1451	41.06	1472	42.44	1493	43.90
21000	1433	41.25	1454	42.65	1474	44.01	1494	45.44
22000	1436	42.85	1456	44.23	1477	45.68	1497	47.09
23000	1440	44.53	1459	45.88	1479	47.29	1499	48.75
24000	1443	46.13	1464	47.69	1483	49.12	1502	50.59
25000	1450	48.01	1471	49.62	1489	51.07	1508	52.58
26000	1463	50.17	1480	51.63	1498	53.13	1514	54.45
27000	1479	52.57	1494	53.91	1509	55.28		
28000	1497	55.08	1511	56.47				
29000	1516	57.77						

Notes:

1. Supply fan performance table includes internal resistance of air handler. For total static pressure determination, system external static pressure must be added to appropriate component sp drops (chilled water coil, filters, optional economizer, optional heating system).
2. Maximum SP leaving the air handler is 5.5" H_20 positive.

(i) Outlined area indicates nonstandard BHP or RPM selections. Contact a local Trane representative for more information.

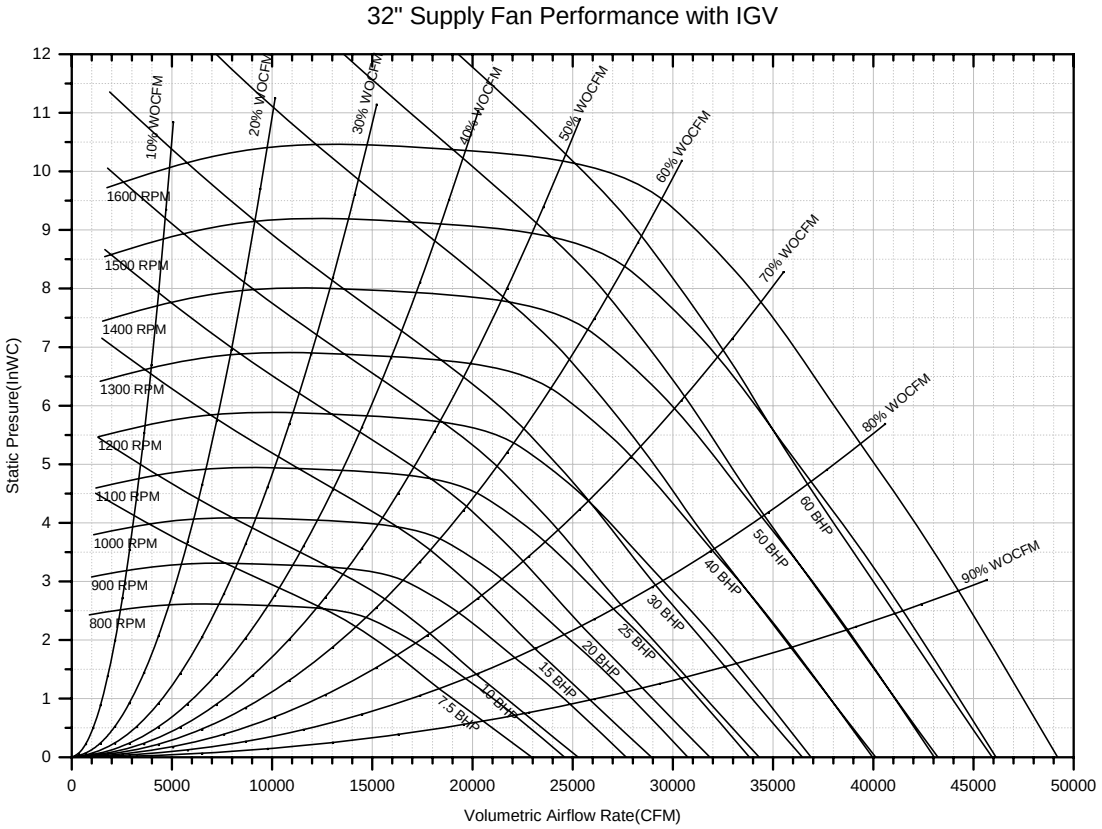


Figure 21. Supply Fan Performance STANDARD CFM—Casing B (32")

Table 20 Supply Fan Performance STANDARD CFM — Casing C (36")

CFM	Total Static Pressure															
Std.	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
23000	559[(i)]	5.72	588	6.67	616	7.65	644	8.66	670	9.68	694	10.64	716	11.60	738	12.57
24000	581	6.41	609	7.41	636	8.41	663	9.47	688	10.53	712	11.58	734	12.54	755	13.54
25000	603	7.15	630	8.20	656	9.24	681	10.32	706	11.43	731	12.54	753	13.59	773	14.61
26000	625	7.96	651	9.04	676	10.12	700	11.24	725	12.39	749	13.54	771	14.67	791	15.73
27000	647	8.82	672	9.95	696	11.07	720	12.21	744	13.40	767	14.59	789	15.79	809	16.92
28000	669	9.75	693	10.93	717	12.08	740	13.27	763	14.48	785	15.74	807	16.97	827	18.16
29000	691	10.74	715	11.97	737	13.16	760	14.37	782	15.64	804	16.91	825	18.20	846	19.47
30000	713	11.80	736	13.06	758	14.30	780	15.57	801	16.84	823	18.17	844	19.49	864	20.80
31000	735	12.93	758	14.24	779	15.53	800	16.81	821	18.13	842	19.49	862	20.87	882	22.23
32000	757	14.13	779	15.49	800	16.82	821	18.14	841	19.49	861	20.88	881	22.27	901	23.73
33000	779	15.40	801	16.82	821	18.18	841	19.55	861	20.92	880	22.34	900	23.79	919	25.25
34000	802	16.76	823	18.21	843	19.63	862	21.03	881	22.44	900	23.92	919	25.38	938	26.89
35000	824	18.19	845	19.69	864	21.16	883	22.60	902	24.04	920	25.54	939	27.05	957	28.57
36000	846	19.70	866	21.25	886	22.76	904	24.24	922	25.74	940	27.25	958	28.81	976	30.37
37000	869	21.30	888	22.89	907	24.45	925	25.98	943	27.52	960	29.06	978	30.62	995	32.22
38000	891	22.98	910	24.62	929	26.23	946	27.81	964	29.38	981	30.97	998	32.55	1015	34.22
39000	914	24.76	932	26.43	950	28.09	968	29.72	985	31.32	1001	32.94	1018	34.59	1035	36.27
40000	936	26.62	954	28.34	972	30.05	989	31.71	1006	33.36	1022	35.02	1038	36.71	1054	38.37
41000	959	28.57	976	30.35	994	32.10	1010	33.81	1027	35.49	1043	37.20	1058	38.90	1074	40.65
42000	981	30.63	999	32.45	1015	34.24	1032	36.00	1048	37.73	1063	39.47	1079	41.21	1094	42.99
43000	1004	32.78	1021	34.64	1037	36.49	1053	38.28	1069	40.06	1084	41.85	1100	43.65	1115	45.43
44000	1026	35.03	1043	36.93	1059	38.82	1075	40.68	1090	42.51	1105	44.33	1120	46.16	1135	48.00
45000	1035	35.06	1052	36.89	1068	38.74	1084	40.74	1101	42.71	1116	44.56	1130	46.02	1144	47.25
CFM	Total Static Pressure															
Std.	2.25		2.50		2.75		3.00		3.25		3.50		3.75		4.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
23000	760	13.58	781	14.64	804	15.75	826	16.89	846	18.01	867	19.16	887	20.31	908	21.53
24000	776	14.59	797	15.66	818	16.76	840	17.96	860	19.12	880	20.30	900	21.50	919	22.69
25000	793	15.64	813	16.74	833	17.87	853	19.02	873	20.22	894	21.48	914	22.76	932	23.95
26000	810	16.79	829	17.89	849	19.04	868	20.21	888	21.43	908	22.70	927	23.97	946	25.29
27000	829	18.05	847	19.15	866	20.33	884	21.48	903	22.72	921	23.96	941	25.28	959	26.58
28000	847	19.33	865	20.49	882	21.62	901	22.84	919	24.09	936	25.34	955	26.67	973	28.03
29000	865	20.71	883	21.90	901	23.09	918	24.29	935	25.56	952	26.82	970	28.16	987	29.46
30000	883	22.11	901	23.37	918	24.59	935	25.84	952	27.08	969	28.40	985	29.69	1002	31.05
31000	901	23.58	920	24.90	937	26.19	953	27.47	969	28.72	986	30.05	1002	31.39	1018	32.76
32000	920	25.12	938	26.52	955	27.87	971	29.16	987	30.48	1003	31.82	1019	33.17	1035	34.59
33000	938	26.73	956	28.16	973	29.58	990	30.94	1006	32.32	1021	33.67	1036	35.02	1051	36.44
34000	956	28.37	974	29.88	992	31.38	1009	32.86	1024	34.25	1039	35.66	1054	37.02	1069	38.44
35000	975	30.13	992	31.68	1010	33.20	1027	34.76	1042	36.22	1058	37.69	1072	39.11	1086	40.53
36000	994	31.98	1011	33.56	1028	35.17	1045	36.74	1061	38.27	1075	39.75	1091	41.31	1105	42.79
37000	1012	33.86	1029	35.48	1047	37.17	1063	38.76	1078	40.37	1094	41.98	1109	43.53	1122	45.00
38000	1031	35.84	1048	37.54	1065	39.21	1081	40.88	1097	42.56	1112	44.25	1127	45.87	1141	47.41
39000	1051	37.92	1067	39.65	1084	41.41	1099	43.10	1115	44.86	1130	46.56	1145	48.25	1159	49.85
40000	1070	40.11	1086	41.87	1102	43.64	1118	45.43	1134	47.20	1149	48.98	1164	50.75	1178	52.41
41000	1090	42.42	1106	44.20	1121	46.00	1137	47.79	1151	49.58	1167	51.43	1181	53.19	1196	55.02
42000	1110	44.79	1125	46.59	1141	48.47	1155	50.27	1170	52.15	1185	54.01	1200	55.85	1214	57.76
43000	1129	47.20	1145	49.10	1160	50.99	1175	52.89	1189	54.76	1203	56.62	1218	58.54	1232	60.44
44000	1150	49.83	1164	51.70	1179	53.65	1194	55.55	1208	57.51	1223	59.46	1236	61.38	1251	63.35
45000	1156	48.50	1169	49.81	1182	51.24	1195	52.87	1210	54.79	1225	56.80	1239	58.80	1253	60.79

Table 20 Supply Fan Performance STANDARD CFM — Casing C (36")

CFM	Total Static Pressure															
Std.	4.25		4.50		4.75		5.00		5.25		5.50		5.75		6.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
23000	929	22.80	952	24.15	975	25.48	998	26.90	1021	28.30	1045	29.80	1067	31.28	1089	32.76
24000	939	23.96	960	25.28	980	26.55	1003	28.01	1025	29.43	1045	30.82	1069	32.43	1090	33.86
25000	951	25.22	970	26.52	988	27.76	1009	29.16	1030	30.63	1050	32.05	1071	33.55	1093	35.13
26000	964	26.56	982	27.85	1000	29.15	1017	30.46	1036	31.87	1056	33.34	1077	34.88	1096	36.35
27000	978	27.98	995	29.26	1013	30.61	1030	31.97	1048	33.41	1065	34.83	1084	36.28	1102	37.80
28000	992	29.42	1010	30.84	1026	32.17	1044	33.58	1060	35.00	1076	36.33	1093	37.81	1110	39.32
29000	1005	30.90	1022	32.30	1040	33.73	1057	35.24	1073	36.62	1089	38.08	1105	39.53	1122	41.05
30000	1019	32.49	1036	33.88	1053	35.35	1070	36.90	1087	38.39	1102	39.81	1118	41.30	1134	42.87
31000	1034	34.13	1050	35.58	1067	37.10	1084	38.63	1100	40.16	1116	41.69	1132	43.22	1147	44.74
32000	1051	36.03	1066	37.41	1082	38.92	1098	40.50	1114	42.00	1130	43.57	1145	45.13	1161	46.77
33000	1066	37.87	1082	39.37	1097	40.87	1112	42.36	1128	43.91	1143	45.44	1159	47.14	1174	48.73
34000	1083	39.86	1098	41.34	1113	42.90	1128	44.36	1142	45.89	1158	47.57	1172	49.13	1188	50.86
35000	1101	42.01	1115	43.48	1130	45.02	1144	46.54	1158	48.12	1172	49.68	1188	51.40	1201	52.99
36000	1118	44.18	1132	45.71	1147	47.31	1160	48.81	1174	50.36	1189	52.08	1202	53.66	1216	55.30
37000	1136	46.54	1150	48.05	1164	49.63	1177	51.18	1191	52.79	1205	54.47	1218	56.12	1232	57.82
38000	1155	49.01	1168	50.50	1182	52.14	1194	53.66	1207	55.24	1221	56.88	1234	58.58	1248	60.34
39000	1173	51.52	1186	53.07	1199	54.69	1212	56.27	1225	57.91	1238	59.61	1251	61.26	1264	62.97
40000	1192	54.15	1205	55.78	1217	57.36	1230	59.01	1243	60.71	1256	62.36	1267	63.96	1280	65.73
41000	1209	56.73	1223	58.52	1236	60.17	1249	61.88	1261	63.54	1273	65.26	1285	66.92	1297	68.63
42000	1228	59.55	1241	61.30	1255	63.13	1267	64.80	1279	66.52	1291	68.19	1304	70.03	1315	71.68
43000	1246	62.40	1260	64.23	1273	66.12	1285	67.86	1298	69.66	1309	71.39	1321	73.17	1333	74.88
44000	1264	65.30	1278	67.20	1291	69.05	1304	70.97	1316	72.83	1328	74.63				
45000	1268	62.86	1281	64.80	1295	66.81	1322	74.12								

CFM	Total Static Pressure															
Std.	6.25		6.50		6.75		7.00		7.25		7.50		7.75		8.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
23000	1109	34.17	1131	35.76	1151	37.28	1171	38.79	1192	40.40	1212	42.00	1233	43.70	1251	45.26
24000	1111	35.38	1134	37.05	1154	38.55	1174	40.14	1194	41.73	1214	43.42	1233	44.98	1252	46.62
25000	1114	36.66	1135	38.27	1155	39.81	1176	41.49	1195	43.06	1215	44.72	1236	46.48	1254	48.11
26000	1116	37.89	1137	39.52	1158	41.23	1178	42.86	1199	44.59	1218	46.24	1236	47.76	1256	49.59
27000	1122	39.39	1140	40.88	1161	42.61	1180	44.26	1201	45.98	1219	47.59	1238	49.28	1258	51.07
28000	1128	40.80	1147	42.50	1166	44.11	1185	45.78	1202	47.33	1222	49.15	1240	50.85	1259	52.62
29000	1137	42.45	1154	44.05	1172	45.70	1189	47.32	1207	49.00	1225	50.65	1242	52.36	1261	54.15
30000	1149	44.32	1164	45.83	1180	47.39	1197	49.06	1214	50.80	1231	52.49	1249	54.25	1265	55.84
31000	1163	46.33	1178	47.89	1192	49.41	1207	50.99	1222	52.61	1238	54.25	1255	56.05	1271	57.80
32000	1176	48.31	1191	49.92	1205	51.49	1220	53.11	1234	54.69	1248	56.32	1263	57.98	1280	59.91
33000	1189	50.39	1204	52.03	1218	53.64	1233	55.31	1247	56.94	1261	58.62	1274	60.23	1289	62.03
34000	1202	52.47	1217	54.14	1232	55.88	1246	57.60	1260	59.26	1273	60.87	1288	62.66	1301	64.38
35000	1217	54.74	1231	56.46	1245	58.14	1260	60.00	1274	61.69	1288	63.47	1300	65.05	1315	66.95
36000	1230	57.01	1245	58.77	1260	60.61	1273	62.28	1287	64.01	1300	65.81	1315	67.68	1327	69.35
37000	1245	59.37	1259	61.19	1273	62.96	1287	64.80	1300	66.57	1314	68.41	1328	70.32	1341	72.01
38000	1260	61.94	1275	63.83	1287	65.54	1301	67.30	1314	69.12	1328	71.01	1342	72.96		
39000	1277	64.75	1290	66.46	1303	68.22	1316	70.05	1329	71.93	1342	73.73				
40000	1294	67.57	1306	69.34	1318	71.03	1330	72.78	1344	74.73						
41000	1310	70.40	1322	72.23	1335	74.12										
42000	1327	73.51														

CFM	Total Static Pressure			
Std.	8.25		8.50	
Air	RPM	BHP	RPM	BHP
23000	1271	46.90	1289	48.49
24000	1272	48.36	1289	49.92
25000	1273	49.82	1290	51.36
26000	1274	51.28	1293	53.06

Table 20 Supply Fan Performance STANDARD CFM — Casing C (36")

CFM	Total Static Pressure			
Std.	8.25		8.50	
Air	RPM	BHP	RPM	BHP
27000	1276	52.75	1294	54.50
28000	1279	54.48	1297	56.19
29000	1280	56.01	1299	57.96
30000	1283	57.73	1302	59.69
31000	1288	59.61	1304	61.36
32000	1295	61.65	1311	63.45
33000	1303	63.72	1318	65.44
34000	1315	66.15	1328	67.84
35000	1328	68.64	1341	70.37
36000	1341	71.22		

Notes:
1. Supply fan performance table includes internal resistance of air handler. For total static pressure determination, system external static pressure must be added to appropriate component sp drops (chilled water coil, filters, optional economizer, optional heating system).
2. Maximum SP leaving the air handler is 5.5" H_20 positive.

(i) Outlined area indicates nonstandard BHP or RPM selections. Contact a local Trane representative for more information.

