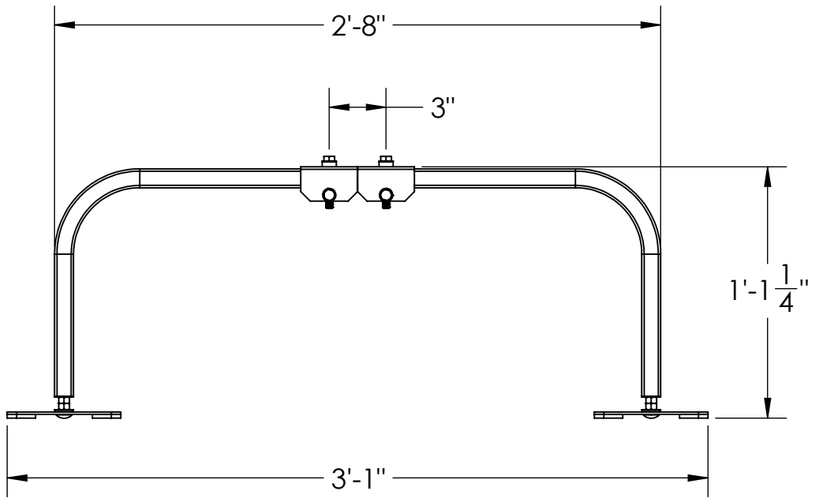
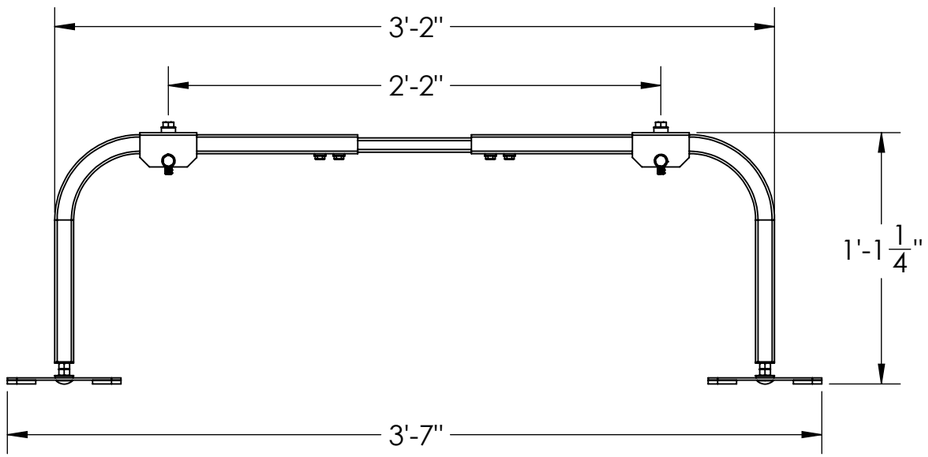
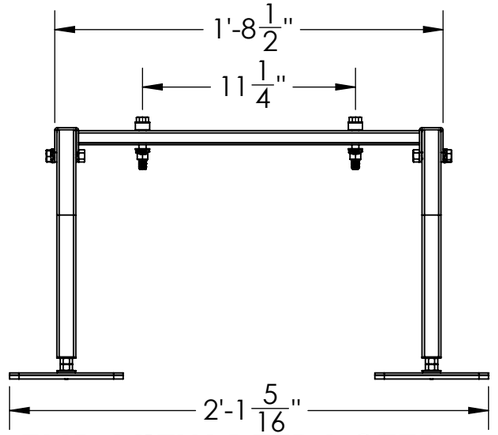


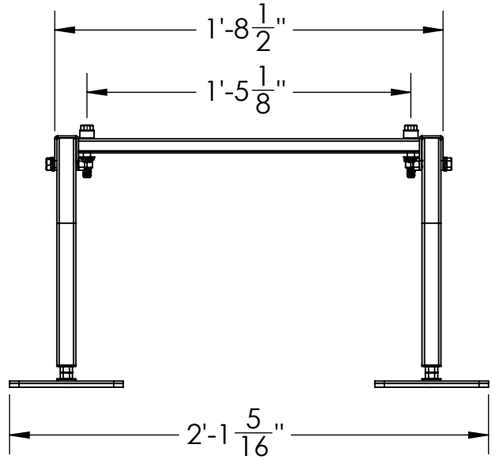
SIDE VIEW RETRACTED



SIDE VIEW EXPANDED



END VIEW RETRACTED



END VIEW EXPANDED

(*) - WIDTH IS ADJUSTABLE IN 1" INCREMENTS

IMPORTANT NOTE: THE INSTALLER IS RESPONSIBLE FOR THETHERING AND BOLTING UNITS TO WITHSTAND WIND AND/OR SEISMIC LOADS.

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES [MILLIMETERS]
TOLERANCES ARE: ANGLES ±1.0°
FRACTIONAL SIZES X/Y ±1/64

INCHES	[MILLIMETERS]
.X = ±0.1	[X = ± 2.5]
.XX = ±0.01	[.X = ± 1.3]
.XXX = ±0.005	[.XX = ±0.13]

THIRD ANGLE PROJECTION

DIVERSITECH

DO NOT SCALE DRAWING

MATERIAL:

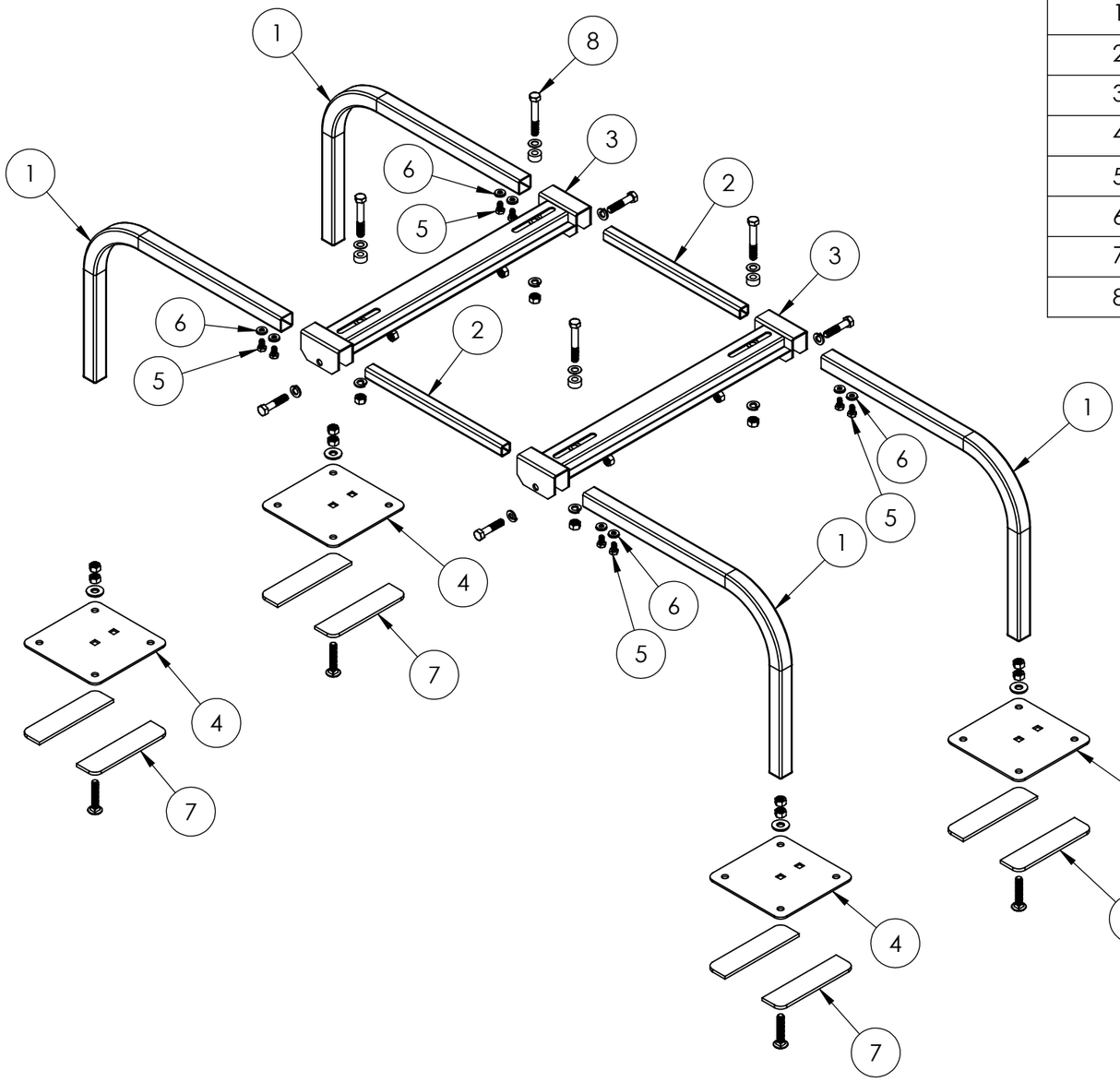
DWG. NO. MINI SPLIT STAND - 1201
MODEL NO. QSMS1201

DESCRIPTION

WEIGHT GMS.

REV.

SHEET 1 OF 2



ITEM NO.	PART NUMBER	DESCRIPTION	Default/ QTY.
1	MS107	Mini Split 12in J-Bar	4
2	MS106	Mini Split Extension Bar	2
3	MS119	Mini Split Long Saddle Arm	2
4	MS105	Mini Split 6x6 Feet	4
5	QSR008	1/4-20x1/2in Zinc Hex Bolt	8
6	QSR015	1/4in Bonded Washers	8
7	QSR042	Mini Split Rubber Foot	8
8	HDKMS01	Haedware kit for QSMS1200/1201	1

NOTE - ALL ASSEMBLY HARDWARE IS INCLUDED

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES [MILLIMETERS]
TOLERANCES ARE: ANGLES ±1.0°
FRACTIONAL SIZES X/Y ±1/64

INCHES	[MILLIMETERS]
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THIRD ANGLE PROJECTION

DIVERSITECH

DO NOT SCALE DRAWING

MATERIAL:

DWG. NO. MINI SPLIT STAND - 1201
MODEL NO. QSMS1201

DESCRIPTION

WEIGHT GMS.

REV.

SHEET 2 OF 2

Trane NTXSKS12A Outdoor Heat Pump

Technical Specification

Make	Trane
Company	Trane
Model code	NTXSKS12A
Previously known as	1
Dimensions	Height: 21 5/8 Width: 31 1/2 Depth: 11 1/4

Additional info

- 15.4 SEER, 9.6 HSPF, INVERTER-driven compressor
- Cleaner air with washable anti-allergen filters
- Provides instant warmth even in extreme climates
- Complete comfort control of temperature, fan speed, and air direction in each room or zone via kumo cloud® or other smart home devices
- Installs quickly and easily, without the need for major construction and remodeling

ATTACHMENT 7

Product Catalog

Packaged Rooftop Air Conditioners Precedent™ 17 Plus — Cooling and Gas/Electric

3 to 5 Tons — 60 Hz

September 2021 **RT-PRC048Q-EN**

TRANE TECHNOLOGIES

Introduction

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

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

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

All units utilize ReliaTel™ controls. These are standard for variable staged cooling Precedent™ products.

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

With its sleek, compact cabinet, Precedent continues to provide the highest standards in quality and reliability, comfort, ease of service, and the performance of Trane light commercial products.

Copyright

Trademarks

Revision History

- Deleted High Static Drive option from Features and Benefits data table.
- Added Traq Dampers specifications in Features and Benefits, Weights and in Mechanical Specifications chapter.
- Running Edits.

Table of Contents

Features and Benefits

	Standard Features	Options[a]		
		Factory Installed	Factory or Field Installed	Field Installed
1-year Limited Parts Warranty	X			
2 inch MERV 8 Filters or 2 inch MERV 13 Filters with Filter Removal Tool		X		
5-year Limited Compressor Warranty	X			
5-year Limited Heat Exchanger Warranty	X			
Anti-Short Cycle Timer (Standard with ReliaTel™)	X			
Barometric Relief			X	
Black Epoxy Pre-Coated Coils		X		
CO_2 Sensor[b]				X
CO_2 Sensor (Wiring Only)		X		
Clogged Filter/Fan Failure Switch			X	
Colored and Numbered Wiring	X			
CompleteCoat™ Condenser Coil		X		
Condensate Overflow Switch		X		
Convertible Airflow	X			
Crankcase Heaters	X			
Dehumidification Option		X		
Direct Drive Variable Speed Motors	X			
Discharge Air Temperature Sensing Kit			X	
Easy Access Low Voltage Terminal Board (LTB)	X			
Economizer: Standard and Low Leak			X	
Electric Heaters			X	
Enhanced Dehumidification Functionality	X			
Fault Detection and Diagnostics (FDD)[c]		X		
Filters are Standard on all Units	X			
Foil-Faced and Edge Captured Insulation	X			
Frostat™			X	
Tool-less Hail Guards			X	
High Altitude Kit				X
High Pressure Control	X			
Hinged Access Doors		X		
Humidity Sensor/Humidistat				X
IAQ Dual Sloped, Plastic, Removable, Reversible Drain Pan	X			
Liquid Line Refrigerant Drier	X			
Low Ambient Cooling to 0°F	X			
Low Pressure Control	X			
LP Conversion Kit				X
Manual Outside Air Damper				X
Motorized Outside Air Dampers				X
Multiple Zone VAV (Variable Air Volume)		X		
Operating Charge of R-410A	X			
Outside Air Measuring/Monitoring Control (Traq Dampers)				X
Patent-Pending Hybrid Condenser Coil for easy cleaning	X			
Phase Balance Protection	X			