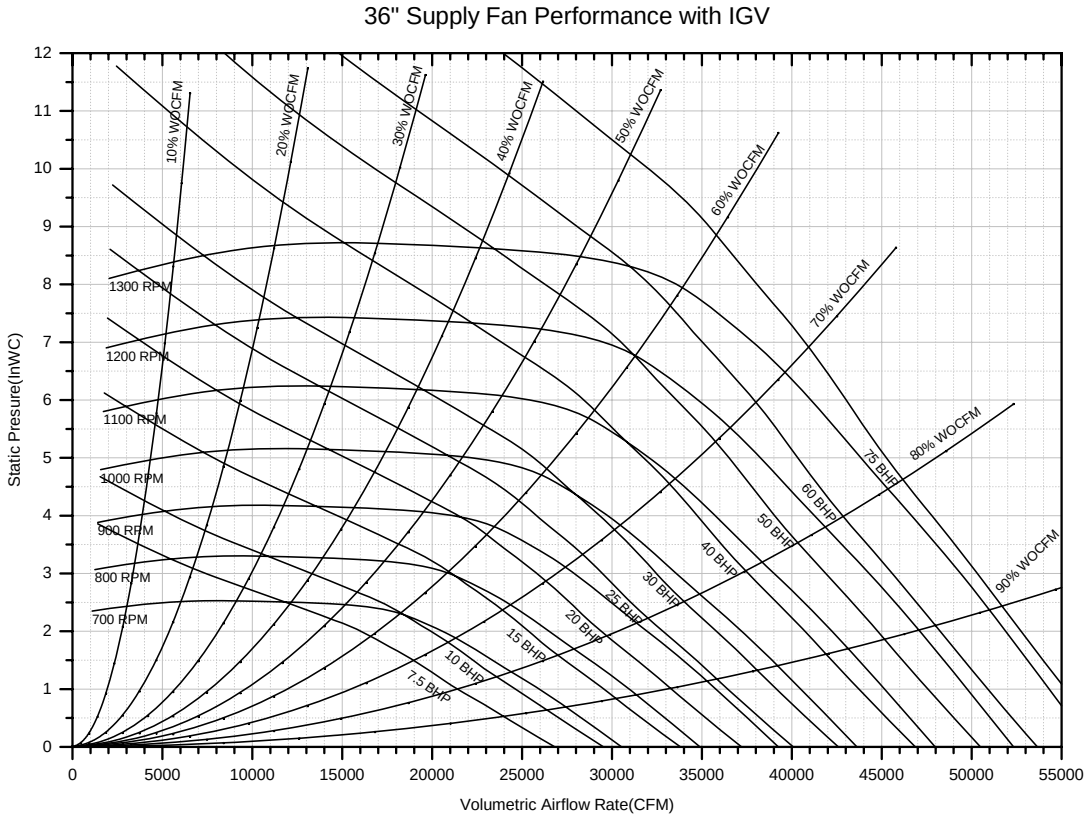


Figure 22. Supply Fan Performance STANDARD CFM —Casing C (36")

Performance Data—Exhaust Fan

Table 21 Exhaust Fan Performance LOW CFM—Case B, STANDARD CFM—Case A (25" Fan)

CFM	Negative Static Pressure															
Std.	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
10000	260[i]	1.42	319	1.91	372	2.44	423	3.03	470	3.65	515	4.27	555	4.89	594	5.52
11000	274	1.77	330	2.32	380	2.87	427	3.48	472	4.14	516	4.84	556	5.51	593	6.18
12000	288	2.19	341	2.78	389	3.38	433	4.00	476	4.69	517	5.41	558	6.18	594	6.90
13000	303	2.67	354	3.32	399	3.96	441	4.61	481	5.30	520	6.05	559	6.85	596	7.66
14000	319	3.23	366	3.92	410	4.61	450	5.31	488	6.02	525	6.78	563	7.61	598	8.46
15000	335	3.86	379	4.60	422	5.35	461	6.09	497	6.83	532	7.60	567	8.43	601	9.33
16000	352	4.58	394	5.36	434	6.16	472	6.95	507	7.73	541	8.55	574	9.39	606	10.27
17000	368	5.39	408	6.21	447	7.07	483	7.90	518	8.74	550	9.58	582	10.46	612	11.33
18000	385	6.29	423	7.16	460	8.05	495	8.95	529	9.85	560	10.72	591	11.63	620	12.55
19000	403	7.30	438	8.21	474	9.15	508	10.10	541	11.05	571	11.98	601	12.92	629	13.87
20000	420	8.41	454	9.37	488	10.34	520	11.35	552	12.34	583	13.33	611	14.31	639	15.30
21000	437	9.63	470	10.63	502	11.65	534	12.71	564	13.76	594	14.79	622	15.81	649	16.87
22000	455	10.97	487	12.02	517	13.08	548	14.17	577	15.29	606	16.37	633	17.44	661	18.55
23000	473	12.43	503	13.53	532	14.64	562	15.77	590	16.93	618	18.08	646	19.21	672	20.34
24000	491	14.02	520	15.16	548	16.32	577	17.49	604	18.69	631	19.90	657	21.08	683	22.27
25000	508	15.74	537	16.94	564	18.15	591	19.35	618	20.59	644	21.86	670	23.10	695	24.35
26000	527	17.60	554	18.86	580	20.10	606	21.35	632	22.62	658	23.95	682	25.26		
27000	545	19.59	572	20.92	597	22.20	622	23.52	647	24.82						
28000	563	21.74	589	23.13	614	24.46	637	25.81								

CFM	Negative Static Pressure			
Std.	2.25		2.50	
Air	RPM	BHP	RPM	BHP
10000	630	6.15	666	6.80
11000	630	6.87	664	7.55
12000	629	7.62	664	8.38
13000	631	8.47	664	9.26
14000	632	9.34	665	10.20
15000	635	10.23	667	11.17
16000	638	11.20	669	12.16
17000	642	12.28	673	13.30
18000	649	13.49	677	14.48
19000	657	14.85	684	15.84
20000	666	16.31	692	17.34
21000	676	17.91	701	18.98
22000	686	19.62	711	20.72
23000	697	21.49	721	22.61
24000	708	23.45	732	24.65
25000	719	25.57		

[i] Outlined area indicates nonstandard BHP or RPM selections. Contact a local Trane representative for more information.

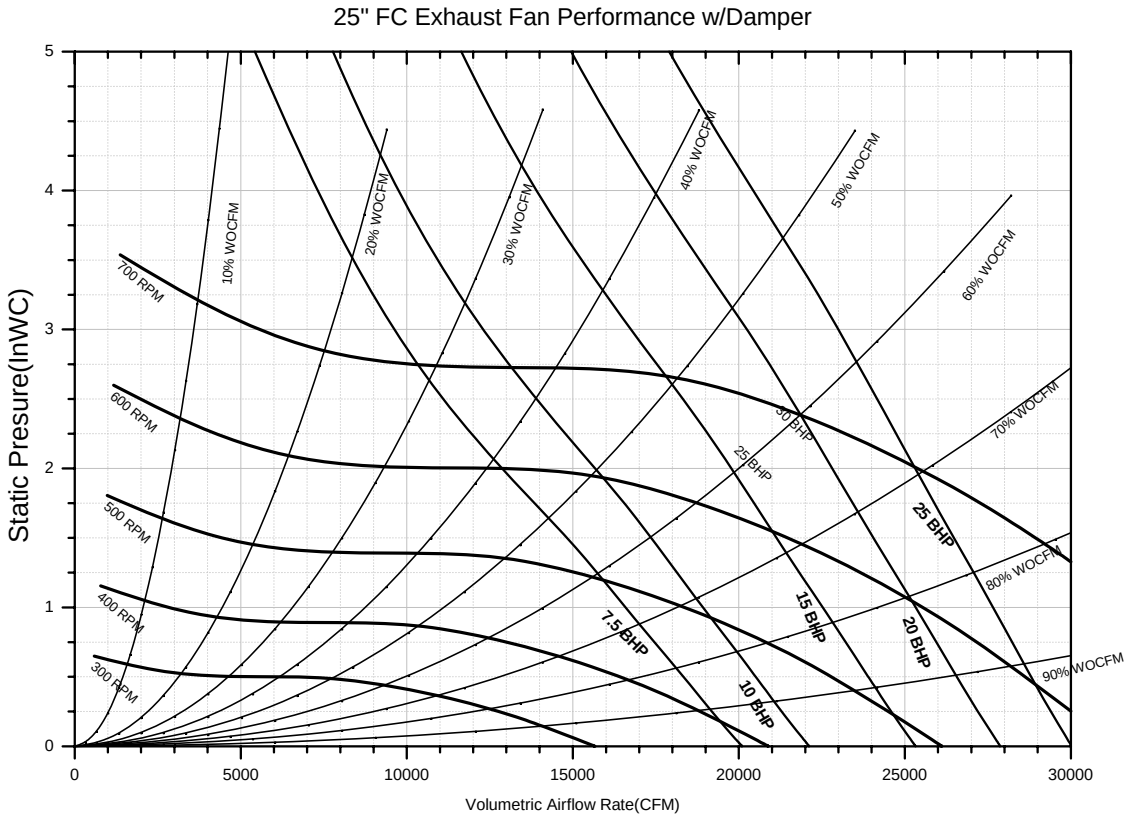


Figure 23. Exhaust Fan Performance LOW CFM—Case B, STANDARD CFM—Case A (25" Fan)

Table 22 Exhaust Fan Performance LOW CFM—Case C; STANDARD CFM — Case B (28" Fan)

CFM	Negative Static Pressure															
Std.	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
13000	237[i]	1.90	289	2.58	335	3.29	377	4.06	417	4.86	455	5.69	490	6.56	524	7.46
14000	247	2.27	297	2.98	341	3.74	382	4.54	420	5.39	457	6.25	491	7.14	524	8.07
15000	257	2.68	305	3.44	347	4.23	387	5.08	424	5.96	459	6.86	493	7.79	525	8.74
16000	267	3.15	313	3.95	354	4.78	392	5.65	429	6.58	462	7.52	495	8.49	527	9.49
17000	278	3.67	322	4.51	362	5.39	399	6.29	434	7.25	467	8.23	498	9.25	529	10.29
18000	289	4.24	332	5.14	370	6.06	406	7.00	439	7.98	471	9.00	502	10.07	532	11.15
19000	301	4.89	342	5.82	379	6.79	413	7.77	446	8.79	477	9.85	507	10.94	536	12.06
20000	312	5.59	352	6.57	387	7.59	421	8.62	452	9.66	483	10.76	512	11.88	541	13.07
21000	324	6.37	361	7.39	397	8.46	429	9.53	460	10.63	490	11.75	518	12.90	546	14.11
22000	336	7.21	372	8.30	406	9.40	438	10.52	468	11.65	497	12.82	524	14.01	551	15.24
23000	349	8.13	382	9.27	416	10.41	446	11.58	476	12.75	504	13.96	531	15.19	557	16.45
24000	361	9.13	393	10.32	426	11.50	456	12.73	484	13.95	511	15.18	538	16.45	564	17.76
25000	374	10.21	404	11.46	436	12.68	465	13.94	493	15.22	520	16.51	545	17.80	571	19.14
26000	386	11.38	415	12.68	446	13.95	474	15.24	502	16.59	528	17.93	553	19.26	578	20.63
27000	399	12.64	427	13.99	456	15.31	484	16.65	511	18.03	537	19.43	561	20.80	585	22.20
28000	412	13.99	439	15.40	466	16.78	494	18.14	520	19.56	545	20.98	570	22.44	593	23.88
29000	424	15.43	450	16.89	477	18.33	504	19.73	530	21.19	554	22.69	578	24.18	601	25.68
30000	437	16.98	462	18.49	488	19.98	514	21.45	540	22.93	564	24.45	587	26.00	609	27.54
31000	450	18.63	474	20.19	499	21.73	524	23.25	549	24.77	573	26.34	596	27.95	618	29.53
32000	463	20.38	487	22.00	510	23.59	535	25.17	560	26.74	583	28.33	605	29.98	626	31.59
33000	476	22.25	499	23.92	522	25.56	545	27.19	569	28.79	593	30.46	615	32.12	636	33.82
34000	489	24.23	511	25.94	534	27.65	556	29.33	579	30.97	602	32.65	624	34.38	645	36.11
35000	502	26.33	524	28.09	546	29.85	567	31.58	590	33.30	612	34.99	634	36.75	654	38.52

CFM	Negative Static Pressure			
Std.	2.25		2.50	
Air	RPM	BHP	RPM	BHP
13000	557	8.41	589	9.40
14000	557	9.06	587	10.04
15000	556	9.75	586	10.79
16000	557	10.51	586	11.57
17000	558	11.34	587	12.44
18000	561	12.23	589	13.37
19000	564	13.21	592	14.39
20000	567	14.22	595	15.44
21000	572	15.34	598	16.58
22000	577	16.49	603	17.79
23000	583	17.74	608	19.09
24000	589	19.08	614	20.47
25000	595	20.50	619	21.89
26000	602	22.03	625	23.43
27000	609	23.64	631	25.08
28000	616	25.35	639	26.86
29000	624	27.17	646	28.70
30000	632	29.10	653	30.68
31000	640	31.12	661	32.72
32000	648	33.28	669	34.90
33000	657[i]	35.51	677	37.20
34000	666	37.89	685	39.61
35000	674	40.35	694	42.14

[i]Outlined area indicates nonstandard BHP or RPM selections. Contact a local Trane representative for more information.

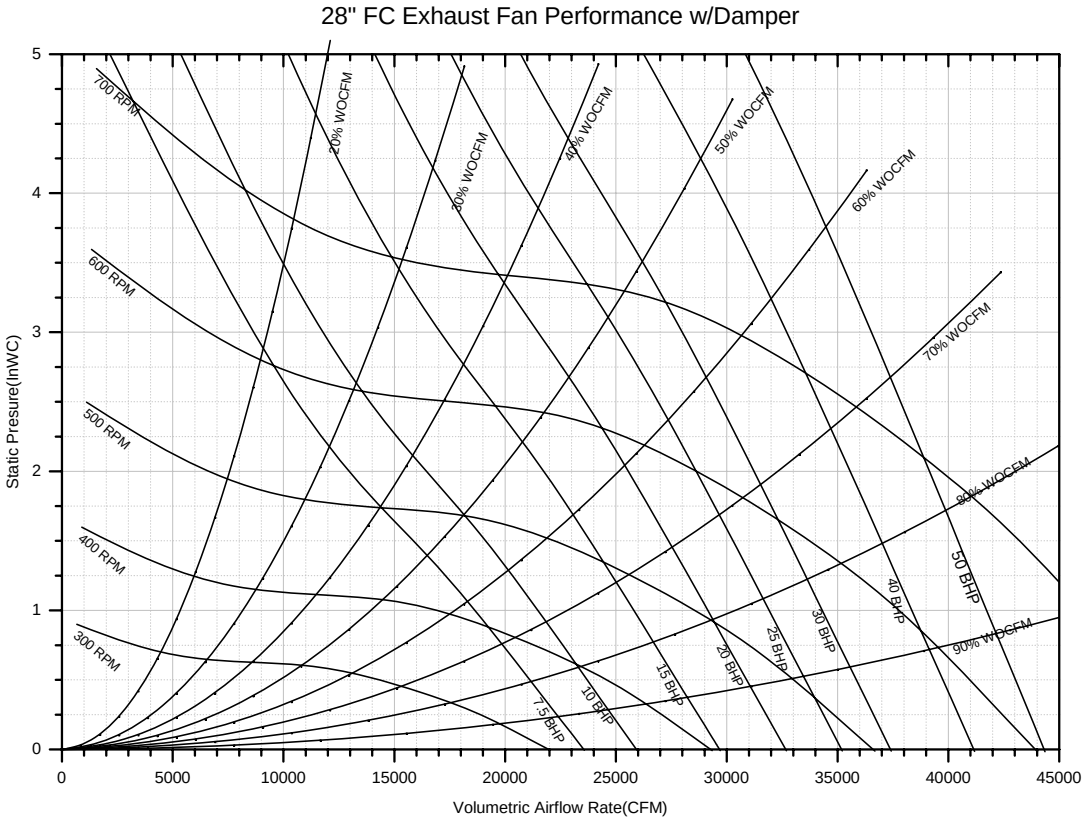


Figure 24. Exhaust Fan Performance LOW CFM—Case C; STANDARD CFM—Case B (28" Fan)

Table 23 Exhaust Fan Performance STANDARD CFM—Case C (32" Fan)

CFM	Negative Static Pressure															
Std.	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
23000	272[i]	6.16	307	7.39	339	8.59	370	9.96	400	11.36	429	12.87	458	14.48	484	16.02
24000	280	6.87	314	8.17	345	9.42	375	10.77	405	12.25	433	13.75	460	15.39	487	17.09
25000	288	7.63	321	8.98	352	10.31	381	11.66	410	13.21	437	14.71	464	16.37	490	18.10
26000	296	8.45	328	9.83	359	11.27	387	12.62	415	14.21	442	15.79	468	17.43	494	19.19
27000	305	9.34	336	10.76	367	12.30	394	13.69	421	15.25	447	16.90	472	18.52	497	20.31
28000	314	10.30	344	11.77	374	13.38	401	14.84	426	16.34	452	18.09	477	19.77	501	21.51
29000	323	11.35	353	12.88	382	14.54	407	16.03	432	17.55	458	19.30	482	21.10	505	22.83
30000	333	12.50	362	14.07	389	15.73	415	17.34	439	18.87	463	20.59	488	22.47	510	24.25
31000	343	13.73	371	15.35	396	16.96	422	18.69	446	20.28	469	21.97	493	23.87	516	25.78
32000	353	15.04	380	16.70	403	18.26	430	20.13	452	21.75	475	23.42	498	25.35	521	27.35
33000	363	16.44	388	18.08	411	19.68	437	21.63	460	23.35	482	25.04	504	26.88	526	28.94
34000	373	17.91	397	19.53	419	21.17	445	23.22	467	24.99	488	26.72	510	28.53	531	30.60
35000	383	19.48	405	21.04	427	22.77	452	24.80	475	26.72	495	28.52	516	30.32	537	32.38
36000	393	21.14	413	22.63	436	24.50	459	26.47	482	28.53	502	30.37	523	32.24	543	34.17
37000	403	22.89	421	24.29	445	26.33	466	28.23	490	30.42	510	32.33	529	34.23	549	36.21
38000	413	24.73	429	26.08	454	28.27	474	30.10	497	32.41	517	34.42	537	36.35	556	38.32
39000	423	26.68	438	27.96	464	30.28	481	32.06	504	34.40	525	36.55	544	38.54	562	40.58
40000	433	28.72	447	29.96	472	32.35	490	34.17	511	36.45	533	38.80	551	40.85	569	42.91

CFM	Negative Static Pressure			
Std.	2.25		2.50	
Air	RPM	BHP	RPM	BHP
23000	508	17.55	533	19.11
24000	512	18.66	536	20.29
25000	516	19.86	538	21.48
26000	518	20.99	542	22.78
27000	522	22.20	545	24.08
28000	525	23.44	548	25.34
29000	528	24.70	551	26.71
30000	533	26.15	555	28.11
31000	537	27.65	559	29.63
32000	542	29.27	563	31.19
33000	547	30.93	567	32.90
34000	553	32.72	573	34.74
35000	558	34.53	578	36.62
36000	563	36.37	583	38.64
37000	569	38.34	589	40.69
38000	574	40.38	594	42.77
39000	580	42.59	599	44.90
40000	587	44.97	605	47.20

[i] Outlined area indicates nonstandard BHP or RPM selections. Contact a local Trane representative for more information.

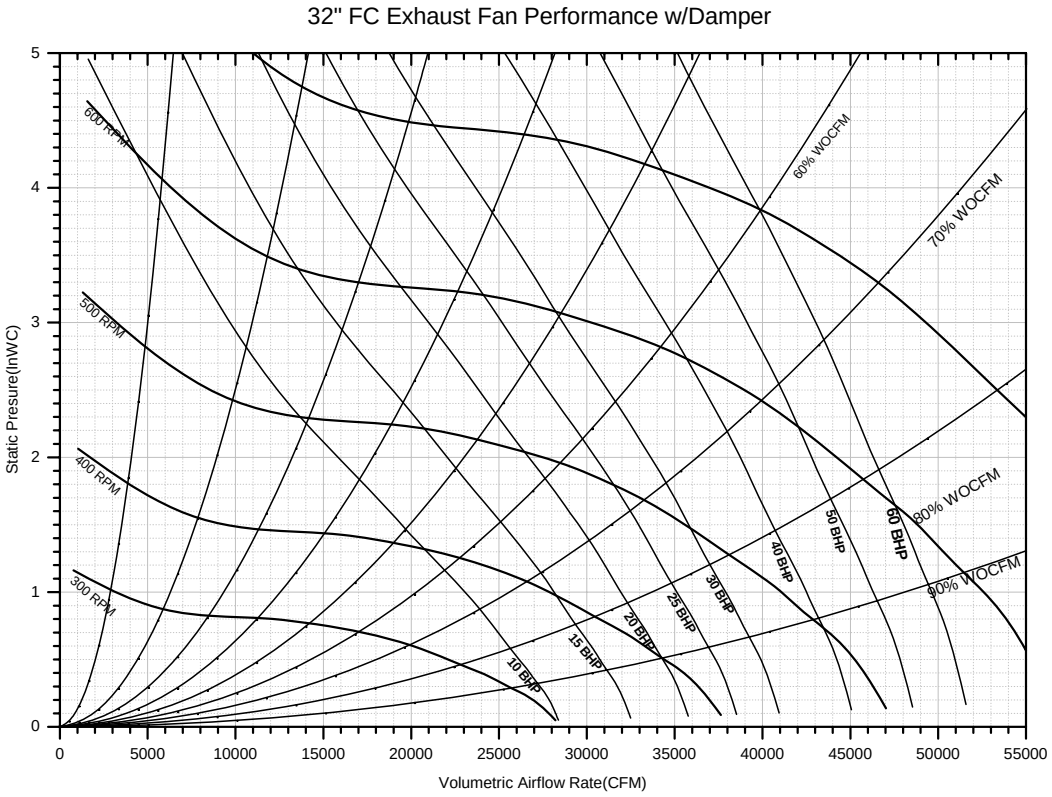


Table 24 Exhaust Fan Performance STANDARD CFM—Case C (32" Fan)

Performance Data—Return Fan

Table 25 Return Fan Performance STANDARD CFM—Case A (36.5" Fan)

CFM	Negative Static Pressure															
Std.	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
16000	614[i]	2.65	647	3.39	678	4.15	709	5.00	739	5.83	767	6.65	797	7.53	825	8.41
17000	648	3.07	680	3.87	710	4.66	739	5.53	767	6.44	795	7.31	822	8.19	849	9.11
18000	683	3.55	713	4.39	741	5.22	769	6.10	797	7.08	823	8.01	848	8.92	875	9.89
19000	717	4.07	746	4.96	773	5.84	799	6.74	826	7.72	851	8.74	876	9.73	900	10.69
20000	752	4.65	780	5.57	806	6.51	831	7.45	855	8.44	881	9.52	904	10.56	928	11.60
21000	787	5.29	813	6.25	839	7.23	863	8.21	886	9.21	910	10.33	934	11.45	956	12.53
22000	822	5.99	847	6.99	872	8.02	895	9.04	917	10.07	940	11.17	963	12.34	985	13.54
23000	858	6.75	881	7.80	905	8.87	928	9.93	949	11.00	971	12.11	992	13.31	1014	14.55
24000	893	7.57	915	8.66	938	9.78	960	10.89	981	12.00	1002	13.13	1022	14.33	1043	15.61
25000	928	8.46	950	9.59	972	10.75	994	11.92	1014	13.07	1034	14.24	1054	15.46	1074	16.76
26000	964	9.43	984	10.60	1006	11.79	1026	13.00	1046	14.21	1066	15.42	1085	16.65	1104	17.95
27000	999	10.46	1019	11.67	1039	12.91	1060	14.17	1079	15.43	1098	16.67	1116	17.93	1135	19.24
28000	1035	11.57	1054	12.82	1073	14.11	1093	15.41	1112	16.73	1131	18.01	1148	19.31	1166	20.64
29000	1070	12.76	1089	14.06	1108	15.39	1127	16.72	1145	18.09	1163	19.43	1181	20.76	1198	22.11
30000	1106	14.04	1124	15.38	1142	16.73	1160	18.12	1179	19.53	1196	20.93	1213	22.31	1230	23.72
31000	1142	15.40	1159	16.77	1176	18.17	1194	19.61	1212	21.05	1229	22.50	1246	23.93	1262	25.35

CFM	Negative Static Pressure			
Std.	2.25		2.50	
Air	RPM	BHP	RPM	BHP
16000	851	9.29	876	10.20
17000	875	10.04	900	11.00
18000	901	10.86	925	11.84
19000	925	11.70	949	12.72
20000	951	12.61	974	13.68
21000	978	13.61	1000	14.69
22000	1007	14.67	1027	15.78
23000	1035	15.76	1056	16.95
24000	1064	16.89	1084	18.16
25000	1093	18.07	1113	19.41
26000	1123	19.32	1142	20.72
27000	1153	20.60	1172	22.06
28000	1183	21.99	1202	23.49
29000	1215	23.49	1232	24.97
30000	1247	25.14	1263	26.58
31000	1278	26.81	1294	28.28

[i] Outlined area indicates nonstandard BHP or RPM selections. Contact a local Trane representative for more information.