	Standard Features	Options[a]		
		Factory Installed	Factory or Field Installed	Field Installed
Phase Loss Protection	X			
Phase Monitor	X			
Phase Reversal Protection	X			
Powered Exhaust				X
Powered[d] or Unpowered Convenience Outlet		X		
Progressive Tubular Aluminized Steel Heat Exchanger	X			
Provisions for through-the-base Condensate Drain Connections	X			
Quick Access Panels	X			
Quick Adapt Curbs				X
Quick Start Kit				X
Reference or Comparative Enthalpy			X	
Remote Potentiometer				X
Roof Curb				X
Scroll Compressors	X			
Single Point Power	X			
Single Side Service	X			
Single Zone Variable Air Volume (SZVAV)		X		
Stainless Steel Drain Pan		X		
Stainless Steel Heat Exchanger		X		
Standardized Components	X			
Supply, Return or Plenum Air Smoke Detector		X		
Thermal Expansion Valve	X			
Through-the-Base Electrical Access		X		
Through-the-Base Electrical with Circuit Breaker		X		
Through-the-Base Electrical with Disconnect Switch		X		
Through-the-Base Gas Access		X		
Ultra Low NOx Gas Furnace[e][f][g][h][i][j]		X		
Ventilation Override Accessory				X

(a) Refer to model number description for option availability.
(b) CO_2 sensor always field installed; associated with demand control ventilation.
(c) FDD can be accomplished via either (1) TD5 Human Interface (Digit 31=1) or BAYSENS924 with BACnet card (factory or field installed).
(d) Powered convenience outlet not available on 460V and 575V units
(e) Applicable only for California SCAQMD and SJVAPCD.
(f) Option requires Stainless Steel Heat Exchanger (digit 10=X or Y).
(g) Only available in 208-230V and 460V (Not on 575V).
(h) Through-the-Base Gas option not available with Ultra Low NOx gas furnace option.
(i) Ultra Low NOx gas furnace option does not allow Field Installed LP Conversion Kit.
(j) Ultra Low NOx gas furnace option does not allow Field Installed High Altitude Kit.

	Standard Features	Options[a]		
		Factory Installed	Factory or Field Installed	Field Installed
BACnet® Communications Interface (BCI)			X	
Dual Thermistor Remote Zone Sensor				X
Human Interface		X		
LonTalk® Communications Interface (LCI)			X	
ReliaTel™ Microprocessor Controls	X			
Thermostat				X
Trane® Air-Fi® Wireless Communication Interface		X		
Trane® Communications Interface (TCI)			X	
Wireless Zone Sensor				X
Zone Sensor				X

(a) Refer to model number description for option availability.

Standard Features

Anti-Short Cycle Timer

Provides a 3 minute minimum “ON” time and 3 minute “OFF” time for compressors to enhance compressor reliability by assuring proper oil return.

Colored And Numbered Wiring

Save time and money tracing wires and diagnosing the unit.

Compressors

Precedent contains the best compressor technology available to achieve the highest possible performance. Variable stage compressors are outstanding for humidity control, light load cooling conditions and system back-up applications.

Condenser Coil

Precedent boasts a patent-pending 1+1+1 condenser coil, permanently gapped for easy cleaning.

Controls – ReliaTel™

ReliaTel microprocessor controls provide unit control for heating, cooling and ventilating utilizing input from sensors that measure indoor and outdoor temperature and other zone sensors. ReliaTel also provides outputs for building automation systems and expanded diagnostics. For a complete list of ReliaTel offerings, refer to the “Other Benefits” section within the Features and Benefits section of this catalog.

Convertible Units

The units ship in a downflow configuration. They can be easily converted to horizontal by simply moving two panels.

Units come complete with horizontal duct flanges so the contractor doesn't have to field fabricate them. These duct flanges are a time and cost saver.

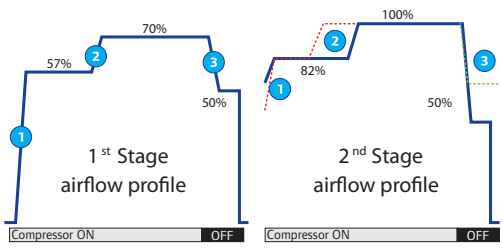
Cooling

High Efficiency variable stage cooling available.

Crankcase Heaters

These band heaters provide improved compressor reliability by warming the oil to prevent migration during off-cycles or low ambient conditions.

Direct Drive Variable Speed Motors



Direct Drive motor shall be variable speed type with constant airflow setting. Motor will be ECM (Electronically Commutated Motor) as standard pre-programmed with enhanced airflow capabilities.

Drain Pan

Every Precedent™ unit has a plastic, removable, dual-sloped drain pan that's easy to clean and reversible to allow installation of drain trap on either side of the unit.

Easy Access Low Voltage Terminal Board

The low voltage terminal board is external to the electrical control cabinet. It is extremely easy to locate and attach the thermostat wire and test operation of all unit functions. This is another cost and time saving installation feature.

Enhanced Dehumidification

Enhanced Dehumidification will be available on all units equipped with a space humidity sensor, regardless of whether the unit is configured with traditional Hot Gas Reheat (see "Dehumidification (Hot Gas Reheat Option)," p. 10). Humidity levels are decreased while increasing the comfort level in an air space through advanced controls of compressor and indoor fan operation.

Heat Exchanger

The compact cabinet features a progressive tubular heat exchanger in low, medium and high heat capacities.

The heat exchanger is fabricated using corrosion-resistant aluminized steel burner and tubes as standard on all models. It has an induced draft blower to pull the gas mixture through the burner tubes. The heater has a direct spark ignition system which doubles as a safety device to prove the flame.

High Pressure Control

All units include high pressure control as standard.

Low Ambient Cooling

All Precedent microprocessor units have cooling capabilities down to 0°F as standard.

Low Voltage Connections

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

Phase Monitoring Protection

Precedent™ units with 3-phase power are equipped with phase monitoring protection as standard. The phase monitor protects motors by preventing unit operation when there is a phase loss, phase imbalance or phase reversal condition. An illuminated green LED indicates proper phase operation, and an illuminated red LED indicates there is a fault.

Constant CFM Fan

All variable stage units shall include constant CFM direct drive variable speed indoor motor with advanced airflow profile.

Note: *Available on T/YHC037, 047, 067 (E) models.*

Quick-Access Panels

Remove two screws for access to the standardized internal components and wiring.

Standardized Components

Components are placed in the same location on all Precedent units. Due to standardized components throughout the Precedent line, contractors/owners can stock fewer parts.

Through-the-Base Condensate

Every unit includes provisions for through the base condensate drain connections. This allows the drain to be connected through the roof curb instead of a roof penetration.

Other Benefits

- Cabinet design ensures water integrity
- Ease of Service, Installation and Maintenance
- Mixed model build enables “fastest in the industry” ship cycle times
- Outstanding Airflow Distribution
- ReliaTel™ Controls
- Unmatched Product Support is one of our finest assets. Trane Sales Representatives are a Support Group that can assist you with:
  - Product
  - Application
  - Service
  - Training
  - Special Applications
  - Specifications
  - Computer Programs and much more

Factory Installed Options

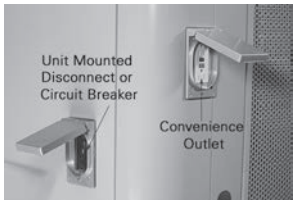
Black Epoxy Pre-Coated Coils

The pre-coated coils are an economical option for protection in mildly corrosive environments.

Circuit Breaker

This option is a factory installed thermal magnetic, molded case, HACR circuit breaker with provisions for through-the-base electrical connections.

Note: *Available on units equipped with through-the-base electrical.*



CO_2 Sensor Wiring

This is the unit wiring for field installed CO_2 sensors. Factory-installed CO_2 sensor wiring saves time and ensures proper unit connections for the field installed CO_2 sensor kits.

CompleteCoat™ Condenser Coil

These coils provide excellent corrosion resistance as well as uniformity of coverage and coating thickness.

Condensate Overflow Switch

A condensate overflow switch is available to shut the unit down in the event that the condensate drain line becomes clogged.This option protects the unit from water overflowing from the drain pan and entering the base of the units.

Convenience Outlet

This option is a GFCI, 120V/15 amp, 2 plug, convenience outlet, either powered or unpowered. This option can only be ordered when through-the-base electrical with either the disconnect switch or circuit breaker option is ordered.

Note: *Not available on 10 ton, 575V units.*

Dehumidification (Hot Gas Reheat Option)

This option allows for increased outdoor air ventilation. It reduces humidity levels while increasing comfort level in the air space. Cooling can operate without a demand for dehumidification. The hot gas reheat coil is designed to deliver maximum reheat temperatures.

Disconnect Switch

Factory installed 3-pole, molded case, disconnect switch for through-the-base electrical connections.

Codes require a method of assured unit shutdown for servicing. Field-installed disconnects sometimes interfere with service access. Factory installation of unit disconnects reduces costs, assures proper mounting and provides the opportunity to upgrade to unit circuit breaker protection.

Note: *Available on units equipped with through-the-base electrical.*

Fault Detection and Diagnostics (FDD)

This offering meets the mandatory requirement of CA Title 24 of fully configurable diagnostics allowing fault history and reading fault codes at the unit. This option provides detection of the following faults: Air temperature sensor failure/fault and notification of acceptable economizer mode. The FDD system shall be certified by the Energy Commission as meeting the requirements.

High Efficiency Filtration

Precedent units offer a variety of high efficiency filtration options. MERV 8 and MERV 13 filters provide additional filtration beyond the capabilities of typical 2 inch throwaway filters. Also, when MERV 8 or MERV 13 filters are ordered, units come equipped with a filter removal tool.

Hinged Access Doors

These doors permit easy access to the filter, fan/heat and compressor/control sections. They reduce the potential roof damage from screws or sharp access door corners.

Note: *A compressor isolation panel is available for 3 to 5 ton units to ease commissioning and servicing of units.*

Human Interface

The 5 inch Color Touchscreen Human Interface provides an intuitive user interface to the rooftop unit that speeds up unit commissioning, shortens unit troubleshooting times, and enhances preventative maintenance measures. The human interface includes several features such as:

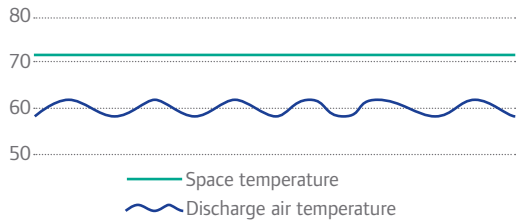
- Data trending capabilities by means of time series graphs
- Historical alarm messages
- Real-time sensor measurements
- On board system setpoints
- USB port that enables the downloading of component runtime information as well as trended historical sensor data

Multiple-Zone VAV Control

A multiple-zone VAV (MZVAV) system consists of a packaged rooftop unit that serves several individually controlled zones. Each zone is equipped with a VAV terminal unit that varies the quantity of air delivered to maintain the desired temperature in that zone. The rooftop unit controller varies the speed of the indoor fan to maintain the static pressure in the supply ductwork at a setpoint, ensuring that all zones receive the necessary quantity of air. In addition, cooling capacity is cycled to maintain the supply air temperature at the desired setpoint.

For decades, Trane has been an industry leader in rooftop VAV systems. Now, multiple-zone VAV control is available in light commercial rooftop platform (3-25 tons).

Single Zone Variable Air Volume



Single Zone VAV control offers full supply fan modulation across the available airflow range. In addition to full supply fan modulation, the unit controls the discharge air temperature to a varying discharge air temperature setpoint in order to maintain Space Temperature.

Stainless Steel Drain Pan

For excellent corrosion and oxidation resistance, the optional stainless steel drain pan provides a cleanable surface that complement other IAQ solutions such as high efficiency filtration (MERV 8 or 13), demand control ventilation (CO_2), and hot gas reheat.

Stainless Steel Heat Exchanger

The optional stainless steel heat exchanger is constructed of 409 stainless steel tubes and 439 stainless steel burners. It is resistant to corrosion and oxidation and easy to clean. The high strength to weight ratio allows for high ventilation rates with gas units. It is an excellent option to compliment the dehumidification option as a high outside air ventilation unit. With this option, a 10-year stainless steel heat exchanger warranty is standard.

Note: *Stainless steel heat exchanger is standard with Ultra Low NOx Gas Furnace option.*

Supply, Return, and Plenum Air Smoke Detector

With this option installed, if smoke is detected, all unit operation will be shut down. Reset will be manual at the unit. In order for the supply air smoke detector or return air smoke detector to properly sense smoke in the supply air stream or the return air stream, the air velocity entering the smoke detector unit must be between 500 - 4000 feet per minute. Equipment covered in this manual will develop an airflow velocity that falls within these limits over the entire airflow range specified in the evaporator fan performance table. Supply and/or return smoke detectors may not be used with the plenum smoke detector.

Note: *Plenum smoke detectors have no auxiliary contacts for external connections.*

Figure 1. Supply/Return air smoke detector

Figure 2. Plenum air smoke detector

Through-the-Base Electrical Utility Access

An electrical service entrance shall be provided allowing electrical access for both control and main power connections inside the curb and through-the-base of the unit. Option will allow for field installation of liquid-tight conduit and an external field installed disconnect switch.

Factory provided through-the-base openings simplify wiring and piping. Because these utility openings frequently minimize the number of roof penetrations, the integrity of roofing materials is enhanced.