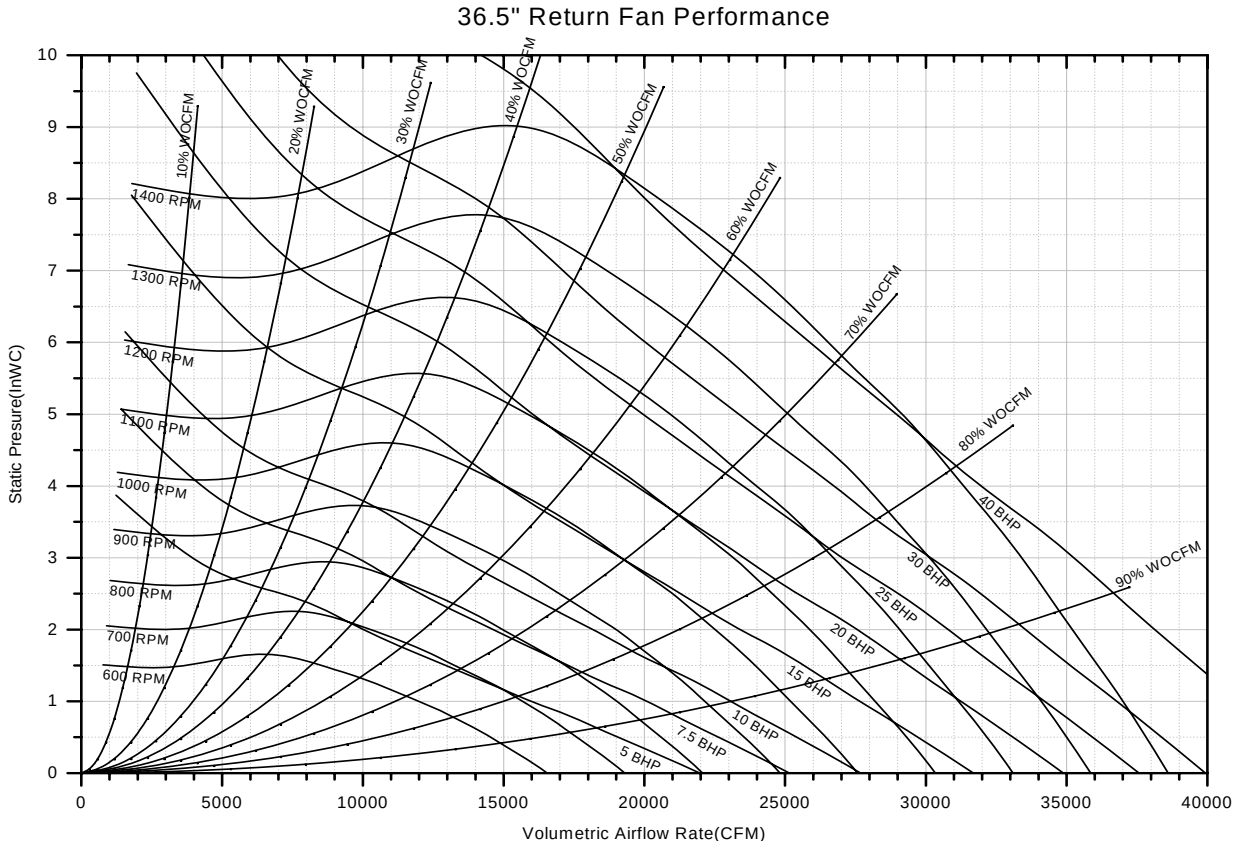


Figure 25. Return Fan Performance STANDARD CFM—Case A (36.5" Fan)

Table 26 Return Fan Performance STANDARD CFM—Case B and Case C (40" Fan)

CFM	Negative Static Pressure															
Std.	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00	
Air	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
20000	571[i]	3.45	600	4.37	627	5.31	655	6.38	682	7.42	707	8.43	732	9.49	758	10.60
21000	596	3.89	625	4.87	651	5.85	677	6.92	703	8.04	727	9.10	752	10.20	776	11.32
22000	622	4.37	649	5.39	675	6.42	700	7.50	725	8.67	748	9.81	772	10.94	795	12.11
23000	648	4.90	674	5.97	699	7.04	722	8.12	747	9.33	770	10.56	792	11.72	814	12.91
24000	674	5.47	699	6.58	723	7.69	746	8.81	769	10.03	792	11.31	813	12.56	835	13.80
25000	700	6.09	724	7.24	747	8.40	770	9.56	792	10.79	813	12.10	835	13.44	856	14.72
26000	726	6.75	749	7.95	772	9.16	794	10.37	814	11.59	836	12.94	857	14.35	877	15.68
27000	752	7.46	774	8.70	797	9.96	818	11.20	838	12.49	858	13.83	878	15.25	898	16.69
28000	779	8.23	800	9.50	821	10.81	842	12.10	862	13.41	881	14.76	901	16.24	920	17.71
29000	805	9.05	825	10.37	846	11.71	867	13.07	885	14.40	904	15.77	923	17.26	942	18.80
30000	831	9.92	851	11.28	871	12.68	891	14.08	910	15.46	928	16.88	946	18.33	965	19.92
31000	858	10.85	877	12.26	896	13.69	916	15.14	934	16.57	952	18.00	969	19.50	987	21.09
32000	884	11.85	902	13.29	921	14.76	940	16.25	958	17.74	976	19.23	993	20.74	1010	22.30
33000	911	12.90	928	14.38	947	15.90	965	17.43	983	18.98	1000	20.48	1016	22.03	1033	23.64
34000	937	14.02	954	15.54	972	17.10	990	18.69	1008	20.28	1024	21.83	1040	23.41	1056	25.02
35000	964	15.20	980	16.76	998	18.37	1015	19.98	1032	21.63	1048	23.24	1064	24.86	1080	26.48
36000	990	16.44	1007	18.05	1023	19.69	1040	21.36	1057	23.05	1073	24.70	1089	26.40	1104	28.06
37000	1017	17.76	1033	19.41	1049	21.09	1065	22.81	1082	24.54	1098	26.26	1113	27.96	1128	29.65
38000	1043	19.15	1059	20.84	1075	22.56	1091	24.31	1107	26.09	1122	27.86	1137	29.63	1152	31.35
39000	1070	20.61	1085	22.35	1100	24.10	1116	25.91	1132	27.71	1147	29.53	1162	31.37	1176	33.15
40000	1097	22.14	1112	23.92	1126	25.71	1141	27.56	1157	29.41	1172	31.27	1186	33.14	1201	34.99
41000	1123	23.75	1138	25.58	1152	27.42	1167	29.30	1182	31.20	1196	33.09	1211	35.03		
42000	1150	25.44	1164	27.30	1178	29.19	1193	31.11	1207	33.05	1221	35.00				
43000	1177	27.21	1191	29.11	1204	31.04	1218	33.01								
44000	1204	29.06	1217	31.01												

CFM	Negative Static Pressure			
Std.	2.25		2.50	
Air	RPM	BHP	RPM	BHP
20000	782	11.73	804	12.83
21000	800	12.46	822	13.64
22000	819	13.30	841	14.52
23000	837	14.13	859	15.39
24000	856	15.02	878	16.33
25000	876	16.01	897	17.31
26000	896	17.01	916	18.33
27000	918	18.09	937	19.47
28000	940	19.23	958	20.63
29000	961	20.34	979	21.86
30000	983	21.52	1001	23.11
31000	1004	22.69	1022	24.38
32000	1027	23.94	1044	25.69
33000	1050	25.31	1066	27.04
34000	1072	26.69	1088	28.44
35000	1096	28.20	1111	29.98
36000	1119	29.74	1134	31.52
37000	1143	31.44	1157	33.16
38000	1166	33.16	1181	34.98
39000	1191	34.98	1204	36.82
40000	1214	36.83		

[i] Outlined area indicates nonstandard BHP or RPM selections. Contact a local Trane representative for more information.

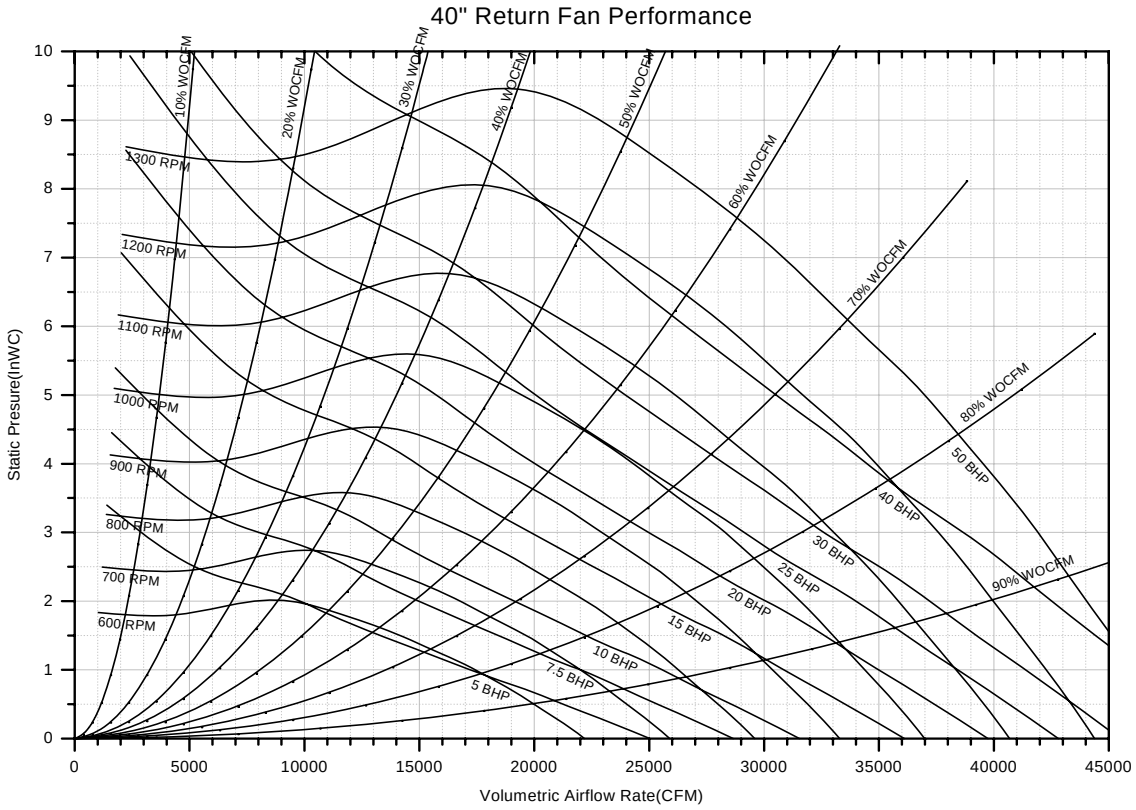


Figure 26. Return Fan Performance STANDARD CFM—Case B and Case C (40" Fan)

Performance Data—Heat

Table 27 Natural Gas Heating Capacities[1]

				Air Temperature Rise vs. Unit CFM									
				CFM									
Case	Gas Heat Modules	Heat Input (MBh)	Heat Output (MBh)	18000	20000	22000	24000	26000	30000	34000	38000	42000	46000
A, B, C	LOW	850	680	34.8	31.3	28.5	26.1	24.1	20.9	18.4	16.5	14.9	13.6
	MED	1100	880		40.6	36.9	33.8	31.2	27.0	23.9	21.3	19.3	17.6
	HIGH	1800	1440				55.3	51.0	44.2	39.0	34.9	31.6	28.9

Notes:
1. Actual limits may be + or - the values shown; to accurately calculate capacities, contact the local Trane Sales Office or utilize TOPSS.
2. Follow the supply CFM ranges posted in the General Data for each case size.

Table 28 Electric Heat Air Temperature Rise

			CFM							
Nominal Tons	kw Input (60 Hz)	Total (MBh)	20000	22000	26000	30000	34000	38000	42000	46000
A	90	307.2	14.2	12.9	10.9	9.4	8.3	7.5	6.7	
	265	904.4	-	37.9	32.1	27.8	24.5	21.9	19.8	-
B	90	307.2	14.2	12.9	10.9	9.4	8.3	7.5	6.7	-
	140	477.8	-	20.0	16.9	14.7	13.0	11.6	10.5	9.6
	265	904.4	41.7	37.9	32.1	27.8	24.5	21.9	19.8	-
	300	1023.9	-	42.9	36.3	31.5	27.8	24.8	22.5	20.5
C	90	307.2	14.2	12.9	10.9	9.4	8.3	7.5	6.7	-
	265	904.4	-	37.9	32.1	27.8	24.5	21.9	19.8	-

Notes: Follow the supply CFM ranges posted in the General Data for each case size

Table 29 Electric Heat kw Ranges

	Nominal Voltage	
Case	460	575
A, C	90-265	90-265
B	90-300	90-300

Table 30 Hot Water Coil Heating Capacities (Q/ITD)

Casing	Airflow (CFM)	Water Flow (GPM)	High Capacity 40	80	120	160	200	Low Capacity 30	60	100	140	175
		WPD (ft.)	0.3	1.0	2.1	3.7	5.6	0.2	0.6	1.5	2.8	4.3
A, B, C	16000		7.57	9.02	9.59	9.90	10.10	5.50	6.54	7.05	7.29	7.42
	20000		8.26	10.08	10.84	11.25	11.52	6.02	7.34	8.01	8.33	8.50
	23000		8.67	10.75	11.64	12.13	12.44	6.34	7.85	8.63	9.01	9.21
	28000		9.21	11.69	12.78	13.39	13.79	6.77	8.56	9.52	9.99	10.25
	33000		9.65	12.46	13.74	14.47	14.94	7.11	9.15	10.28	10.84	11.14
	38000		10.00	13.11	14.56	15.40	15.94	7.38	9.65	10.93	11.58	11.93
	43000		10.29	13.67	15.28	16.21	16.83	7.61	10.08	11.50	12.22	12.62
	45000		10.39	13.87	15.54	16.51	17.15	7.69	10.23	11.71	12.46	12.88

Notes:
1. Capacities are expressed as MBH (Q) per degree (F) of initial temperature difference (ITD) between the entering steam temperature (F) and the entering (return) air temperature (F) to the coil.
2. WPD is waterside pressure drop in feet of water
3. Hot water capacity is at 180°F entering water temperature and 65°F entering air temperature
4. Maximum entering water temperature is 200°F.
5. Capacities do not include fan heat.

Table 31 Steam Coil Heating Capacities (Q/ITD)

Casing	Airflow (CFM)	High Cap	Low Cap
A, B, C	16000	7.33	4.99
	20000	8.17	5.67
	23000	8.73	6.10
	28000	9.55	6.71
	33000	10.27	7.20
	38000	10.92	7.61
	43000	11.52	7.95
	45000	11.74	8.07

Notes:
1. Capacities are expressed as MBH (Q) per degree (F) of initial temperature difference (ITD) between the entering steam temperature (F) and the entering (return) air temperature (F) to the coil.
2. Steam coil capacity is at 15 psig and 65°F entering air temperature.
3. Capacities are expressed as MBH (Q) per degree (F) of initial temperature difference (ITD) between the entering steam temperature (F) and the entering (return) air temperature (F) to the coil.
4. The maximum recommended steam pressure is 35 psig.
5. Capacities do not include fan heat.