Through-the-Base Gas Access

Factory provided through-the-base openings simplify wiring and piping. Because these utility openings frequently minimize the number of roof penetrations, the integrity of roofing materials is enhanced.

Note: *Through-the-Base gas not available with Ultra Low NOx gas furnace option.*

Ultra Low NOx Gas Furnace (CA Only)

Gas heat models that provide 14 ng/J NOx furnace emissions to comply with California's South Coast Air Quality Management District (SCAQMD) and San Joaquin Valley Air Pollution Control District (SJVAPCD) requirements.

Factory or Field Installed Options

Barometric Relief

Designed to be used on downflow units, barometric relief is an unpowered means of relieving excess building pressure.

Clogged Filter/Fan Failure Switch

A dedicated differential pressure switch is available to achieve active fan failure indication and/or clogged filter indication.

These sensors allow a zone sensor service light or Integrated Comfort System to indicate a dirty filter or a fan that’s not working. The field installation charges for these valuable feedback devices often eliminate them from consideration. Factory installation can make such features a good investment.

Discharge Air Temperature Sensing Kit

Provides true discharge air temperature sensing in heating models. The kit is functional only with the ReliaTel Options Module.

Economizer (Standard)

This accessory shall be available with or without barometric relief. The assembly includes fully modulating 0-100 percent motor and dampers, minimum position setting, preset linkage, wiring harness with plug, spring return actuator and fixed dry bulb control. The barometric relief shall provide a pressure operated damper that shall be gravity closing and shall prohibit entrance of outside air during the equipment “off” cycle. Optional solid state or differential enthalpy control shall be available for either factory or field installation. The economizer arrives in the shipping position and shall be moved to the operating position by the installing contractor.

Electric Heaters

Electric heat modules are available within the basic unit. If ordering the through-the-base electrical option with an electrical heater, the heater must be factory installed.

Fresh Air Options – Dampers and Economizer

0 - 25% manual or 0 - 50% motorized outside air hoods are available.

Economizers are equipped with either dry bulb or reference or comparative enthalpy sensing. These economizers provide free cooling as the outdoor temperature and/or humidity decreases. Correctly installed, they offer a valuable energy savings. Factory-installed economizers save time and ensure proper installation.

Frostat™

This capillary bulb embedded in the face of the evaporator coil monitors coil temperature to prevent evaporator icing and protect the compressor. Recommended for applications with low leaving air temperatures, low airflow and or high latent load applications.

Reference or Comparative Enthalpy

Measures and communicates humidity while maximizing comfort control.

Hail Guards

Hail protection quality coil guards protects the condenser coil from vandalism and/or hail damage.

Field Installed Options

CO_2 Sensor - Demand Control Ventilation (DCV)

Demand-controlled ventilation (DCV) is a control strategy that responds to the actual demand (need) for ventilation by regulating the rate at which the HVAC system brings outdoor air into the building. A CO_2 sensor measures the concentration (parts per million, ppm) of CO_2 (Carbon Dioxide) in the air. As the CO_2 concentration changes, the outside air damper modulates to meet the current ventilation needs of the zone.The CO_2 sensor kit is available as a field installed accessory. Two field installed kits are offered; CO_2 sensor and wiring or CO_2 sensor only.The CO_2 Sensor only kit should be ordered with factory installed CO_2 sensor wiring. Factory installed CO_2 sensor wiring saves set-up time and ensures proper unit connections for the CO_2 sensor.

High Altitude Kit

While recommended for units applied above 2000 feet, domestic contractors should consult with local authority on best practice. High altitude kits contain gas orifices that derate the gas input rate (Btuh/r) by 10%.

Note: *High altitude kit is not available with Ultra Low NOx gas furnace option.*

Humidity Sensor/Humidistat

The humidity sensor/humidistat, when used in conjunction with our dehumidification (hot gas reheat) units will provide outstanding humidity control and comfort. Humidity sensors can be wall or duct mounted. The humidity deadband can be set between 40% and 60% relative humidity.

LP Conversion Kit

Provided for field conversion of gas/electric units from natural gas to propane.

Note: *Ultra Low NOx gas furnace option is for natural gas operation only.*

Outside Air Measuring/Monitoring Control (Traq Dampers)

Quantity of fresh air entering the unit will be measured and monitored via Trane UC400 controller and series of pressure sensing rings mounted at the outside air intake.

Quick Adapt Curbs

Enables easy conversion of existing Voyager™ 3 to 10 ton units to Precedent™ units on replacement jobs.

Quick Start Kits

Single phase equipment to enable startup and prevent building lighting dimming during low voltage.

Roof Curbs

Available for downflow units. Only two roof curbs for the entire line simplifies curb selection.

Remote Potentiometer

When properly installed in the economizer control circuitry, this accessory provides a remote variable resistance to enable the operator to adjust the minimum damper position.

Ventilation Override Accessory

With the Ventilation Override Accessory installed, the unit can be set to transition to up to 3 different pre-programmed sequences for Smoke Purge, Pressurization, and Exhaust. The transition occurs when a binary input on the RTOM is closed (shorted). This would typically be a hard wired relay output from a smoke detector or fire control panel. The ventilation override kit is available as a field installed accessory.

Zone Sensors/Thermostats

Available in programmable, automatic and manual styles.

Other Benefits

Airflow Distribution

Airflow is outstanding. Precedent™ can replace an older machine with old ductwork and, in many cases, improve the comfort through better air distribution.

Cabinet Integrity

For added water integrity, Precedent™ has a raised 1 1/8 inch lip around the supply and return of the downflow units to prevent water from blowing into the ductwork.

The compact cabinet with rounded corners takes up less room. The beveled and ribbed top is aesthetically pleasing and designed to prevent water from pooling.

Flexibility

Precedent™ offers ultimate flexibility. Units are built to order in our standard “shortest in the industry” ship cycle time.

Rigorous Testing

All of the Precedent™ designs were rigorously rain tested at the factory to ensure water integrity.

Actual shipping tests were performed to determine packaging requirements. Units were test shipped around the country to determine the best packaging design. Factory shake and drop tests were used as part of the package design process to help assure that the unit arrives at the job site in top condition.

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

We perform a 100% coil leak test at the factory. The evaporator and condenser coils are leak tested at 600 psig. The assembled unit is leak tested to 465 psig.

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

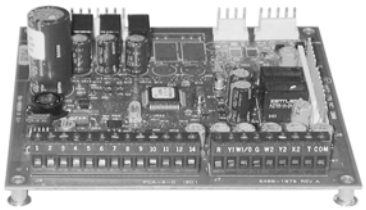
Every unit receives a 100% unit run test before leaving the production line to make sure it meets rigorous requirements.

Easy to Install, Service and Maintain

Because today's owners are very cost-conscious when it comes to service and maintenance, this unit was designed with direct input from service contractors. This valuable information helped to design a product that would get the service technician off the job quicker and save the owner money. This product line offers outstanding standard features enhanced by a variety of factory and field installed options, multiple control options, rigorously tested proven designs and superior product and technical support.

ReliaTel™ Controls

Figure 3. ReliaTel board



ReliaTel controls provide unit control for heating, cooling, and ventilating, utilizing input from sensors that measure outdoor and indoor temperature. ReliaTel also provides outputs for building automation systems and expanded diagnostics. Quality and reliability are enhanced through ReliaTel control and logic:

- Prevents the unit from short cycling, considerably improving compressor life.
- Ensures the compressor will run for a specific amount of time which allows oil to return for better lubrication, enhancing the reliability of the compressor.
- Reduces the number of components required to operate the unit, reducing possibilities for component failure.

ReliaTel Makes Installing and Servicing Easy

ReliaTel eliminates the need for field-installed, anti-short cycle timer and time delay relays. The wiring of the low voltage connections to the unit and the zone sensors is as easy as 1-1, 2-2, and 3-3. This simplified system makes wiring easier for the installer.

ReliaTel Makes Testing Easy

ReliaTel requires no special tools to run the unit through its paces. Simply place a jumper between Test 1 and Test 2 terminals on the Low Voltage Terminal Board and the unit will walk through its operational steps automatically. The unit automatically returns control to the zone sensor after stepping through the test mode a single time, even if the jumper is left on the unit.

As long as the unit has power and the "system on" LED is lit, ReliaTel is operational. The light indicates that the controls are functioning properly. ReliaTel features expanded diagnostic capabilities when utilized with Trane Integrated Comfort™ Systems. Some zone sensor options have central control panel lights which indicate the mode the unit is in and possible diagnostic information (dirty filters for example).

ReliaTel Has Other Benefits

- The ReliaTel built-in anti-shortcycle timer, time delay relay and minimum “on” time control functions are factory tested to assure proper operation.
- ReliaTel softens electrical “spikes” by staging on fans, compressors and heaters.
- Intelligent Fallback is a benefit to the building occupant. If a component goes astray, the unit will continue to operate at predetermined temperature setpoint.
- Intelligent Anticipation is a standard feature. It functions continuously as ReliaTel and zone sensor(s) work together in harmony to provide much tighter comfort control than conventional electromechanical thermostats.
- The ReliaTel design is standardized across the board, ensuring a lower cost to owners.

Application Considerations

Application of this product should be within the cataloged airflow and cooling considerations.

Barometric Relief

This product line offers an optional barometric relief damper for use in conjunction with economizer option. This accessory consists of gravity dampers which open with increased pressure. As the building air pressure increases, the pressure in the unit return air section also increases, opening the dampers and relieving the conditioned space.

Note: *The effectiveness of barometric relief damper during economizing operation is limited, depending on the pressure drop of the return-air path. For some applications, powered exhaust may be better suited for preventing over-pressurization when economizing.*

Black Epoxy Coil

The coils are manufactured with a thermoset, vinyl coating that is bonded to the aluminum fin stock prior to the fin stamping process. These coils are an economical option for protection in mildly corrosive environments.

Note: *Not to be used where seacoast applications exist.*

Clearance Requirements

The recommended clearances identified with unit dimensions should be maintained to assure adequate service maximum capacity and peak operating efficiency. Actual clearances which appear inadequate should be reviewed with the local Trane sales personnel.

Model Number	Clearance required from duct to combustible surfaces (inches)
THC037E	0
THC047E	0
THC067E	0

CompleteCoat™ Condenser Coil

The coils provide protection from corrosive environments and are ideal for seacoast applications.

Condensate Trap

The evaporator is a draw-thru configuration. A trap must be field provided prior to start-up on the cooling cycle.

Heating Operation

The heat exchanger is manufactured with aluminized steel. To prevent condensation within the heat exchanger, do not exceed 50% outside air or a minimum mixed air temperature of 40°F.

Low Airflow

Units equipped electric heat or staged gas heat may not be selected for supply airflow less than 320 cfm/ton. Cooling-only units can be used in applications designed for supply airflow below 320 cfm/ton. The units must be high-efficiency models with dehumidification (hot gas reheat) or be equipped with a TXV, Frostat™, and crankcase heaters.

Units selected with multiple-speed indoor fan control, single-zone VAV control, or multiple-zone VAV control are capable of operating at supply airflows below 320 cfm/ton at part-load conditions, but design (or "full") airflow must be set to 320 cfm/ton or higher.

Low Ambient Cooling

The Precedent™ line features, with ReliaTel™ microprocessor controls, low ambient cooling down to 0°F. The following features or options need to be included/considered when low ambient applications are required: continuous fan operation, crankcase heaters, thermal expansion valves, Frostat™ .

Contact a local Trane Representative for more assistance with low ambient cooling applications.

Optional Stainless Steel Heat Exchanger

The optional stainless steel heat exchanger is manufactured with 409 stainless steel tubes and 439 stainless steel burners. To prevent corrosion and prolong heat exchanger reliability, the minimum mixed air temperature allowed across the heat exchanger is 20°F.

The stainless steel heat exchanger option is an excellent option that compliments the dehumidification package. Whenever high outside air or outside applications exist, these options should be utilized.

Note: *Stainless steel heat exchanger is standard with Ultra Low NOx gas furnace option.*

Unit Pitch

These units have reversible sloped condensate drain pans. Units must be installed level. Any unit slope must be toward the side of unit where condensate drain is connected.

VariTrac®/Comm 3/4

VariTrac® or Comm 3/4 will not be supported, nor is compatible with Precedent™ 17 Plus units.

Optional Ultra Low NOx Gas Furnace

Units designed for California's mild ambient operating conditions only. Risk of heating failure when start up temperature is below freezing (0°C/32°F).

Selection Procedure

Cooling Capacity

Note: *Cooling Capacity Procedure is the same for electric heat (T*C) and gas heat (Y*C).*

1. Calculate the building's total and sensible cooling loads at design conditions. Use the Trane calculation methods or any other standard accepted method.

   Factors used in unit selection:

   - Packaged Cooling with Optional Electric Heat
   - Total Cooling Load: 58 MBh
   - Sensible Cooling Load: 40 MBh
   - Airflow: 2000 cfm
   - Electrical Characteristics: 460/60/3
   - Summer Design Conditions: Entering Evaporator Coil: 80 DB
   - 67 WB Outdoor Ambient: 95
   - External Static Pressure: 0.36 in. wg
   - Downflow Configuration
   - Efficiency: 17 SEER
   - Economizer

2. As a starting point, a rough determination must be made of the size of the unit. The final selection will be made after examining the performance at the given conditions. Divide the total cooling load by nominal Btuh per ton (12 MBh per ton); then round up to the nearest unit size.