Table 32 Properties of Steam

Steam Pressure (psig)	2	5	10	15	20	25	30	40	50
Temperature of Steam (F)	219	227	239	250	259	267	274	287	298

Performance Data—Component Static Pressure Drops/Fan Drive Selections

Table 33 Chilled Water Coil Airside Pressure Drop (in H_20)

		Chilled Water Coil															
		Airside Pressure Drop (in H_2O)															
		2 row				4 row				6 row				8 row			
Casing	CFM	80 fpf	108 fpf	144 fpf	168 fpf	80 fpf	108 fpf	144 fpf	168 fpf	80 fpf	108 fpf	144 fpf	168 fpf	80 fpf	108 fpf	144 fpf	168 fpf
A, B, C	16000	0.03	0.06	0.09	0.12	0.09	0.13	0.19	0.25	0.13	0.19	0.29	0.36	0.18	0.27	0.39	0.49
	20000	0.06	0.09	0.13	0.16	0.13	0.19	0.27	0.34	0.20	0.28	0.40	0.50	0.27	0.38	0.54	0.68
	23000	0.07	0.11	0.16	0.19	0.17	0.24	0.33	0.41	0.25	0.35	0.49	0.61	0.34	0.48	0.67	0.83
	28000	0.10	0.15	0.21	0.26	0.24	0.33	0.44	0.54	0.35	0.49	0.66	0.81	0.48	0.67	0.89	1.10
	33000	0.14	0.19	0.26	0.32	0.31	0.43	0.57	0.69	0.46	0.64	0.85	1.03	0.63	0.87	1.14	1.39
	38000	0.18	0.24	0.33	-	0.40	0.54	0.70	-	0.59	0.80	1.04	-	0.81	1.09	1.41	-
	43000	0.22	0.29	-	-	0.49	0.65	-	-	0.73	0.98	-	-	0.99	1.34	-	-
	45000	0.23	0.31	-	-	0.53	0.70	-	-	0.78	1.05	-	-	1.07	1.44	-	-

Table 34 Component Static Pressure Drops (in. H_2O)

			Gas Heating						Hydronic Heating Coil Data						
		Electric Heating (Horiz.)	Low Heat		Medium Heat		High Heat		Hot Water Coil		Steam Coil				
Casing	CFM	All kw's (i)	DF	Hz	DF	Hz	DF	Hz	High	Low	High	Low	Return Damper	Econo Damper (wide open in H_20)	Traq Damper (wide open in H_20)
A, B, C	16000	0.01	0.01	0.10	0.01	0.12	0.01	0.14	0.13	0.08	0.12	0.08	0.06	0.11	0.19
	20000	0.02	0.01	0.16	0.01	0.19	0.01	0.22	0.17	0.11	0.16	0.11	0.09	0.15	0.26
	23000	0.03	0.01	0.21	0.01	0.26	0.01	0.30	0.23	0.15	0.22	0.16	0.13	0.23	0.38
	28000	0.04	0.02	0.31	0.02	0.38	0.02	0.44	0.32	0.21	0.31	0.22	0.20	0.34	0.57
	33000	0.06	0.02	0.42	0.02	0.53	0.02	0.61	0.42	0.28	0.41	0.30	0.28	0.47	0.79
	38000	0.07	0.03	0.56	0.03	0.70	0.03	0.81	0.53	0.36	0.52	0.39	0.38	0.63	1.05
	43000	0.10	0.04	0.72	0.04	0.89	0.04	1.03	0.65	0.45	0.65	0.49	0.49	0.81	1.34
	45000	0.10	0.04	0.79	0.04	0.98	0.04	1.13	0.71	0.49	0.70	0.53	0.53	0.89	1.47

(i) There is no pressure drop with Electric Heat DF configuration

Table 35 Component Static Pressure Drops (in. H_2O)

		Standard Filter Section (Cooling Coil)				Final Filter Section (Cooling Coil)					
Casing	CFM	Std 2" High Eff Throw Away Filters	90-95% Low PD Cartridge Filters w/ 2" Prefilter	90-95% Cartridge Filters w/ 2" Prefilter (i)	90-95% Bag Filters w/ 2" Prefilter (ii)	90-95% Std Temp Low PD Cartridge Filters w/4" Prefilter (iii)	90-95% Std Temp Bag Filters w/ 2" Prefilter (iv)	90-95% Std Temp Cartridge Filters w/ 2" Prefilter (v)	90-95% Hi Temp Cartridge Filters w/ 2" Hi Temp Prefilter (vi)	90-95% Hi Temp HEPA w/ 2" Hi Temp Prefilter (vii)	90-95% Std Temp HEPA Filters w/ 2" Hi Temp Prefilter (viii)
A, B, C	16000	0.08	0.24	0.27	0.34	0.23	0.36	0.29	0.35	0.54	0.48
	20000	0.11	0.29	0.32	0.39	0.29	0.42	0.34	0.42	0.66	0.58
	23000	0.11	0.29	0.32	0.39	0.29	0.42	0.34	0.42	0.66	0.58
	28000	0.18	0.49	0.49	0.56	0.51	0.61	0.54	0.68	1.01	0.88
	33000	0.23	0.61	0.61	0.67	0.65	0.73	0.69	0.86	1.22	1.06
	38000	0.28	0.74	0.76	0.78	0.81	0.86	0.86	1.06	-	-
	43000	0.33	0.89	0.92	0.91	0.98	1.00	1.05	1.30	-	-
	45000	0.36	0.95	0.99	0.96	1.05	1.06	1.13	1.40	-	-

(i) Case A, B, C Max CFM 50000
(ii) Case A, B, C Max CFM 50000
(iii) Case A, B, C Max CFM 55500
(iv) Case A, B, C Max CFM 46250
(v) Case A, B, C Max CFM 46250
(vi) Case A, B, C Max CFM 46250
(vii) Case A, B, C Max CFM 37000
(viii) Case A, B, C Max CFM 37000

Table 36 Supply Air Fan Drive Selections

Casing	Low/ Std	RPM	Horse Power (HP)							
			15 HP	20 HP	25 HP	30 HP	40 HP	50 HP	60 HP	75 HP
			Drive No.	Drive No.	Drive No.	Drive No.	Drive No.	Drive No.	Drive No.	Drive No.
A	Std	2000						L		
		1900					K			
		1800					J			
		1700				H				
		1600			G					
		1500		F						
		1400	E	E						
B	Std	1500							F	
		1400						E	E	
		1300					D	D		
		1200				C	C			
		1100			B	B				
		1000		A	A					
		900	9	9						
C	Std	1300							D	D[(i)]
		1200						C	C	
		1100					B	B		
		1000				A	A			
		900		9	9	9				
		800	8	8	8					

(i) If a 75HP motor is chosen on a fan with IGV, drives D and E are allowed. If it is chosen on a fan without IGV only drive D is allowed.

Table 37 Exhaust Air Fan Drive Selections

Casing	Low / Std	RPM	Horse Power (HP)								
			7.5 HP	10 HP	15 HP	20 HP	25 HP	30 HP	40 HP	50 HP	60 HP
			Drive No.	Drive No.	Drive No.	Drive No.	Drive No.	Drive No.	Drive No.	Drive No.	Drive No.
A	Std	700				7	7				
		600	6	6	6	6	6				
		500	5	5	5	5					
		400	4	4	4						
B	Low	700				7	7				
		600	6	6	6	6	6				
		500	5	5	5	5					
		400	4	4	4						
B	Std	600				6	6	6	6	6	
		500			5	5	5	5	5	5	
		400	4	4	4	4	4	4	4		
		300	3	3	3						
C	Low	600				6	6	6	6	6	
		500			5	5	5	5	5	5	
		400	4	4	4	4	4	4	4		
		300	3	3	3						
C	Std	500								6	6
		400			5	5	5	5	5		
		300			4	4	4				

Table 38 Return Air Fan Drive Selections

Casing	Low / Std	RPM	Horse Power (HP)						
			7.5	10	15 HP	20 HP	25 HP	30 HP	40 HP
			Drive No.	Drive No.	Drive No.	Drive No.	Drive No.	Drive No.	Drive No.
A	Std	1400							E
		1300						D	
		1200					C	C	
		1100				B			
		1000			A	A			
		900			9				
		800	8	8					
		700	7						
B, C	Std	1200							C
		1100						B	B
		1000					A	A	
		900				9			
		800			8				
		700		7					

Electrical Data

Electrical Service Sizing

To correctly size electrical service wiring for a 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 unit type.

Note: *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 on the following page.)

LOAD1 = CURRENT OF THE LARGEST 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 with Gas Heat Air Handling Units

MCA = (1.25 x LOAD1) + LOAD2 + LOAD4

MOP = (2.25 x LOAD1) + LOAD2 + LOAD4

Select a fuse rating equal to the MOP value. If the MOP value does not equal a standard fuse size as listed in NEC 240-6, select the next lower standard fuse rating.

Note: *If selected MOP is less than the MCA, then select the lowest standard maximum fuse size which is equal to or larger than the MCA, provided the selected fuse size does not exceed 800 amps.*

RDE = (1.5 x LOAD1) + LOAD2 + LOAD4

Select a fuse rating equal to the RDE value. If the RDE value does not equal a standard fuse size as listed in NEC 240-6, select the next higher standard fuse rating.

Note: *If the selected RDE is greater than the selected MOP value, then select the RDE value to equal the MOP value.*

Set 2. Cooling with Electric Heat

To arrive at the correct MCA, MOP, and RDE values for these units, two sets of calculations must be performed. 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.

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

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

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

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

Select a fuse rating equal to the MOP value. If the MOP value does not equal a standard fuse size as listed in NEC 240-6, select the next lower standard fuse rating.

Note: *If selected MOP is less than the MCA, then select the lowest standard maximum fuse size which is equal to or larger than the MCA, provided the selected fuse size does not exceed 800 amps.*

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

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

Select a fuse rating equal to the RDE value. If the RDE value does not equal a standard fuse size as listed in NEC 240-6, select the next higher standard fuse rating.

Note: *If the selected RDE is greater than the selected MOP value, then select the RDE value to equal the MOP value.*

GENERAL NOTE

Note: *The selected MOP value is stamped in the MOP field on the nameplate.*

Electrical Data

Table 39 Electrical Service Sizing Data—Motors

Supply Fan Motors		
Motor Horsepower	**460 V**	**575 V**
	FLA	**FLA**
15	19.3	15.4
20	25.5	20.4
25	30.5	24.5
30	37.5	30
40	48.5	39
50	61	49.2
60	72	58
75	88	70
Exhaust/Return Fan Motors		
Motor Horsepower	**460 V**	**575 V**
	FLA	**FLA**
7.5	10	8
10	13.2	10.3
15	19.3	15.4
20	25.5	20.4
25	30.5	24.5
30	37.5	30
40	48.5	39
50	61	49.2
60	72	58

Table 40 Electrical Service Sizing Data—Electric Heat Module (Electric Heat units Only)

	Voltage	
	460	**575**
Module kw	**FLA**	**FLA**
90	108.3	86.6
140	168.4	134.7
265	318.8	255
300	360.8	288.7

Table 41 Electrical Service Sizing Data—Control Power Transformer (Heating Mode Only)

		Voltages	
		460	**575**
Unit Size	**Digit 2 Unit Function**	**FLA**	**FLA**
A, B, C	E, L, S, X	3	3
	F (850 MBH)	4	4
	F (1100 MBH)	4	4
	F (1800 MBH)	4	4

Table 42 Voltage Utilization Range

Unit Voltage	
460/60/3	414-506
575/60/3	517-633

Table 43 Electrical Service Sizing Data - Convenience Outlet Transformer

Nominal Tons	Voltage	
	460	575
	FLA Add	FLA Add
90-150	3.3	2.6

Dimensional Data

Figure 27. Unit Top/Front View

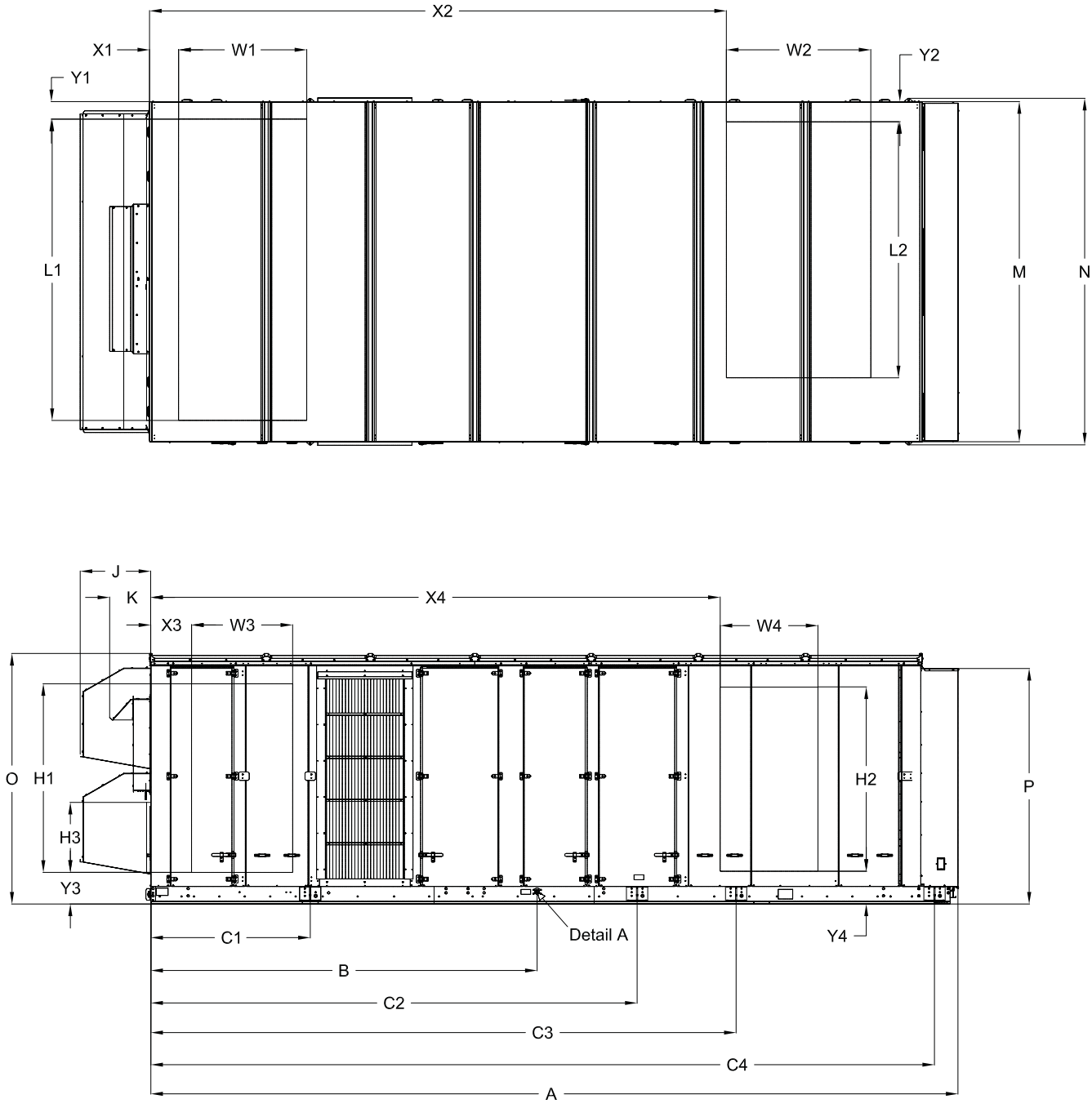


Table 44 Unit Dimensions (In.)—One-Piece Unit

ONE-PIECE Dimensions										
			Unit Dimensions		Lifting Lug Locations				Unit Width	
					Air Handler Side					
Casing	Blank Section		A	B	C1	C2	C3	C4	M	N
A, B, C	None		334 2/16	159 15/16	66	252 14/16	n/a	n/a	139 13/16	143 8/16
	4Ft		382 5/16	159 15/16	66	252 14/16	368 6/16	n/a	139 13/16	143 8/16
	8Ft		430 9/16	159 15/16	66	252 14/16	416 10/16	n/a	139 13/16	143 8/16

	Unit Height		Return Fan	Exhaust Fan
Casing	O	P	J	K
A, B, C	103 12/16	97 9/16	29 3/16	17
	103 12/16	97 9/16	29 3/16	17
	103 12/16	97 9/16	29 3/16	17
	103 12/16	97 9/16	n/a	17
	103 12/16	97 9/16	n/a	17
	103 12/16	97 9/16	n/a	17

Table 45 Downflow/Horizontal Airflow Configuration Dimensions (In.)

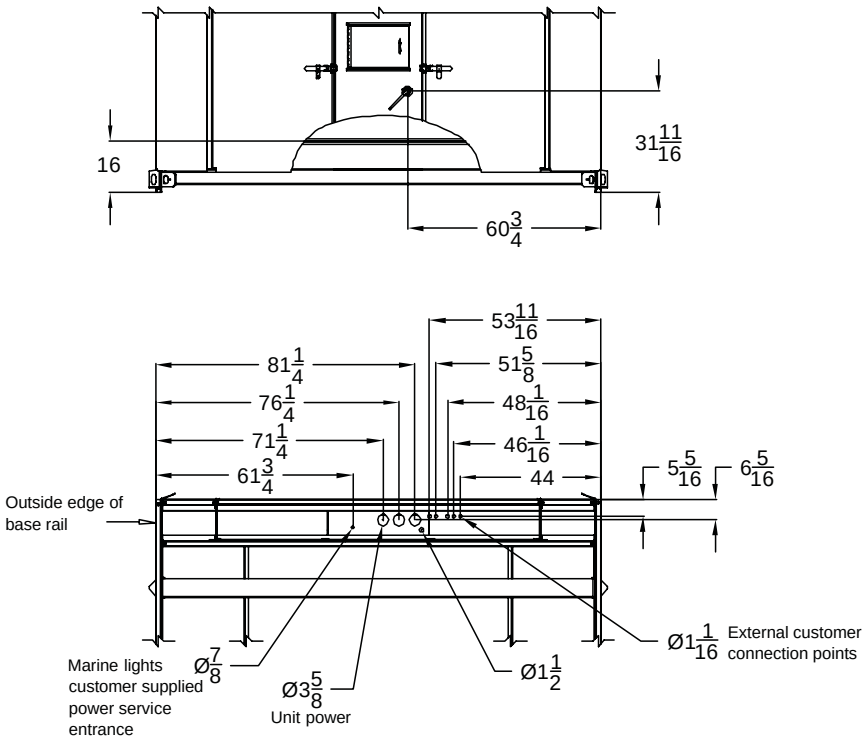
				DOWNFLOW Opening Dimensions							
				Return Opening—with or without Exhaust Fan				Return Opening—with Return Fan			
Casing	Gas Heat	Blank Section		X1	Y1	W1	L1	X1	Y1	W1	L1
A, B, C	No Gas	None		14 13/16	8 14/16	48 3/16	121 15/16	14 13/16	42 14/16	48 3/16	53 14/16
	No Gas	4Ft		14 13/16	8 14/16	48 3/16	121 15/16	14 13/16	42 14/16	48 3/16	53 14/16
	No Gas	8Ft		14 13/16	8 14/16	48 3/16	121 15/16	14 13/16	42 14/16	48 3/16	53 14/16
	Gas	None		14 13/16	8 14/16	48 3/16	121 15/16	14 13/16	42 14/16	48 3/16	53 14/16
	Gas	8Ft		14 13/16	8 14/16	48 3/16	121 15/16	14 13/16	42 14/16	48 3/16	53 14/16

				DOWNFLOW Opening Dimensions			
				Supply Opening			
Casing	Gas Heat	Blank Section		X2	Y2	W2	L2
A, B, C	No Gas	None		256 1/16	13	47 14/16	102 8/16
	No Gas	4Ft		304 4/16	13	47 14/16	102 8/16
	No Gas	8Ft		352 8/16	13	47 14/16	102 8/16
	Gas	None		256 1/16	13	47 14/16	102 8/16
	Gas	8Ft		352 8/16	13	47 14/16	102 8/16

				HORIZONTAL Opening Dimensions							
				Return Side Opening				Return End Opening			
Casing	Gas Heat	Blank Section		X3	Y3	W3	H1	X1	Y3	H3	H1
A, B, C	No Gas	None		9 5/16	10 10/16	54 12/16	84 15/16	6 5/16	8 3/16	35 3/16	127 2/16
	No Gas	4Ft		9 5/16	10 10/16	54 12/16	84 15/16	6 5/16	8 3/16	35 3/16	127 2/16
	No Gas	8Ft		9 5/16	10 10/16	54 12/16	84 15/16	6 5/16	8 3/16	35 3/16	127 2/16
	Gas	None		9 5/16	10 10/16	54 12/16	84 15/16	6 5/16	8 3/16	35 3/16	127 2/16
	Gas	8Ft		9 5/16	10 10/16	54 12/16	84 15/16	6 5/16	8 3/16	35 3/16	127 2/16

				HORIZONTAL Opening Dimensions			
				Supply Opening			
Casing	Gas Heat	Blank Section		X4	Y4	W4	H2
A, B, C	No Gas	None		254 12/16	10 10/16	54 12/16	84 15/16
	No Gas	4Ft		302 15/16	10 10/16	54 12/16	84 15/16
	No Gas	8Ft		351 3/16	10 10/16	54 12/16	84 15/16
	Gas	None		254 12/16	10 10/16	54 12/16	66 11/16
	Gas	8Ft		351 3/16	10 10/16	54 12/16	84 15/16