   59 MBh / 12 MBh = approx. 5 tons

3. Table 7, p. 35 shows that a THC067E4 has a **gross** cooling capacity of 60.0 MBh and 45.29 MBh sensible capacity at 2000 cfm and 95 DB outdoor ambient with 80 DB, 67 WB air entering the evaporator.

   To Find Capacity at Intermediate Conditions not in the table

   When the design conditions are between two numbers that are in the capacity table, interpolation is required to approximate the capacity.

   Note: *Extrapolation outside of the table conditions is not recommended.*

4. In order to select the correct unit which meets the building's requirements, the fan motor heat must be deducted from the gross cooling capacity. The amount of heat that the fan motor generates is dependent on the effort by the motor - cfm and static pressure. To determine the total unit static pressure:

External Static Duct System	0.36 wg
Standard Filter 2 in. from Table 17, p. 44	0.05 wg
Economizer from Table 17, p. 44 (100% Outside Air) *worst case	0.11 wg
Electric Heater Size 6 kW from Table 17, p. 44	0.02 wg
Total Static Pressure	0.54 wg

Note: (reference "Heating Capacity" on page 22 for determination of heater size)

Note: *The evaporator fan performance Table 13, p. 42 has deducted the pressure drop for a filter already in the unit (see note below Table 13, p. 42). Therefore, the actual total static pressure is 0.54 -0.5 (from Table 17, p. 44) = 0.49 wg.*

With 2000 cfm and 0.5 wg.
Table 13, p. 42 shows 0.55 bhp for this unit.

Note: *Below the table is the formula to calculate Fan Motor Heat*

2.9245 x bhp + 0.055 = MBh.
2.9245 x 0.55 + 0.055 = 1.7 MBh.

Now subtract the fan motor heat from the gross cooling capacity of the unit:

Net Total Cooling Capacity
= 60.0 MBh - 1.7 = 58.3 MBh

Net Sensible Cooling Capacity
= 45.3 MBh - 1.7 = 43.6 MBh

Subtracting Sensible from Total Capacity to find Latent Capacity

Net Latent Capacity
= 58.3 - 43.6 = 14.7 MBh

5. Compare your resulting capacities to the building load. If the performance will not meet the required load of the building's total or sensible cooling load, try a selection at the next higher size unit.

Heating Capacity

Note: *Heating capacity procedure DIFFERS for electric heat (THC) and gas heat (YHC) units*

1. Calculate the building heating load using the Trane calculation form or other standard accepted method.
2. Size the system heating capacity to match the calculated building heating load. The following are building heating requirements:
   Total heating load of 15 MBh
   2000 cfm

   THC units with optional electric heat: 460V/3 phase Power Supply

   The electric heat accessory capacities are listed in Table 19, p. 45. From the table, a 6 kW heater will deliver 20.48 MBh at 480 volts. In order to determine capacity at 460 volts, the heater voltage correction factor from Table 20, p. 45 must be used. Therefore, 20.48 MBh x 0.918 (voltage correction factor) = 18.8 MBh

   YHC units with gas heat: Fuel- natural gas.

   60 MBh, 80 MBh and 130 MBh input models shown in Table 17, p. 44. The output capacities of these furnaces are 48 MBh, 64 MBh and 104 MBh respectively. The low heat model with 48 MBh best matches the building requirements.

Air Delivery Selection

Note: *Air delivery procedure is the same for electric heat and gas heat units.)*

External static pressure drop through the air distribution system has been calculated to be 0.5 inches of water. Enter Table 12, p. 41 for a THC067E4 at 2000 cfm and 0.5 static pressure. The standard direct drive motor will give the desired airflow at a rated bhp of 0.55 and 835 rpm.

Dehumidification Selection

Dehumidification selection procedure is the same for both electric heat (THC) and gas heat (YHC) models).

Typical 5 ton THC067E	OA Conditions	RA conditions
2000 cfm Total Supply airflow	Part load day and raining	75°F db
800 cfm Outside Air (40%)	68°F db	63°F wb
1200 cfm Return Air	67°F wb	
0.34 inch External Static Pressure	95% RH	

1. Determine the mixed/entering air condition (MA).

MA = (% outside air*outside air dry-bulb temperature) + (% return air*return air dry-bulb temperature)

MA = (0.40*68°F) + (0.60*75°F)

MA = 72.20°F db

Repeat for wet-bulb temperature (wb).

MA 72.2°F db
64.6°F wb

2. Determine the additional static pressure drop for a reheat unit.

   Table 17, p. 44 shows a static pressure drop of 0.13 inch for the reheat coil and an additional 0.08 for the mandatory 2 inch pleated filters required when ordering the dehumidification option. Total static pressure =

   0.34 + 0.08 + 0.13= 0.55

Note: *Do not forget to also add any additional static from other accessories. This selection does not include additional accessories.*

3. Determine leaving evaporator temperature (SA').

   Leaving Evaporator Temperature = SA'

   Utilizing the manual **Cooling Capacity** selection method as previously described, find the leaving evaporator temperatures with the formula:

$$\Delta \text{ Temp} = \frac{\text{gross sensible or gross latent cooling capacity in Btuh}}{\text{(cfm) (1.085)}}$$

   Subtract your sensible Δ temp from the entering db and latent Δ temp from the entering wb to determine the leaving evaporator db and wb (temperatures without the addition of fan heat).

   52.7°F db
   52.7°F wb
   52.7°F dp

4. Determine leaving unit temperature in standard cooling mode.

   Repeat Step 3a substituting **net** sensible or latent capacity for **gross** sensible or latent capacity to find the leaving unit temperature including fan heat.

   53.7°F db
   53.1°F wb

5. Determine reheat temperature rise.

   Using the leaving evaporator temp (SA'), go to Table 22, p. 46 and determine the reheat temperature rise for that particular cfm: ≅17.0°F db

Note: *Reheat temperature rise is based on* ***supply airflow*** *and leaving* ***evaporator coil*** *temperature.*

6. Determine leaving unit sensible temperature with reheat active (SA)
   Reheat temperature (obtained in step 4) + (SA' + fan heat) = SA

Note: *(SA' + fan heat) = leaving unit temperature in standard cooling mode from step 3b.*

19.0°F db + 53.7°F = 72.7°F db

SA=72.7°F

Since reheat adds only sensible heat, the dewpoint temperature will remain constant so follow the dewpoint temperature line across the psychrometric chart to find the new wb temperature.

+/–60.5°F wb
52.7 dp
49.9% RH

If the space relative humidity is equal to or above the space relative humidity setpoint, the Dehumidification option will:

- Energize compressor
- Hot gas reheat valve is energized and hot gas is diverted to the reheat coil
- Dehumidification/reheat is terminated when space humidity is reduced to 5% below relative humidity setpoint

At MA air enters the RTU. The RTU filters, cools, and dehumidifies the air as it moves through the evaporator coil. Air leaves the evaporator coil saturated at the preset dew point condition (SA') and is reheated by the hot gas reheat coil to deliver 72.7°F (SA) supply air to the space.