Figure 28. Electrical Entry Details/Bottom View



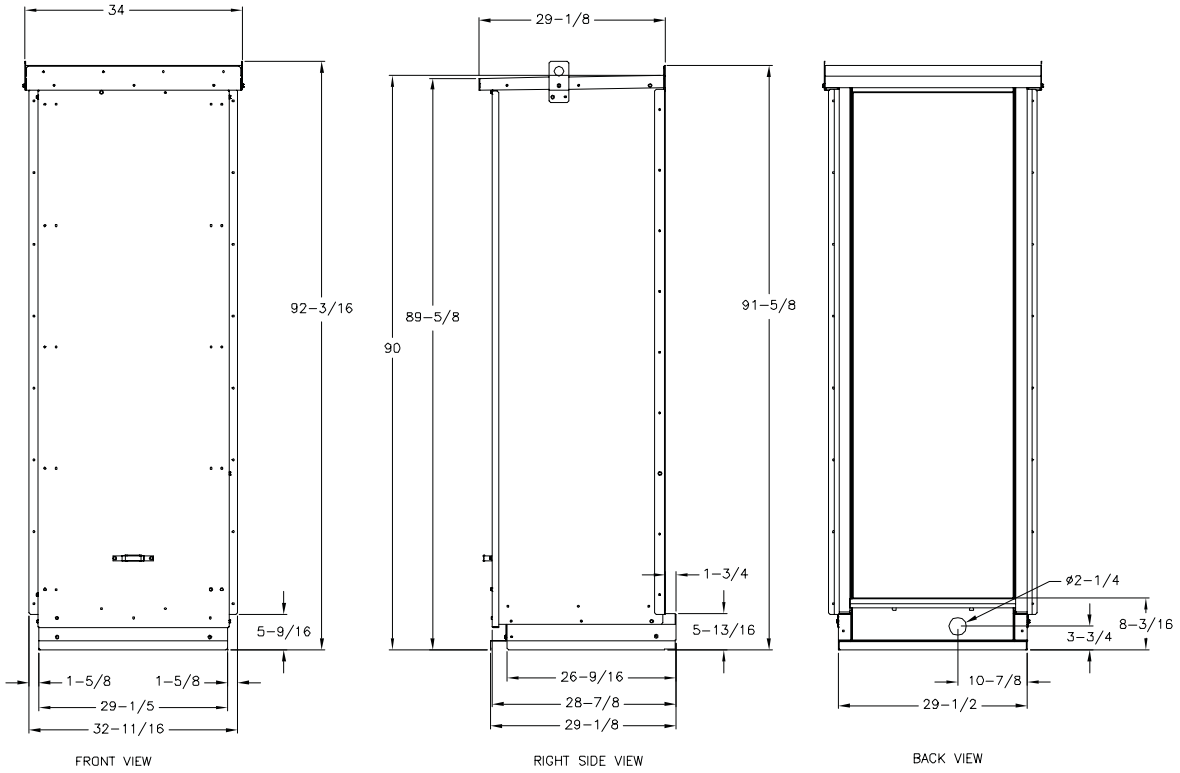
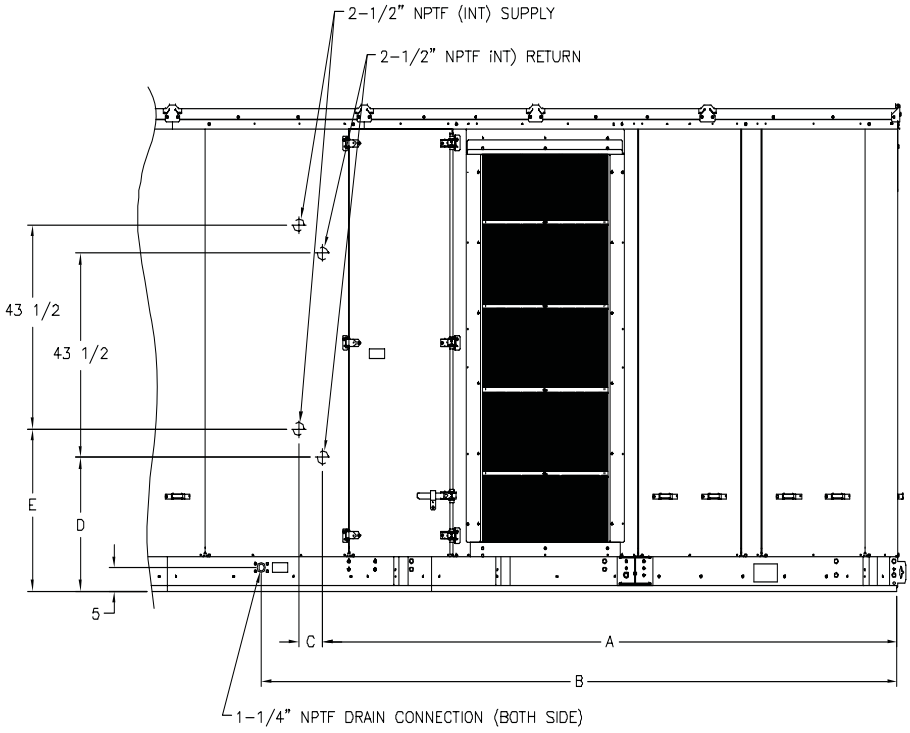


Figure 29. Piping Enclosure

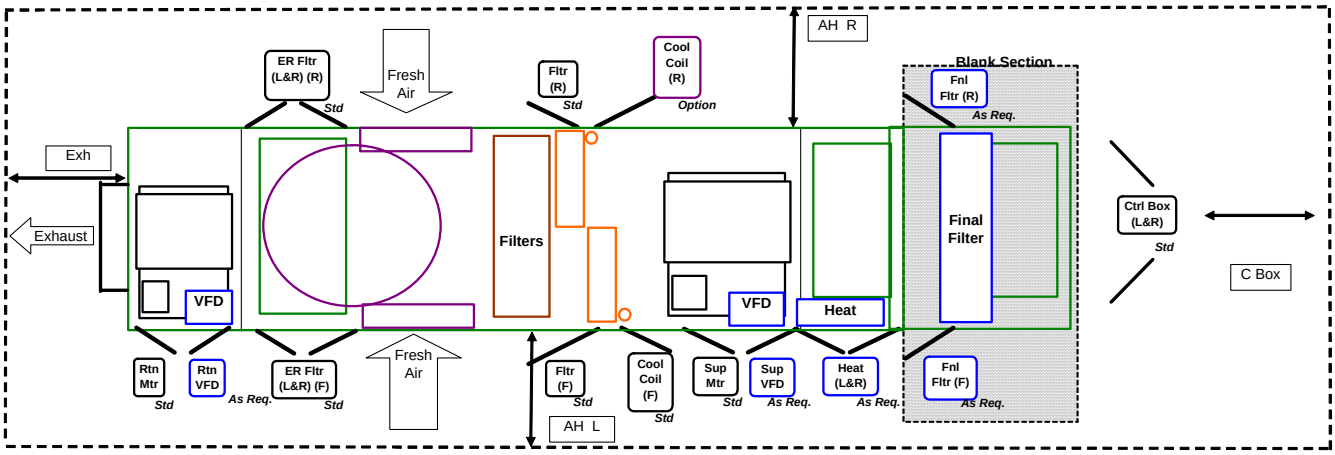
AIR HANDLER CHILLED WATER PIPING LOCATIONS
VIEW FROM BACK OF UNIT



COIL	A	B	C	D	E
2-ROW	147-7/8	159-3/4	2-3/4	27-7/8	35-3/8
4-ROW	147-7/8	159-3/4	5-3/4	28-5/8	34-5/8
6-ROW	149-1/4	159-3/4	6	28-5/8	34-5/8
8-ROW	149-1/4	159-3/4	9	28-5/8	34-5/8

Figure 30. Chilled Water Piping Locations

Figure 31. Minimum Required Clearance [i]



[i] Unit drawing is representative only and may not accurately depict all models.

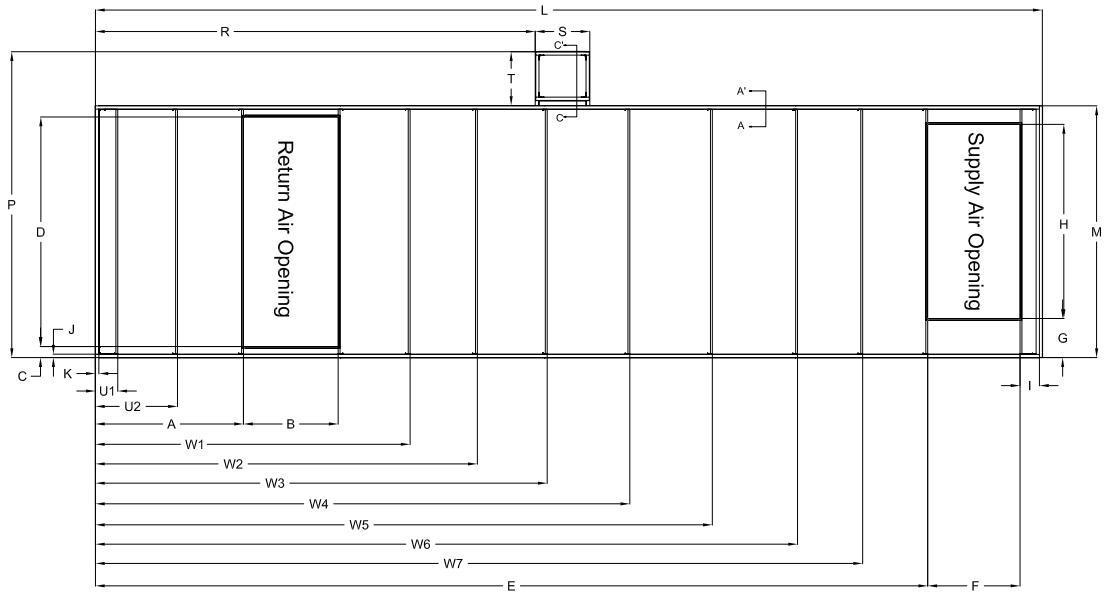
Table 46 Minimum Required Clearance

Door Location	Availability	Unit Option Selection (Door Swing Ft. and In.)					
		Standard	VFD		Heat		
		A,B,C	Return / Exhaust	Supply	Electric / Hot Water / Steam	Two-side Access	Final Filter
Exhaust Motor	Std	2' 2"	*	*	*	*	*
Exhaust VFD	As Req.	*	2' 2"	*	*	*	*
Filter (Front)	Std	2' 8"	*	*	*	*	*
Filter (Rear)	Option	*	*	*	*	2' 2"	*
Cooling Coil (Front)	Std	2' 2"	*	*	*	*	*
Cooling Coil (Rear)	Std	2' 8"	*	*	*	*	*
or Cooling Coil (Rear)	Option	*	*	*	*	*	*
Supply Motor	Std	2' 8"	*	*	*	*	*
Supply VFD	As Req.	*	*	2' 2"	*	*	*
Heat (Left & Right)	As Req.	*	*	*	2' 2"	*	*
Final Filter (Front)	As Req.	*	*	*	*	*	2' 2"
Final Filter (Rear)	As Req.	*	*	*	*	*	2' 2"
Control Box (L & R)	Std	3' 2"	*	*	*	*	*

Minimum Required Clearance (Ft.)

AH_L	AH_R	Exh	Control Box
8'	8'	8'	6'

Figure 32. Optional Roof Curb (Downflow)



Note: All dimensions measured from top flange of roof curb

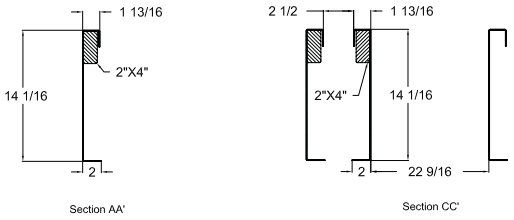


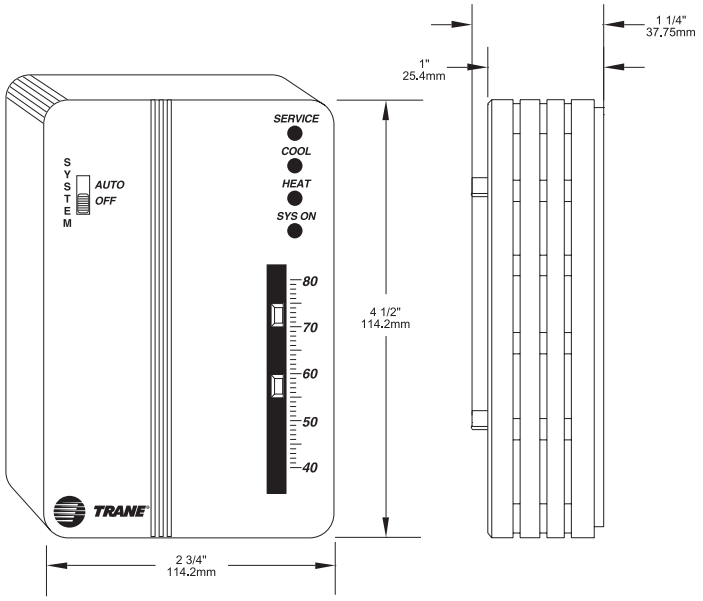
Table 47 Downflow Roof Curb Dimensions (In.)

		Dimensions									
Casing	**Blank Section**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**
A, B, C	None	11 15/16	49 8/16	5 15/16	123	253 2/16	49 8/16	20 15/16	104	11 15/16	1 13/16
	4Ft	11 15/16	49 8/16	5 15/16	123	301 5/16	49 8/16	20 15/16	104	11 15/16	1 13/16
	8Ft	11 15/16	49 8/16	5 15/16	123	349 9/16	49 8/16	20 15/16	104	11 15/16	1 13/16

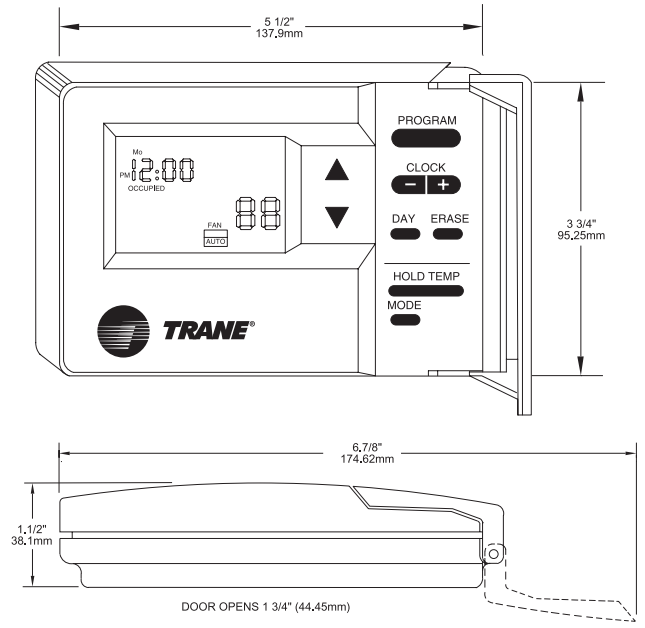
		Dimensions						
Casing	**Blank Section**	**K**	**L**	**M**	**P**	**R**	**S**	**T**
A, B, C	None	1 13/16	314 9/16	134 14/16	163 15/16	139 7/16	28 15/16	29 1/16
	4Ft	1 13/16	362 12/16	134 14/16	163 15/16	139 7/16	28 15/16	29 1/16
	8Ft	1 13/16	411	134 14/16	163 15/16	139 7/16	28 15/16	29 1/16

		Cross Member Location								
Casing	**Blank Section**	**U1**	**U2**	**W1**	**W2**	**W3**	**W4**	**W5**	**W6**	**W7**
A, B, C	None	n/a	n/a	103 6/16	145 11/16	183 6/16	218 4/16	n/a	n/a	n/a
	4Ft	n/a	n/a	103 6/16	145 11/16	187 15/16	231 10/16	266 8/16	n/a	n/a
	8Ft	n/a	n/a	103 6/16	145 11/16	189 15/16	234 3/16	279 13/16	314 11/16	n/a

Figure 33. Field Installed VAV Zone Sensors



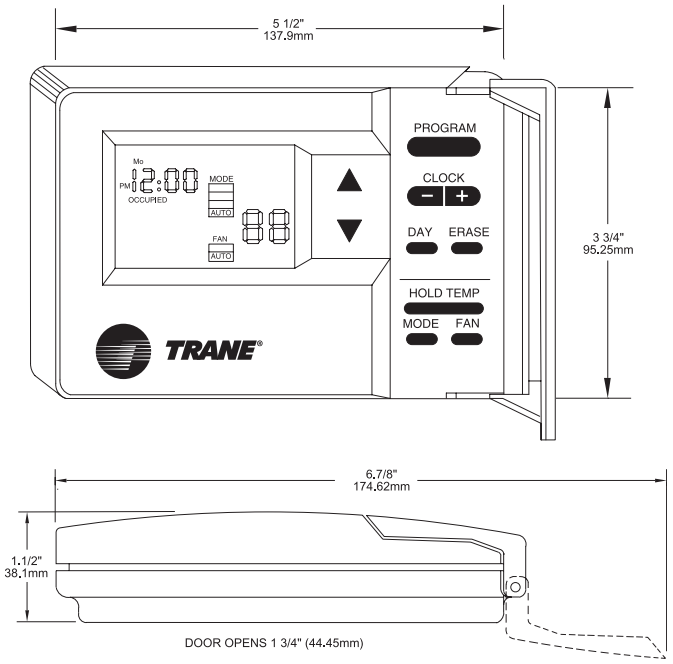
SINGLE SETPOINT SENSOR WITH SYSTEM FUNCTION LIGHTS (BAYSENS021*)



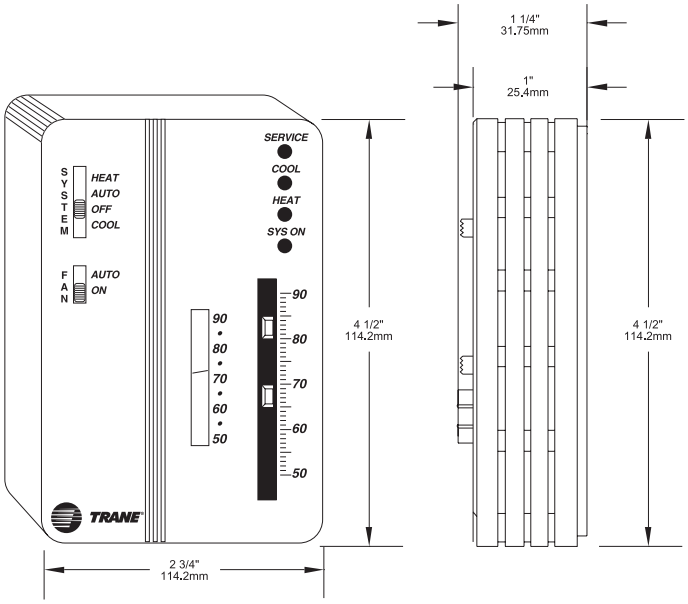
PROGRAMMABLE NIGHT-SETBACK SENSOR (BAYSENS020*)

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

Figure 34. Field Installed CV Zone Sensors



PROGRAMMABLE NIGHT-SETBACK SENSOR (BAYSENS019*)

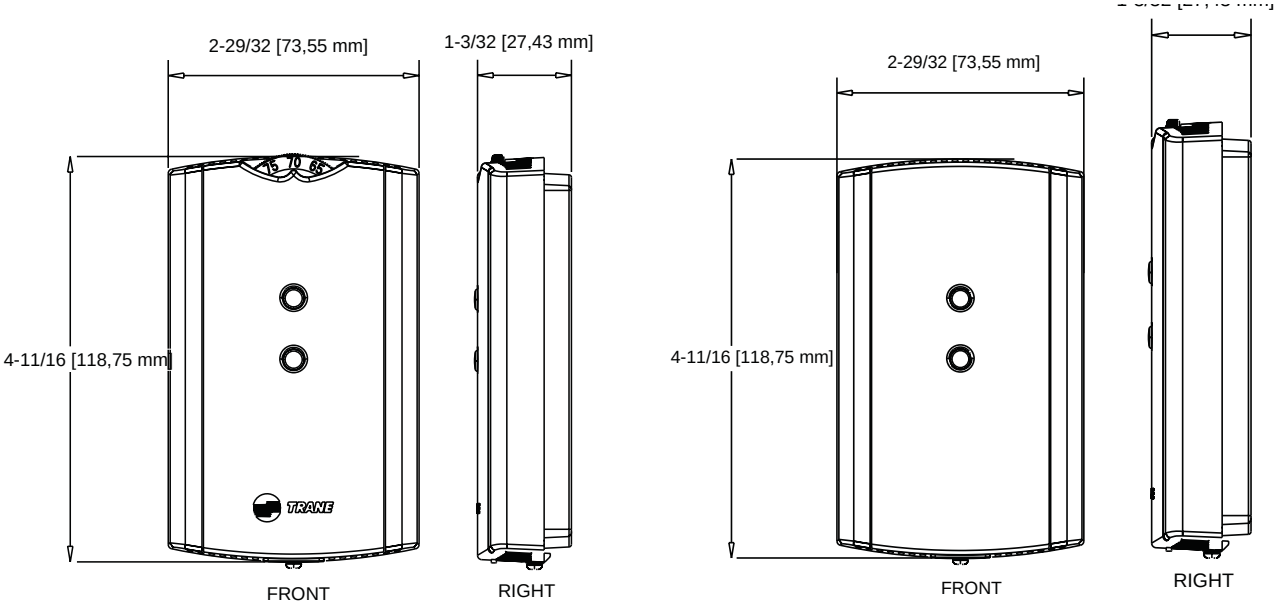


DUAL SETPOINT, MANUAL/AUTOMATIC CHANGEOVER SENSOR WITH SYSTEM FUNCTION LIGHTS (BAYSENS010*) WITHOUT LED STATUS INDICATORS (BAYSENS008*)

SINGLE SETPOINT WITHOUT LED STATUS INDICATORS (BAYSENS006*)

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

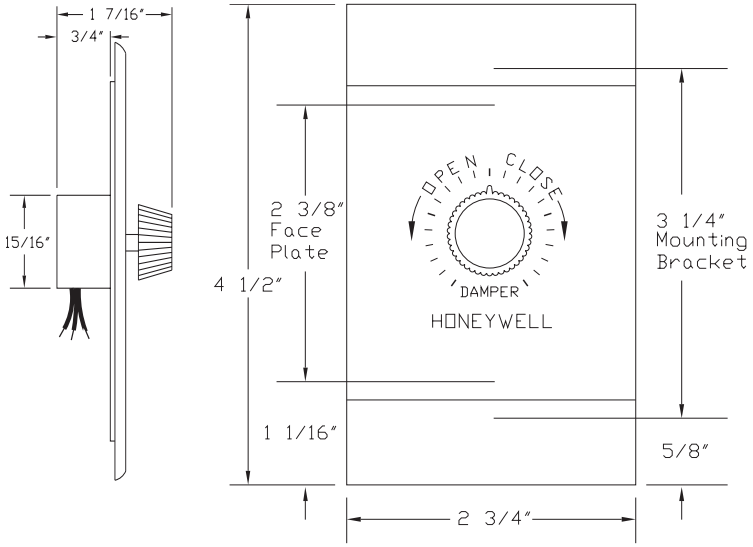
Figure 35. Field Installed VAV and CV Zone Sensors



ZONE TEMPERATURE SENSOR W/TIMED OVERRIDE BUTTON AND LOCAL SETPOINT ADJUSTMENT (BAYSENS074*)

ZONE TEMPERATURE SENSOR W/TIMED OVERRIDE BUTTONS (BAYSENS073*) ALSO AVAILABLE SENSOR ONLY (BAYSENS077*)

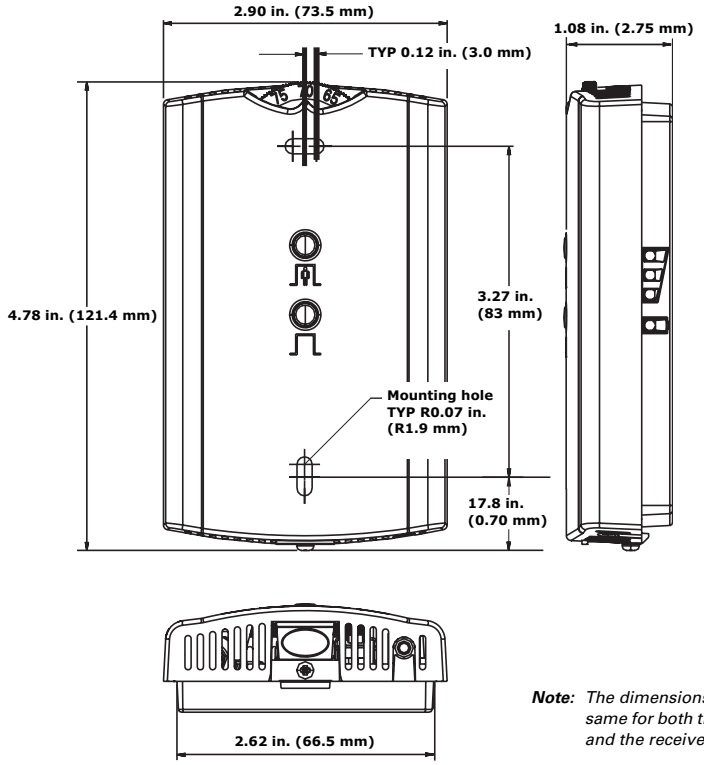
TEMPERATURE SENSOR (BAYSENS016*)



REMOTE MINIMUM POSITION POTENTIOMETER CONTROL (BAYSTAT023*)

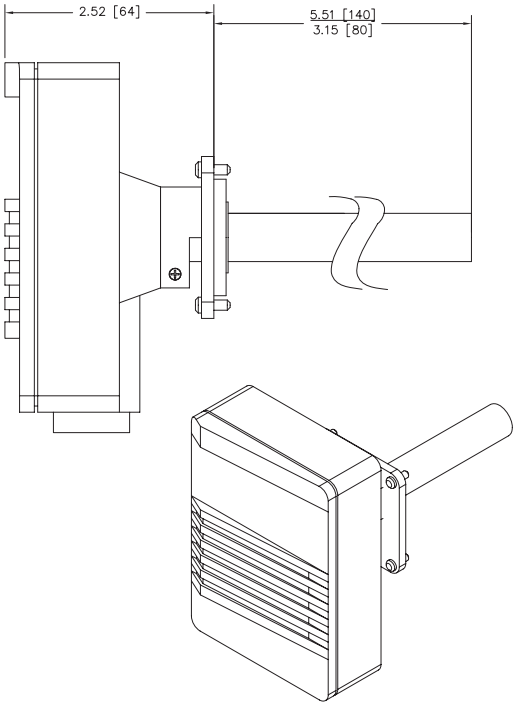
Notes:
1. Remote sensors are available for use with all zone sensors to provide remote sensing capabilities.

Figure 36. Field Installed VAV and CV Zone Sensors



Note: *The dimensions are the same for both the sensor and the receiver.*

WIRELESS ZONE SENSOR



WALL OR DUCT MOUNT CO_2 ZONE SENSORS

Weights

Table 48 Approximate Operating Weights (Lbs.)

Nominal Tons	Unit (Minimum)	Roof Curb (Minimum)
A	8580	1066
B	8782	1066
C	8910	1066

Notes:
1. Weights shown include the following features: standard coils, 0-25% Fresh Air, throwaway filters, low cfm supply fan, minimum motor sizes (high efficiency), constant volume, 460 XL, No heat
2. Weights shown represent approximate operating weights and have a + 5% accuracy. To calculate weight for a specific unit configuration, utilize TOPSS or contact the local Trane sales representative. ACTUAL WEIGHTS ARE STAMPED ON THE UNIT NAMEPLATE.

Table 49 Component Weights (Lbs.)

	A		B		C	
	Size	Wt (lbs.)	Size	Wt (lbs.)	Size	Wt (lbs.)
Supply Fan Assembly						
Supply Fan & FanBoard Assy.	25"	1226	32"	1419	36"	1530
IGV		112		88		66
Belt Guard		116		116		116
Supply VFD (50 HP and below)		233		233		233
Supply VFD (60 thru 75 HP)		284		284		284
Supply-Exh Fan Motor - 15 HP		181		181		181
Supply-Exh Fan Motor - 20 HP		206		206		206
Supply-Exh Fan Motor - 25 HP		358		358		358
Supply-Exh Fan Motor - 30 HP		413		413		413
Supply-Exh Fan Motor - 40 HP		495		495		495
Supply-Exh Fan Motor - 50 HP		604		604		604
Supply-Exh Fan Motor - 60 HP		-		776		776
Supply-Exh Fan Motor - 75 HP		-		-		879
Return/Exhaust Fan Assembly						
Return Fan & Dampers	36"	2284	40"	2333	40"	2333
Exhaust Fan & Dampers - Low CFM	25"	879	25"	879	28"	963
Exhaust Fan & Dampers - Hi. CFM	-	-	28"	963	32"	1417
Belt Guard		119		119		119
Exhaust VFD (50 HP and below)		244		244		244
Exhaust VFD (60 HP)		295		295		295
Exh Fan Motor - 7.5 HP		160		160		-
Exh Fan Motor - 10 HP		181		181		181
Exh Fan Motor - 15 HP		206		206		206
Exh Fan Motor - 20 HP		206		206		206
Exh Fan Motor - 25 HP		358		358		358
Exh Fan Motor - 30 HP		-		413		413
Exh Fan Motor - 40 HP		-		495		495
Exh Fan Motor - 50 HP		-		604		604
Exh Fan Motor - 60 HP		-		-		776
Chilled Water Assy.						
2 Row 5W Chilled Water Coil - 80 FPF		992		992		992
2 Row 5W Chilled Water Coil - 108 FPF		1042		1042		1042
2 Row 5W Chilled Water Coil - 144 FPF		1106		1106		1106
2 Row 5W Chilled Water Coil - 168 FPF		1148		1148		1148

Table 49 Component Weights (Lbs.)

	A		B		C	
	Size	Wt (lbs.)	Size	Wt (lbs.)	Size	Wt (lbs.)
4 Row W Chilled Water Coil - 80 FPF		1523		1523		1523
4 Row W Chilled Water Coil - 108 FPF		1622		1622		1622
4 Row W Chilled Water Coil - 144 FPF		1750		1750		1750
4 Row W Chilled Water Coil - 168 FPF		1835		1835		1835
6 Row WD Chilled Water Coil - 80 FPF		2046		2046		2046
6 Row WD Chilled Water Coil - 108 FPF		2195		2195		2195
6 Row WD Chilled Water Coil - 144 FPF		2387		2387		2387
6 Row WD Chilled Water Coil - 168 FPF		2515		2515		2515
8 Row WD Chilled Water Coil - 80 FPF		2643		2643		2643
8 Row WD Chilled Water Coil - 108 FPF		2842		2842		2842
8 Row WD Chilled Water Coil - 144 FPF		3098		3098		3098
8 Row WD Chilled Water Coil - 168 FPF		3268		3268		3268
External Piping Cabinet						
External Piping Cabinet - Shipping		353		353		353
External Piping Cabinet - Operation		268		268		268
Gas/Electric Heat						
Gas Heat Low	0.85M	690	0.85M	690	0.85M	690
Gas Heat Med	1.1M	840	1.1M	840	1.1M	840
Gas Heat High	1.8M	1150	1.8M	1150	1.8M	1150
Electric Heat		485		485		485
Hydronic Heat						
Steam Heat Low		946		946		946
Steam Heat High		1014		1014		1014
Hot Water Heat Low		1080		1080		1080
Hot Water Heat High		1125		1125		1125
Filters						
Filter Rack - Throwaway Filters		181		181		181
Filter Rack - Bag Filters		395		395		395
Filter Rack - Cartridge Filters		662		662		662
Final Filters - Bag Filters		392		392		392
Final Filters - Cartridge Filters w/ 2" pre-filter		607		607		607
Final Filters - Cartridge Filters w/ 4" pre-filter		638		638		638
Final Filters - High Temp. Cartridge		669		669		669
Final Filters - HEPA		1777		1777		1777
Final Filters - HEPA High Temp.		1839		1839		1839
Fresh Air						
0-25% Damper		611		611		611
Econ		759		759		759
Econ w/ Air Measure		715		715		715
Cabinet						
Cabinet		5971		5971		5971
Cabinet - 4' Blank Section		846		846		846
Cabinet - 8' Blank Section		1650		1650		1650

Table 49 Component Weights (Lbs.)

	A		B		C	
	Size	Wt (lbs.)	Size	Wt (lbs.)	Size	Wt (lbs.)
Control Box - Main						
Control Box - Main		454		454		454
Convenience Outlet		36		36		36

Table 50 Roof Curb Weights

Casing	Blank	Installed Weight	Shipping Weight
A, B, C	None	1066	1334
	4 Ft	1147	1415
	8 Ft	1228	1497

Options

A full range of factory installed options are available, allowing for the air handler design that best suits each individual application.

Chilled Water Cooling

- ARI certified type 5W, W, or WD coils provided with water modulating valve and actuator. Turbulators and various row, fin series, and valve options are available.

Cooling Only/Heating Casings

- Cooling Only—Extended casing of solid double wall construction with foam injected insulation throughout the air handler.
- Electric Heat—Nickel-chromium electric heating elements in individually fused circuits of 48 amps or less and with all necessary safeties. A full range of sizing options is available.
- Natural Gas Heat-Two-Stage—Two-pass stainless steel tubular free floating heat exchanger has industrial type burner and combustion blower. Available with high, medium and low fire and UL and CSA approval.
- Natural Gas Heat-Full Modulation—The heat exchanger drum, tubes and front and rear headers are constructed of corrosion resistant stainless steel. Available with high, medium and low fire and UL and CSA approval.
- Steam Heat—ARI certified type NS coil with non-freeze steam distribution. Coils are pitched for drainage and are provided with steam modulating valve with actuator. High and low heat options are available.
- Hot Water Heat—ARI certified type 5W coil mounted for drainage and provided with hot water modulating valve with actuator. High and low heat options are available.

Blank Sections

- Four Foot Blank Section—Solid double wall construction with foam injected insulation. The blank section is located at the airflow discharge. Single point latching, hinged access doors are located on either side of the blank section. Final filter options are available for cooling only units.
- Eight Foot Blank Section—Solid double wall construction with foam injected insulation. The blank section is located at the airflow discharge. Single point latching, hinged access doors are located on either side of the blank section. Final filter options are available for all units.

Fan Options

- Standard CFM supply exhaust/return fans—Available to meet standard airflow application needs.
- Low CFM exhaust fans—Available to meet low leaving air temperature requirements.

Power Supply

Air Handlers are available with 460 or 575 voltage, 3 phase 60 hertz power supply.

Exhaust

- No Exhaust—Air Handlers can be built for makeup air applications with no exhaust. Relief opening is sealed watertight.
- 100 Percent Modulating Exhaust Fan—A double width, double inlet forward-curved fan can exhaust up to 100 percent supply air. The fan operates when economizer damper is open greater than minimum position. Discharge dampers at fan outlet modulate in response to economizer damper position on Constant Volume (CV) air handlers.
- 100 Percent Modulating Exhaust Fan with Statitrac™ Control—For both CV and Variable Air Volume (VAV) air handlers, the 100 percent modulating exhaust discharge dampers are modulated in response to building pressure. A differential pressure control system, Statitrac, uses a differential pressure transducer to compare indoor building pressure to atmospheric pressure. The FC exhaust fan is turned on when required to lower building static pressure to setpoint. The Statitrac control system then modulates the discharge dampers to control the building pressure to within the adjustable, specified deadband that is set at the Human Interface Panel.
- 100 Percent Modulating Exhaust Fan with Statitrac Control and Variable Frequency Drive—Provided with all the necessary controls to control/maintain building space pressure through a CV or VAV air handler. The Variable Frequency Drive (VFD) modulates the speed of the exhaust fan motor in response to building pressure. A differential pressure control system, Statitrac, uses a differential pressure transducer to compare indoor building pressure to atmospheric pressure. The 0-100% modulating relief dampers modulate in response to a signal from the unit microprocessor, based upon the space static pressure, and causes the damper to modulate open or closed as required to maintain the space pressure within the deadband.
- 100 Percent Modulating Exhaust Fan with Statitrac Control and Variable Frequency Drive and Bypass—Bypass control provides full nominal airflow in the event of drive failure.

Return

- 100 Percent Modulating Return Fan—A single width plenum fan with airfoil blade can relieve up

to 100 percent supply air. The fan operates in conjunction with the supply fan. The relief damper modulates in response to economizer damper position on Constant Volume air handlers.

- 100 Percent Modulating Return Fan with Statitrac Control and Variable Frequency Drive and Bypass—Provided with all the necessary controls to control/ maintain building space pressure through a VAV air handler. The Variable Frequency Drive (VFD) modulates the speed of the return fan motor in response to return plenum pressure. A differential pressure control system, Statitrac, uses a differential pressure transducer to compare indoor building pressure to atmospheric pressure. The Statitrac control system modulates the relief dampers to control the building pressure to within the adjustable, specified deadband that is set at the Human Interface Panel.
- 100 Percent Modulating Return Fan with Statitrac Control and Variable Frequency drive and Bypass—Bypass control provides full nominal airflow in the event of drive failure.

Filters

- No filters (two-inch nominal thickness throwaway filter rack only) option—Includes a galvanized steel filter rack (less filter media) with filter channels to handle a complete set of two-inch nominal thickness throwaway filters to accommodate applications which require field supplied filters.
- No filters (bag/cartridge filter rack with throwaway prefilter rack only) option—Includes a galvanized steel filter rack (less filter media) to handle a complete set of two-inch or four-inch (depending on airflow) nominal thickness throwaway prefilters and 7/8" nominal header thickness bag or cartridge filters to accommodate applications which require field supplied filters.
- Standard throwaway filters—U.L. Class 2, two-inch nominal thickness, high efficiency pleated media filters rated MERV 7 per ASHRAE 52.2. Filters are mounted in a galvanized steel filter rack.
- MERV 15, 90-95 percent bag filter option—Nineteen-inch deep bag filters are U.L. Class 2 and have synthetic media mounted to a 7/8" nominal thickness header frame. These bag filters have an efficiency rating of MERV 15 per ASHRAE 52.2. To ensure maximum bag filter life, two-inch prefilters are included with the bag filters. Filters are mounted in a galvanized steel filter rack.
- MERV 14, 90-95 percent cartridge filter option—Twelve-inch deep cartridge filters are U.L. Class 1 and are mounted a 7/8" nominal thickness header frame. These cartridge filters have an efficiency rating of MERV 14 per ASHRAE 52.2. To ensure maximum cartridge filter life, two-inch (or four-inch, depending on the application) prefilters are included with the cartridge filters. Filters are mounted in a galvanized steel filter rack.
- MERV 14, 90-95 percent, low pressure drop, totally incinerable, cartridge filter option—Twelve-inch deep cartridge filters are U.L. Class 2 and mounted with a rigid 7/8" nominal thickness header frame. These low pressure drop cartridge filters have an efficiency rating of MERV 14 per ASHRAE 52.2. To ensure maximum cartridge filter life, two-inch or four-inch prefilters (depending on airflow) are included with the high-flow, cartridge filters. Filters are mounted in a galvanized steel filter rack.

Final filter section filter options mount integral within the optional blank section of the unit and are accessible by hinged access doors.

- MERV 15, 90-95 percent, standard temperature rated, bag, final filter option—Available on cooling only units with four or eight-foot blank section, as well as steam and hot water units with eight-foot blank section, unit casing only.

  Nineteen-inch deep bag filters are U.L. Class 2 and have synthetic media mounted to a 7/8" nominal thickness header frame. These bag filters have an efficiency rating of MERV 15 per ASHRAE 52.2. To ensure maximum bag final filter life, two-inch prefilters are included with the bag filters. Filters are mounted in a galvanized steel filter frame bank.
- MERV 14, 90-95 percent low pressure drop, totally incinerable, standard temperature rated, cartridge, final filter option—Available on cooling only units with four or eight-foot blank section, as well as steam and hot water units with eight-foot blank section, unit casing only.

  Twelve-inch deep cartridge filters are U.L. Class 2 and are mounted with a rigid 7/8" nominal thickness header frame. These cartridge filters have an efficiency raing of MERV 14 per ASHRAE 52.2. To ensure maximum cartridge final filter life, four-inch prefilters are included with the low pressure drop cartridge filters. Filters shall be mounted in a galvanized steel filter frame bank.
- MERV 14, 90-95 percent, standard temperature rated, cartridge, final filter option—Available on cooling only units with four or eight-foot blank section, as well as steam and hot water units with eight-foot blank section, unit casing only.

  Twelve-inch deep cartridge filters are U.L. Class 1 and are mounted with a 7/8" nominal thickness header frame. These cartridge filters have an efficiency rating of MERV 14 per ASHRAE 52.2. To ensure maximum cartridge filter life, two-inch prefilters are included with the cartridge filters. Filters are mounted in a galvanized steel filter frame bank.

- MERV 14, 90-95 percent, high temperature rated, cartridge, final filter option—Available on gas and electric heat units with eight foot blank section unit casing option only.

  Twelve-inch deep cartridge filters are U.L. Class 1 and are mounted in a galvanized steel casing with a 7/8" nominal thickness header frame. These cartridge filters have an efficiency rating of MERV 14 per ASHRAE 52.2. To ensure maximum cartridge final filter life, high temperature rated two-inch prefilters are included with the cartridge filters. Filters are mounted in a galvanized steel filter frame bank.

- MERV 17, 99.97 percent, standard temperature rated, HEPA, final filter option—Available on cooling only units with four or eight-foot blank section, as well as steam and hot water units with eight-foot blank section, unit casing only.

  Twelve-inch deep HEPA filters are U.L. Class 1 and are mounted in a galvanized steel casing. These filters have an efficiency rating of MERV 17 per ASHRAE 52.2 and an efficiency of 99.97% on a 0.3 micron DOP particle size. To ensure maximum HEPA final filter life, two-inch prefilters are included with the HEPA final filters. Filters are mounted in a galvanized steel filter frame bank.

- MERV 17, 99.97 percent, high temperature rated, HEPA, final filter option—Available on gas and electric heat units with eight foot blank section unit casing option only.

  Twelve-inch deep HEPA filters are U.L. Class 1 and are mounted in a galvanized steel casing. These filters have an efficiency rating of MERV 17 per ASHRAE 52.2 and an efficiency of 99.97% on a 0.3 micron DOP particle size. To ensure maximum HEPA final filter life, high temperature rated two-inch prefilters are included with the HEPA final filters. Filters are mounted in a galvanized steel filter frame bank.

Fresh Air

- 0 to 25 percent Motorized Outside Air Damper—includes only an outside air opening with moisture eliminator and motorized position damper for drawing up to 25 percent outside air. The damper position can be set at the unit mounted Human Interface panel.

- Economizer—Includes the primary temperature controls necessary to automatically use outdoor air for free cooling. Option includes modulating return and outside air dampers, high ambient temperature lockout, minimum position control and spring return motor.

  Standard outside air dampers are provided with a leakage rate of 20 cfm/ft^2 at 1.0 in w.g. pressure difference. Optional Low leakage dampers are available with a leakage rate of 10 cfm/ft^2 (AMCA Class 2) at 1.0 inch w.g. pressure difference, as well as Ultra Low leakage dampers with a leakage rate of 4 cfm/ft^2 (AMCA Class 1) at 1.0 inch w.g. pressure difference.

  The 0 to 100% fresh air economizer has three optional economizer controls available: comparative enthalpy, reference enthalpy, or dry bulb control.

- Fresh Air Measurement—The Trane Traq™ airflow-monitoring solution allows direct measurement and control of fresh air. The Traq damper assembly consists of butterfly-type dampers. The bellmouth inlet of each damper guides air uniformly through a flow-sensing ring that accurately measures total and static pressure from 15 to 100 percent of nominal airflow. The damper assembly ventilation control module (VCM) produces a vdc signal that is proportional to airflow, re-calibrates itself once every 60 seconds, and automatically adjusts for temperature variations. When applied as part of an Integrated Comfort™ system (ICS) with the Tracer Summit™ building automation system, ventilation airflow can be controlled dynamically and documented to verify compliance with ASHRAE Standard 62.1.

- Demand Control Ventilation—When equipped with a CO_2 sensor and the (VCM) module, the IntelliPak II controller modulates the fresh air damper position in order to minimize the unit energy consumption yet simultaneously meet the ventilation requirements of ASHRAE Std 62.1. The Traq airflow monitoring solution augments the system, allowing for measurement and control of fresh air airflow.

System Control

- Constant Volume (CV)—Provided with all the necessary controls to operate the air handler from a zone sensor, including CV microprocessor unit control module and a unit mounted Human Interface Panel.

- Variable Air Volume (VAV) Supply Air Temperature control without inlet guide vanes—Provided with all the necessary controls to operate a VAV air handler from the discharge air temperature, including discharge air microprocessor controller and discharge air sensor. The microprocessor controller coordinates the economizer control and the stages of cooling with zone or outdoor air reset capabilities and an adjustable control band to fine-tune the control to specific applications.

- VAV Supply Air Temperature control with inlet guide vanes—Provided with all the necessary controls to control/operate a VAV air handler from the discharge air temperature, including a discharge air microprocessor controller, a discharge air sensor, pressure sensor and inlet guide vanes on the supply fan. The microprocessor controller coordinates the economizer control and the stages of cooling with zone or outdoor air reset capabilities and an adjustable control band to fine-tune the control to specific applications. The inlet guide vanes are used

with VAV air handlers to control duct static pressure. Option includes vanes and static pressure controls. Airfoil supply fans with inlet vanes are an efficient way to mechanically modulate airflow.

- VAV Supply Air Temperature Control with Variable Frequency Drives w/o Bypass—Provided with all necessary controls to operate a VAV air handler from the discharge air temperature, including discharge air microprocessor controller and discharge air sensor. The microprocessor controller coordinates the economizer control and the stages of cooling with discharge air temperature reset capabilities. Includes factory installed and tested variable frequency drives (VFD) to provide supply fan motor speed modulation. VFD receives 0-10 vdc from the unit microprocessor based upon supply static pressure and causes the drive to accelerate or decelerate as required to maintain the supply static pressure setpoint.
- VAV Supply Air Temperature Control with Variable Frequency Drives and Bypass—Bypass control provides full nominal airflow in the event of drive failure.

Agency Approval

Air Handlers can be provided with UL/CSA approval.

Miscellaneous Options

- Marine Lights (Customer Powered)—A 120V master light switch is factory installed in the main unit control box for lighting control. The master switch is wired into an isolated terminal block with access for customer provided service. Marine light fixtures are supplied with 150W incandescent bulbs. Marine light fixtures are placed in the Supply Section (2), Fresh Air Section (1), Return Section (1), and Extended Casing Section (1) for units without Heat.
- Non-Fused Disconnect Switch with External Handle—External handle enables the operator to disconnect unit power with the control box door closed for safety.
- Unit Interrupt Rating—Using a non-fused circuit breaker for disconnect switch purposes a 65000 Amp rating is optionally available on 460/3/60 powered units and a 25000 Amp rating is available on 575/3/60 units. Fan motors and electric heat (if applicable) circuits are also equipped with series rated circuit breakers.
- GFI Convenience Outlet (Factory Powered)—A 15A, 115V Ground Fault Interrupter convenience outlet is factory installed. It is wired and powered from a factory mounted transformer. Unit mounted non-fused disconnect with external handle is furnished with factory powered outlet.
- Economizer Control with Comparative Enthalpy—used with the fresh air economizer, two enthalpy sensors are provided to compare total heat content of the indoor air and outdoor air to determine the most efficient air source when economizing.
- Economizer Control with Reference Enthalpy—used with the fresh air economizer, an outdoor enthalpy sensor is provided to compare the total heat content of outdoor air to a locally adjustable setpoint. The setpoint is programmed at the human interface, or remote human interface, to determine if the outdoor enthalpy condition is suitable for economizer operation.
- Economizer Control with Dry Bulb—used with the fresh air economizer, an outdoor temperature sensor is included for comparing the outdoor dry bulb temperature to a locally adjustable temperature setpoint. The setpoint is programmed either at the human interface, or remote human interface, to determine if outdoor air temperature is suitable for economizer operation.
- Low Leak Dampers—Return air, fresh air and relief air dampers have chlorinated polyvinyl chloride gasketing to seal to a leakage rate of 10 cfm/ft^2 (AMCA Class 2) at 1.0 in w.g. pressure difference.
- Ultra Low Leak Fresh Air Dampers—Dampers have chlorinated polyvinyl chloride gasketing to seal to a leakage rate of 4 cfm/ft^2 (AMCA Class 1) at 1.0 in w.g. pressure difference.
- High Duct Temperature Thermostats—Two manual reset thermostats are provided with one located in the discharge section of the unit set at 240°F and the other in the return section set at 135°F. The air handler will shut down if the thermostats are tripped.
- High Efficiency Motors—Supply and exhaust/return fans are provided with high efficiency motors.
- High Efficiency TEFC Motors—Supply and exhaust/return fans are provided with high efficiency Totally Enclosed Fan Cooled motors.
- Belt Guards—Supply and exhaust fans can be optionally equipped with a universal size belt guard to accommodate any applicable drive configuration. The guard totally encloses the drive system and is provided with a two-piece removable front panel for servicing. Return fan guards are also available with individually sized belt guard with a single-piece removable panel for servicing.
- Airflow Paths—In addition to the traditional downflow supply and upflow return, horizontal supply and return is available. End return is also available on select units. For additional details on airflow configuration, see Table 1, p. 24 Table 2, p. 24
- Burglar Bars—A grate system is available for the supply and return air duct connection areas on non-horizontal airflow path units to minimize unwanted intrusion into duct systems.
- Generic Building Automation System (GBAS 0-5vdc) Module—

Provided for those cases where non-Tracer building management system is used. The GBAS module provides a binary input for Demand Limiting, four (4) analog inputs for setpoint adjustment and five (5) relay outputs for diagnostic reporting. Inputs can use a potentiometer or 0-5 vdc signal.

- Generic Building Automation System Module (GBAS 0-10 vdc)—Used to provide broad control capabilities for building automation systems other than Trane's Tracer™ system.

  The GBAS module provides a binary input for Demand Limiting, four (4) analog inputs for setpoint adjustment and four (4) analog outputs as well as one (1) relay output for diagnostic reporting. Inputs can use a potentiometer or 0-10 vdc signal.

- Remote Human Interface Panel (RHI)—Remote Human Interface Panel can perform all the same functions as unit mounted Human Interface Panel, except for the Service Mode. Up to 4 air handler units can be monitored and controlled with a single Remote Human Interface Panel.

  This panel uses the same attractive enclosure as the Tracker™ building control panel. With features such as a 2 line X 40 character clear English display, a red LED light to indicate an alarm condition (alarm also shown on the two line display), a simple 16 key keypad that is used in conjunction with the display to prompt the infrequent user when making desired changes and an attractive hinged door makes the RHI very suitable for mounting on any wall.

  The RHI can be mounted inside a building, up to 5000 feet from the unit. The RHI is wired to the IPCB mounted in the air handler with twisted wire pair communication wiring and 24V control wiring.

- Ventilation Override Module (VOM)—With the Ventilation Override Module installed, the unit can be programmed to transition to up to 5 different programmed sequences for Smoke Purge, Evacuation, Pressurization, Purge, Purge with duct control sequence and Unit off. The transition occurs when a binary input on the VOM is closed (shorted); this would typically be a hard wired relay output from a smoke detector or fire control panel.

- Inter-Processor Communication Bridge (IPCB)—This module provides an amplified and filtered version of the IPC link for connection to a Remote Human Interface Panel. Each air handler that is tied into a Remote Human Interface Panel must have a IPCB installed into it.

- Trane LonTalk® Communication Interface Module—Provides an interface to the Trane Integrated Comfort System (ICS), which allows control and monitoring of the air handler by a Tracer or 3rd party building management system utilizing LonTalk protocol.

Field Installed Accessories

Electronic Zone Sensors

- Zone Sensors—Two temperature setpoint levers, heat, auto, off, or cool system switch, fan auto or fan on switch. Optional status indication LED lights, System On, Heat, Cool, and Service are available. These sensors are used with CV units.

- Programmable Night Setback Sensors—Electronic programmable sensors with auto or manual changeover with seven day programming. Keyboard selection of heat, cool, fan auto or on. All programmable sensors have System On, Heat, Cool, Service LED/indicators as standard. Night setback sensors have (1) Occupied, (1) Unoccupied and (2) Override programs per day. Models are available for CV zone temperature control and VAV supply air temperature control.

- Zone Sensor—Sensor with supply air single temperatures 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.

- Remote Sensor—Can be used for remote zone temperature sensing capabilities when zone sensors are used as remote panels.

- Full Warm-Up Sensor—Morning warm-up sensor for use with VAV units.

- Integrated Comfort™ System sensors—Used for zone temperature sensing when Tracer™ is communicating with the air handler. The sensors are available with options such as sensor only, sensor with timed override button, and a sensor with local temperature adjustment control, with timed override button.

- Remote Minimum Position Potentiometer—Minimum position setting of economizer can be remotely adjusted with this accessory.

- Temperature Sensor—Bullet or pencil type sensor that could be used for temperature input such as return air duct temperature.

- Wireless Zone Sensor—The Trane Wireless Zone has the advantage of easy and flexible installation and uses a radio that is specifically designed for the application. It includes sensor, receiver, wiring harness, and two AA lithium batteries. Standard functions include zone temperature, temperature setpoint (in Fahrenheit or Celsius), and occupied/ unoccupied override.

- Inter-Processor Communication Bridge kit—Included in this kit is an Inter-Processor Communicating Bridge (IPCB) module which is required for communication with a Remote Human Interface Panel.

- Remote Human Interface Panel kit—Can control up to four air handlers. The Remote Human Interface Panel has all the features of the Unit Mounted Human Interface Panel, except

no service mode interface is allowed remotely for safety reasons.

- Trane LonTalk® Communication Interface kit—For future opportunities and upgrade flexibility, this kit contains a LonTalk Communication Interface (LCI-I) module, which is required for communication with Tracer Summit or a 3rd party building automation system.
- The CO_2 sensor has the ability to monitor space occupancy levels within the building by measuring the parts per million of CO_2 (Carbon Dioxide) in the air. As the CO_2 levels increase, the outside air damper modulates to meet the CO_2 space ventilation requirements.

Roof Curb

- Roof Curb—Curb supports the air handler and allows for smooth transition of airflow from the air handler to the ductwork. Curb ships from stock and ductwork can be attached directly. Two-inch by four-inch nailer strip is also provided, as well as gasketing to seal supply and return openings. Curb is 14 inches high and is manufactured to the guidelines of the National Roofing Contractors Association.

Mechanical Specifications

General

Units shall be specifically designed for outdoor air handler installation on a roof curb and be completely factory assembled and tested, piped, internally wired and shipped in one piece.

Air handlers shall be available as either no cooling or chilled water cooling units. Heat options include natural gas, electric, hot water, steam or no heat. Filters, outside air system, exhaust air system, optional non-fused disconnect switches and all operating and safety controls shall be furnished factory installed.

All units shall be UL/CSA approved and factory run tested. All units shall also be compliant with IBC Seismic requirements. All units shall have decals and tags to aid in service and indicate caution areas. Electrical diagrams shall be printed on long life water resistant material and shall ship attached to control panel doors.

Casing

Exterior panels shall be zinc coated galvanized steel, phosphatized and painted with a slate grey air-dry finish durable enough to withstand a minimum of 500 hours consecutive salt spray application in accordance with standard ASTM B117. Screws shall be coated with zinc-plus-zinc chromate.

The Air Handler shall be laminated double-wall construction with polyurethane foam core between sheet metal panels and liners. Insulation value shall be R8. All interior surfaces shall be suitable for cleaning per ASHRAE 62. All access doors and panels shall have neoprene gaskets. Unit base shall be watertight with heavy gauge formed load bearing members and curb overhang. Unit lifting lugs shall accept chains or cables for rigging. Lifting lugs shall also serve as unit tie down points.

Access Doors

Access doors shall be hinged with a single, exterior mounted, height and tension adjustable, handle to provide positive latching at three points. Access doors shall provide a door stop mechanism to latch the door in the open position to prevent unsafe door closure by wind.

Doors of laminated double wall construction with a polyurethane foam core between the exterior sheet metal pane and the interior liner, with an insulating value of R8 shall be provided on the air handler's serviceable compartments such as return/exhaust fan, filters, coil and blank sections. Two single wall doors shall be provided for access to the control panel.

Blank Sections

A four or eight foot blank section of laminated double wall construction with a polyurethane foam core between the exterior sheet metal panel and the interior liner, with an insulating value of R8 shall be provided with similarly built, hinged, access doors on either side

Airflow Path

Unit shall have downflow discharge conditioned air path or horizontal discharge. Return airflow path shall be either upflow or horizontal.

Burglar Bar

A grate system shall be installed in supply and return air duct connection areas on non-horizontal airflow path units to minimize unwanted intrusion into duct systems.

Belt Guard

Supply and exhaust fans shall have a universal size belt guard to accommodate any applicable drive configuration. The guard totally encloses the drive system and is provided with a two-piece removable front panel for servicing. Return fan guards shall be individually sized with a single piece removable panel for servicing.

Electrical System

Convenience Outlet

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

Non-Fused Disconnect Switch

An external handle mounted on the control box door shall be provided to disconnect unit power.

Unit Interrupt Rating

A 65000 Amp rating (480V) and 25000 Amp rating (600V) shall be applied to the unit enclosure using a non-fused circuit breaker for disconnect switch purposes. Fan motors and electric heat circuits shall be provided with series rated circuit breakers that will provide the unit rated level of protection. The unit shall be marked with approved UL markings and will adhere to UL 508A regulations.

Marine Lights (Customer Powered)

A 120V master light switch shall be factory installed in the main unit control box for lighting control. The master switch shall be wired into an isolated terminal block with access for customer provided service. Marine light fixtures shall be supplied with 150W incandescent bulbs. Marine light fixtures shall be placed in the Supply Section (2), Fresh Air Section (1), Return Section (1), and Extended Casing Section (1) for units without Heat.

Supply/Exhaust/Return Motors

Supply, exhaust/return motors are either standard efficiency open drip-proof, high efficiency open drip-proof, or high efficiency totally enclosed fan cooled. All supply, exhaust/return motors meet the U.S. Energy Policy Act of 1992 (EPACT).

Cooling System Chilled Water Coil

Coils shall be of type 5W, W, or WD and have a tube in sheet design with 5/8" OD, 0.020" copper tubing mechanically bonded to aluminum fins. Headers shall be constructed of copper tubing with steel pipe connections. Coil casing shall be a minimum 16-gauge G90 galvanized steel with formed end supports and top and bottom channels.

Multiple row and fin series options shall be available including 2, 4, 6, or 8 rows and 80, 108, 144, or 168 fins per foot. Optional, performance enhancing, turbulators shall available for all chilled water coils. All coils shall be factory burst tested at 300 PSIG and leak tested at 200 PSIG.

All coils shall have drain holes. Water diverters and a double sloped galvanized drain pan shall be provided to direct condensate to both sides of the unit.

Water Valve

A 1.5", 2.0", 2.5", or 3.0" water modulating valve with actuator and linkage shall be provided by the manufacturer. Valve, actuator, and linkage shall be field installed and piped by the piping contractor.

External Piping Enclosure

A piping cabinet shall be supplied by the manufacturer (factory assembled) when the chilled water cooling option is selected. The piping cabinet shall be mounted external to the air handler unit and shipped separate to be field installed. The piping cabinet shall have a removable panel.

Air Handling System

Supply Fan

Standard or low airflow supply fan shall have a single fan assembly with double width, double inlet, airfoil fan, motor and fixed pitch sheave drive. All fans shall be statically and dynamically balanced for the operating envelop. It shall be tested in the factory. Supply fans shall be test run in unit as part of the unit test. Fan operating envelop rpm shall be below first critical speed. Fan shafts shall be mounted on two grease lubricated ball bearings designed for 200,000 hours average life. Extended grease lines shall allow greasing of bearings from section base rail. Fan motor and fan assembly shall be mounted on common base to allow consistent belt tension with no relative motion between fan and motor shafts. Entire assemblies shall be completely isolated from unit by two-inch deflection spring isolators.

Controls

Unit shall be completely factory wired with necessary control and contactor pressure lugs or terminal block for power wiring. Units shall provide an internal location for a non-fused disconnect with external handle for safety.

Unit Controller

DDC microprocessor controls shall be provided to control all unit functions. The control system shall be suitable to control CV or VAV applications. The controls shall be factory installed and mounted in the main control panel. All factory installed controls shall be fully commissioned (run tested) at the factory. The unit shall have a Human Interface Panel with a 16 key keypad, a 2 line X 40 character clear English display as standard to provide the operator with full adjustment and display of control data functions. The unit controls shall be used as a stand-alone controller, or as part of a building management system involving multiple units.

1

The unit shall be equipped with a complete microprocessor control system. This system shall consist of temperature and pressure (thermistor and transducer) sensors, printed circuit boards (modules), and a unit mounted Human Interface Panel. Modules (boards) shall be individually replaceable for ease of service. All microprocessors, boards and sensors shall be factory mounted, wired and tested.

The microprocessor boards shall be standalone DDC controls not dependent on communications with an on-site PC or a Building Management Network. The microprocessors shall be equipped with onboard diagnostics, indicating that all hardware, software and interconnected wiring are in proper operating condition.

The modules (boards) shall be protected to prevent RFI and voltage transients from affecting the board circuits. All field wiring shall be terminated at separate, clearly marked terminal strip. Direct field wiring to the I/O boards is not acceptable.

The microprocessor's memory shall be non-volatile EEPROM type requiring no battery or capacitive backup, while maintaining all data.

2

Zone sensors shall be available in several combinations with selectable features depending on sensor.

3

The Human Interface Panel keypad display character format shall be 40 characters x 2 lines. The character font shall be 5 x 7 dot matrix plus cursor. The display shall be Supertwist Liquid Crystal Display (LCD) with blue characters on a gray/green background which provides high visibility and ease of interface. The display format shall be in clear English.

4

The keypad shall be equipped with 16 individual touch-sensitive membrane key switches. The switches shall be divided into four separate sections and be password protected from change by unauthorized personnel. The six main menus shall be STATUS, SETPOINTS, DIAGNOSTICS, SETUP, CONFIGURATION and SERVICE MODE.

Trane LonTalk® Communication Interface Module (LCI-I)

The LCI-I provides an interface to a Tracer Summit system or other control system that supports LonTalk and shall be factory installed, allowing for control and monitoring of the unit through a RS485, two-wire communication link.

Filters

General

Filter options shall mount integral within the unit and be accessible by a hinged access door with a single point latching device.

Cooling Coil Filter Options

No Filters (Two-inch Nominal Thickness Throwaway Filter Rack Only)

Shall provide a galvanized steel filter rack (less filter media) with filter channels to handle a complete set of two-inch nominal thickness throwaway filters to accommodate applications which require field supplied filters.

No Filters (Bag or Cartridge Filter Rack with Throwaway Prefilter Rack Only)

Shall provide a galvanized steel filter rack (less filter media) to handle a complete set of two-inch or four-inch (depending on airflow) nominal thickness throwaway prefilters and 7/8" actual header thickness bag or cartridge filters to accommodate applications which require field supplied filters.

Merv 7 Throwaway Filters (Standard)

Shall be provided as standard—U.L. Class 2, two-inch nominal thickness, high efficiency pleated media filters rated MERV 7 per ASHRAE 52.2. Filters shall be provided mounted in a galvanized steel filter rack.

MERV 15, 90-95 Percent Bag Filters Option

Nineteen-inch deep bag filters shall be U.L. Class 2 and have synthetic media mounted to a 7/8" nominal thickness header frame. These bag filters shall have an efficiency rating of MERV 15 per ASHRAE 52.2. To ensure maximum bag filter life two-inch prefilters shall be included with the bag filters. Filters shall be mounted in a galvanized steel filter rack.

MERV 14, 90-95 Percent Cartridge Filters Option

Twelve-inch deep cartridge filters shall be U.L. Class 1 and be mounted with a 7/8" nominal thickness header frame. These cartridge filters shall have an efficiency rating of MERV 14 per ASHRAE 52.2. To ensure maximum cartridge filter life, two-inch (or four-inch, depending on the application) prefilters shall be included with the cartridge filters. Filters shall be mounted in a galvanized steel filter rack.

MERV 14, 90-95 Percent, Low Pressure Drop, Totally Incinerable, Cartridge Filters Option

Twelve-inch deep cartridge filter shall be U.L. Class 2 and mounted with a rigid 7/8" nominal thickness header frame. These low pressure drop cartridge filters shall have an efficiency rating of MERV 14 per ASHRAE 52.2. To ensure maximum cartridge filter life two-inch or four-inch prefilters (depending on airflow) shall be included with the high-flow, cartridge filters. Filters shall be mounted in a galvanized steel filter rack.

Final Filters Options (Available Only on Units with Blank Section)

Final filter section filter options shall mount integral within the blank section unit casing and be accessible by hinged access doors.

MERV 15, 90-95 Percent, Bag, Final Filter Option

Note: *Available on cooling only units with four or eight-foot blank section, as well as steam and hot water units with eight-foot blank section, unit casing only.*

Nineteen-inch deep bag filters shall be U.L. Class 2 and have synthetic media mounted to a 7/8" nominal thickness header frame. These bag filters shall have an efficiency rating of MERV 15 per ASHRAE 52.2. To ensure maximum bag final filter life two-inch prefilters shall be included with the bag filters. Filters shall be mounted in a galvanized steel filter frame bank.

MERV 14, 90-95 Percent, Cartridge, Final Filter Option

Note: *Available on cooling only units with four or eight-foot blank section, as well as steam and hot water units with eight-foot blank section, unit casing only.*

Twelve-inch deep cartridge filters shall be U.L. Class 1 and be mounted with a 7/8" nominal thickness header frame. These cartridge filters shall have an efficiency rating of MERV 14 per ASHRAE 52.2. To ensure maximum cartridge filter life, two-inch prefilters shall be included with the cartridge filters. Filters shall be mounted in a galvanized steel filter frame bank.

MERV 14, 90-95 Percent, Low Pressure Drop, Totally Incinerable, Cartridge, Final Filter Option

Note: *Available on cooling only units with four or eight-foot blank section, as well as steam and hot water units with eight-foot blank section, unit casing only.*

Twelve-inch deep cartridge filter shall be U.L. Class 2 and mounted with a rigid 7/8" nominal thickness header frame. These cartridge filters shall have an efficiency rating of MERV 14 per ASHRAE 52.2. To ensure maximum cartridge final filter life four-inch prefilters shall be included with these cartridge filters. Filters shall be mounted in a galvanized steel filter frame bank.

MERV 14, 90-95 Percent, High Temperature Rated, Cartridge, Final Filter Option

Note: *Available on gas and electric heat units with eight-foot blank section casing only.*

Twelve-inch deep cartridge filters shall be U.L. Class 1 and be mounted in a galvanized steel casing with a 7/8" nominal thickness header frame. These cartridge filters shall have an efficiency rating of MERV 14 per ASHRAE 52.2. To ensure maximum cartridge final filter life high temperature rated two-inch prefilters shall be included with the cartridge filters. Filters shall be mounted in a galvanized steel filter frame bank.

MERV 17, 99.97 Percent, Standard Temperature Rated, HEPA, Final Filter Option

Note: *Available on cooling only units with four or eight-foot blank section, as well as steam and hot water units with eight-foot blank section, unit casing only.*

Twelve-inch deep HEPA filters shall be U.L. Class 1 and be mounted in a galvanized steel casing. These filters have an efficiency rating of MERV 17 per ASHRAE 52.2 and an efficiency of 99.97% on a 0.3 micron DOP particle size. To ensure maximum HEPA final filter life two-inch prefilters shall be included with the HEPA final filters. Filters shall be mounted in a galvanized steel filter frame bank.

MERV 17, 99.97 Percent, High Temperature Rated, HEPA, Final Filter Option

Note: *Available on gas and electric heat units with eight-foot blank section casing only.*

Twelve-inch deep HEPA filters shall be U.L. Class 1 and be mounted in a galvanized steel casing. These filters have an efficiency rating of MERV 17 per ASHRAE 52.2 and an efficiency of 99.97% on a 0.3 micron DOP particle size. To ensure maximum HEPA final filter life high temperature rated two-inch prefilters shall be included with the HEPA final filters. Filters shall be mounted in a galvanized steel filter frame bank.

Exhaust Air

General

Exhaust air options shall include no relief, 100 percent modulating exhaust fan and 100 percent modulating exhaust fan with direct space building pressurization control.

Exhaust fans shall be either standard or low airflow

No Relief (Standard)

Relief air opening shall be sealed with panel and made watertight.

100 Percent Modulating Exhaust Fan Option

Fan design shall be double width, double inlet forward-curved type. Fan shall be mounted on a shaft with fixed sheave drive. All fans shall be dynamically balanced and tested in factory before being installed in unit. It shall be test run in unit as part of unit test. Fan operating envelop rpm shall be below first critical speed. Fan shaft shall be mounted on two grease lubricated ball or roller bearings as applicable designed for 200000-hour average life. Extended grease lines shall be provided to allow greasing of bearings from section base rail.

Fan motor and assembly shall be mounted on common base to allow consistent belt tension with no relative motion between fan and motor shafts. The entire assembly shall be completely isolated from unit with 2-inch spring isolation. Discharge dampers at unit outlet shall modulate exhaust airflow in response to OA damper position.

100 Percent Modulating Exhaust Fan with Statitrac™ Control Option

Fan design shall be double width, double inlet forward-curved type. Fan shall be mounted on a shaft with fixed sheave drive. All fans shall be dynamically balanced and tested in factory before being installed in unit. Exhaust fan shall be test run as part of unit final run test. Fan operating envelop rpm shall be below first critical speed. Fan shaft shall be mounted on two grease lubricated ball or roller bearings designed for 200000-hour average life. Extended grease lines shall be provided to allow greasing of bearings from section base rail.

Fan motor and assembly shall be mounted on common base to allow consistent belt tension with no relative motion between fan and motor shafts. The entire assembly shall be completely isolated from unit with 2-inch spring isolators. For both CV and VAV air handlers, the 100 percent modulating exhaust discharge damper (or VFD) shall be modulated in response to building pressure.

A differential pressure control system, (Statitrac), shall use a differential pressure transducer to compare indoor building pressure to outdoor ambient atmospheric pressure. The FC exhaust fan shall be turned on when required to lower building static pressure setpoint. The (Statitrac) control system shall then modulate the discharge dampers (or VFD) to control the building pressure to within the adjustable, specified deadband that shall be adjustable at the Human Interface Panel.

Return Air

General

Return air options shall include 100 percent modulating return fan and 100 percent modulating return with direct space building pressurization control. Return fans shall be either standard or low airflow.

100 Percent Modulating Return Fan

A single width plenum fan with airfoil blade shall be mounted on a shaft with fixed sheave drive. The fan shall be dynamically balanced for the operating envelop and tested in factory before being installed in unit. The plenum fan shall be test run in unit as part of unit test. Fan operating envelop rpm shall be below first critical speed. Fan shaft shall be mounted on two grease lubricated ball or roller bearings designed for 200,000-hour average life. Extended grease lines shall be provided to allow greasing of bearings from section base rail. Fan motor and assembly shall be mounted on common base to allow consistent belt tension with no relative motion between fan and motor shafts. The entire assembly shall be completely isolated from unit with 2-inch spring isolators. Discharge dampers at unit outlet shall modulate relief airflow in response to OA / return air damper position. The return fan VFD shall operate in conjunction with the supply fan.

100 Percent Modulating Return Fan with Statitrac™ Control Option

A single width plenum fan with airfoil blade shall be mounted on a shaft with fixed sheave drive. The fan shall be dynamically balanced for the operating envelop and tested in factory before being installed in unit. The plenum fan shall be test run as part of unit final run test. Fan operating envelop rpm shall be below first critical speed. Fan shaft shall be mounted on two grease lubricated ball or roller bearings designed for 200,000-hour average life. Extended grease lines shall be provided to allow greasing of bearings from section base rail. Fan motor and assembly shall be mounted on common base to allow consistent belt tension with no relative motion between fan and motor shafts. The entire assembly shall be completely isolated from unit with 2-inch spring isolators. The 100 percent modulating relief damper shall be modulated in response to building pressure. A differential pressure control system, (Statitrac), shall use a differential pressure transducer to compare indoor building pressure to outdoor ambient atmospheric pressure. The (Statitrac) control system shall modulate the discharge dampers to control the building pressure to within the adjustable, specified deadband that shall be adjustable at the Human Interface Panel. The return fan VFD shall modulate in response to return duct static pressure.

Fresh Air

General

Three outside air options: 0 to 25 percent motorized controlled outside air, 0-100 percent fully modulating economizer, and 0-100 percent fully modulating economizer with fresh air measurement.

Demand Control Ventilation

The fresh air damper position shall modulate in response to a CO_2 sensor in the conditioned space, in order to minimize the unit energy consumption, yet simultaneously meet the ventilation requirements of ASHRAE Std 62.1.

Fresh Air Measurement

A factory mounted airflow measurement station (TRAQ) shall be provided in the fresh air opening to measure airflow. The airflow measurement station shall measure from 15 to 100 percent of unit airflow. The airflow measurement station shall adjust for temperature variations.

0-25 Percent Motorized Outside Air Damper Option

0-25 percent motorized outside air damper shall provide up to 25 percent outside air. The damper position will be adjustable at the Human Interface Panel.

0-100 Percent Modulating Economizer Option

Operated through the primary temperature controls to automatically utilize OA for “free” cooling. Automatically modulated return and OA dampers shall maintain proper temperature in the conditioned space. Economizer shall be equipped with an automatic lockout when the outdoor high ambient temperature is too high for proper cooling. Minimum position control shall be standard and adjustable at the Human Interface Panel or with a remote potentiometer or through the building management system. A spring return motor shall ensure closure of OA dampers during unit shutdown or power interruption. Mechanical cooling shall be available to aid the economizer mode at any ambient. Standard economizer dampers shall have a leakage rate of 20 cfm/ft^2 at 1.0 in W.C. pressure difference.

Low Leak and Ultra Low Leak Economizer Dampers Option

Low leak dampers shall be provided with chlorinated polyvinyl chloride gasketing added to the damper blades and rolled stainless steel jamb seals to the sides of the damper assembly. The low leak dampers shall have a leakage rate of 10 cfm/ft^2 (AMCA Class 2) at 1.0 in W.C. pressure difference.

Ultra low leak damper will have added sealing under the jam seals and in the frame. The ultra low leak dampers shall have a leakage rate of 4 cfm/ft^2 (AMCA Class 1) at 1.0 in W.C. pressure difference.

Note: *Based on testing completed in accordance with AMCA Standard 500D.*

Economizer Control with Comparative Enthalpy

Used with the fresh air economizer, two enthalpy sensors are provided to compare total heat content of the indoor air and outdoor air to determine the most efficient air source when economizing.

Economizer Control with Reference Enthalpy

Used with the fresh air economizer, an outdoor enthalpy sensor is provided to compare the total heat content of outdoor air to a locally adjustable setpoint. The setpoint is programmed at the human interface, or remote human interface, to determine if the outdoor enthalpy condition is suitable for economizer operation.

Economizer Control with Dry Bulb

Used with the fresh air economizer, an outdoor temperature sensor is included for comparing the outdoor dry bulb temperature to a locally adjustable temperature setpoint. The setpoint is programmed at the human interface, or remote human interface, to determine if outdoor air temperature is suitable for economizer operation.

Heating System

Electric Heating Option

All electric heat models shall be completely assembled and have wired electric heating system integral within the air handler. Heavy duty nickel chromium elements internally wired with a maximum density of 40 watts per square inch shall be provided.

Heater circuits shall be 48 amps or less, each individually fused. Automatic reset high limit control shall operate through heater backup contactors. The units shall have optional factory mounted non-fused disconnect switch located in the main control panel to serve the entire unit.

Gas Fired Heating Option

All gas fired units shall be completely assembled and have a wired gas fired heating system integral within unit. Units shall be UL/CSA approved specifically for outdoor applications downstream from chilled water coils. All gas piping shall be threaded connection with a pipe cap provided. Gas supply connection shall be provided through the side on horizontal discharge units, and through the bottom and side for downflow discharge units. All units shall be fire tested prior to shipment.

- Heat Exchanger shall be tubular two pass design with stainless steel primary and secondary surfaces. Free floating design shall eliminate expansion and contraction stresses and noises. Gasketed cleanout plate shall be provided for cleaning of tubes/ turbulators. Heat exchanger shall be factory pressure and leak tested.
- Burner shall be a stainless steel industrial type with an air proving switch to prevent burner operation if the burner is open for maintenance or inspection. Ceramic cone shall be provided to shape the flame to prevent impingement on sides of heat exchanger drum. Burner assembly shall house ignition and monitoring electrode.
- Combustion Blower shall be centrifugal type fan to provide air required for combustion. Fan motor shall have built-in thermal overload protection.
- Gas Safety Controls shall include electronic flame safety controls to require proving of combustion air prior to ignition sequence which shall include a 60 second pre-purge cycle. Pilot ignition shall be provided on 850, 1100 and 1800 MBH heat exchanger units. Sixty second delay shall be provided between first and second stage gas valve operation on two-stage heaters. Continuous electronic flame supervision shall be provided as standard.
- Full Modulation Gas Heaters shall be made from grades of stainless steel suitable for condensing conditions. The heater shall have a turn down ratio of at least 10 to 1 on the 850 and 20 to 1 on the 1100 and 1800 MBH

Steam Heating Option

Steam coils shall be Type NS with non-freeze steam distribution circuits. Distributor tubes shall be located concentrically within condensing tubes to assure even steam distribution. Coils shall be pitched to provide complete drainage. Steam modulating valve with actuator shall be provided.

Hot water Heating Option

Hot water coils shall be Type 5W and factory mounted in the air handling unit to provide complete drainage of coil. Hot water modulating valve with actuator shall be provided.

Accessories

Roof Mounting Curb

Roof mounting curb shall be heavy gauge zinc coated steel with nominal two-inch by four-inch nailer setup. Piping enclosure and supply/return air opening gasketing shall be provided. Curb shall ship knocked down for easy assembly. Channel shall be provided to allow for adjustment of return air opening location. Curb shall be manufactured to National Roofing Contractors Association guidelines.

Electronic Zone Sensors

- Zone Sensors shall provide two temperature setpoint levers, Heat, Auto, Off, or Cool system switch, Fan Auto or Fan On switch. Optional status indication LED lights, System On, Heat, Cool, and Service shall be available. These sensors shall be used with CV units.
- Programmable Night Setback Sensors shall be electronic programmable sensors with auto or manual changeover with 7 day programming. Keyboard shall provide selection of Heat, Cool, Fan Auto or On. All programmable sensors shall have System On, Heat, Cool, Service LED/indicators as standard. Night setback sensors shall have (1) Occupied, (1) Unoccupied and (2) Override programs per day. Sensors shall be available for CV zone

temperature control and VAV Supply Air temperature control.

- VAV zone sensor shall be provided with supply air single temperature setpoint and AUTO/OFF system switch. Status indication LED lights shall include: System On, Heat, Cool and Service. Sensor shall be provided for zone temperature control with VAV units.
- Remote Sensor shall be available to be used for remote zone temperature sensing capabilities when zone sensors are used as Remote panels.
- Fast Warm-Up Sensor shall be used as Morning warm-up sensor with VAV units.
- Integrated Comfort™ System sensors shall be available with sensor only, sensor with timed override, and sensor with local temperature setpoint adjustment with timed override.
- Remote Minimum Position Potentiometer shall be available to remotely adjust the minimum position setting of the unit economizer.
- Wireless Zone Sensor shall be available with a RF wireless zone temperature, setpoint and timed override transmitter and a RF receiver that connects directly to the IntelliPak II controller and uses spread spectrum technology. Sensor battery life shall provide at least 5 years life under normal operating conditions and shall provide a readily visual indication of battery condition.

CO_2 Sensing

- The CO_2 sensor shall have the ability to monitor space occupancy levels within the building by measuring the parts per million of CO_2 (Carbon Dioxide) in the air. As the CO_2 levels increase, the outside air damper modulates to meet the CO_2 space ventilation requirements.

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