Model Number Description

Digit 1 - Unit Type
T DX Cooling
Y DX Cooling, Gas Heat

Digit 2 - Efficiency
H High Efficiency

Digit 3 - Airflow
C Convertible

Digit 4,5,6 - Nominal Gross Cooling Capacity (MBh)
037 3 Ton
047 4 Ton
067 5 Ton

Digit 7 - Major Design Sequence
E R-410A Refrigerant

Digit 8 - Voltage Selection
3 208-230/60/3
4 460/60/3
W 575/60/3

Digit 9 - Unit Controls
R ReliaTel™ Microprocessor

Digit 10 - Heating Capacity
Note: *Applicable to Digit 1, T models only*
0 No Electric Heat
B 6 kW (3 phase)
E 12 kW (3 phase)
G 18 kW (1and 3 phase)
J 23 kW (3 phase)

Note: *Applicable to Digit 1, Y models only*
L Low Heat
M Medium Heat
H High Heat
X Low Heat, Stainless Steel Heat Exchanger
Y Medium Heat, Stainless Steel Heat Exchanger
Z High Heat, Stainless Steel Heat Exchanger

Digit 11 - Minor Design Sequence
A First Sequence[14]

Digit 12,13 - Service Sequence
** Factory Assigned

Digit 14 - Fresh Air Selection
0 No Fresh Air
A Manual Outside Air Damper 0-50%[2]
B Motorized Outside Air Damper 0-50%
C Economizer, Dry Bulb 0-100% without Barometric Relief[5]
D Economizer, Dry Bulb 0-100% with Barometric Relief[5]
E Economizer, Reference Enthalpy 0-100% without Barometric Relief[5]
F Economizer, Reference Enthalpy 0-100% with Barometric Relief[5]
G Economizer, Comparative Enthalpy 0-100% without Barometric Relief[5]
H Economizer, Comparative Enthalpy 0-100% with Barometric Relief[5]
K Low Leak Economizer with Barometric Relief
M Low Leak Economizer with Reference Enthalpy with Barometric Relief
P Low Leak Economizer with Comparative Enthalpy with Barometric Relief

Digit 15 - Supply Fan/Drive Type/ Motor
0 Standard Drive[4]
6 Single Zone VAV[18]
E VAV Supply Air Temperature Control Standard Motor[18]

Digit 16 - Hinged Service Access/ Filters
0 Standard Panels/Standard Filters
A Hinged Access Panels/Standard Filters
B Standard Panels/2 inch MERV 8 Filters
C Hinged Access Panels/2 inch MERV 8 Filters
D Standard Panels/2 inch MERV 13 Filters
E Hinged Access Panels/2 inch MERV 13 Filters

Digit 17 - Condenser Coil Protection
0 Standard Coil
1 Standard Coil with Hail Guard
2 Black Epoxy Pre-Coated Condenser Coil
3 Black Epoxy Pre-Coated Condenser Coil with Hail Guard
4 CompleteCoat™ Condenser Coil
5 CompleteCoat™ Condenser Coil with Hail Guard

Digit 18 - Through the Base Provisions
0 No Through-the-Base Provisions
A Through-the-Base Electric[6]
B Through-the-Base Gas Piping[12]
C Through-the-Base Electric and Gas Piping[12]

Digit 19 - Disconnect/Circuit Breaker (three-phase only)
0 No Disconnect/No Circuit Breaker
1 Unit Mounted Non-Fused Disconnect[6]
2 Unit Mounted Circuit Breaker[6]

Digit 20 - Convenience Outlet
0 No Convenience Outlet
A Unpowered Convenience Outlet
B Powered Convenience Outlet (three-phase only)[7]

Digit 21 - Communications Options
0 No Communications Interface
2 LonTalk® Communications Interface
6 BACnet® Communications Interface
7 Air-Fi® Wireless Communications[19]

Digit 22 - Refrigeration System Option
0 Standard Refrigeration System[8]
B Dehumidification Option[15]

Digit 23 - Refrigeration Controls
Note: *Applicable to Digit 7 = E*
0 No Refrigeration Control[3]
1 Frostat™
2 Crankcase Heater[1]
3 Frostat and Crankcase Heater[1]

Digit 24 - Smoke Detector[13]
0 No Smoke Detector
A Return Air Smoke Detector[9,10]
B Supply Air Smoke Detector
C Supply and Return Air Smoke Detectors[9,10]
D Plenum Smoke Detector

Digit 25 - System Monitoring Controls
0 No Monitoring Control[11]
1 Clogged Filter Switch[11]
2 Fan Failure Switch[11]
3 Discharge Air Sensing Tube[11]
4 Clogged Filter Switch and Fan Failure Switch[11]
5 Clogged Filter Switch and Discharge Air Sensing Tube[11]
6 Fan Failure Switch and Discharge Air Sensing Tube[11]
7 Clogged Filter Switch, Fan Failure Switch and Discharge Air Sensing Tube[11]

A Condensate Drain Pan Overflow Switch

Model Number Description

B Clogged Filter Switch[11] and Condensate Drain Pan Overflow Switch
C Fan Failure Switch[11] and Condensate Drain Pan Overflow Switch
D Discharge Air Sensing[11] and Condensate Drain Pan Overflow Switch
E Clogged Filter Switch[11], Fan Failure Switch[11] and Condensate Drain Pan Overflow Switch
F Clogged Filter Switch[11], Discharge Air Sensing Tube[11] and Condensate Drain Pan Overflow Switch
G Fan Failure Switch[11], Discharge Air Sensing Tube[11] and Condensate Drain Pan Overflow Switch
H Clogged Filter Switch[11], Fan Failure Switch[11], Discharge Air Sensing[11] and Condensate Drain Pan Overflow Switch

Digit 26 - System Monitoring Controls

0 No Monitoring Controls
A Demand Control Ventilation (CO_2)[16,17]

Digit 27 - Unit Hardware Enhancements

0 No Enhancements
1 Stainless Steel Drain Pan

Digit 31 - Advanced Unit Controls

0 Standard Unit Controls
1 Human Interface

Digit 34 - Ultra Low NOx Gas Furnace (CA Only)

0 - None
A - 14 ng/J NOx Emissions [20,21,22,23,24,25]

Model Number Notes

1. Standard on all variable stage units.
2. Manual outside air damper will ship factory supplied within the unit, but must be field installed.
3. High pressure control is standard on all units.
4. Direct drive is standard for 3 to 5 ton variable stage units.

Digit 15 = 0, 6
3 Phase (3-5 ton) - High Efficiency Constant CFM

5. Economizer with Barometric Relief is for downflow configured units only. Order Economizer without Barometric Relief for horizontal configuration. Barometric Relief for horizontal configured units must be ordered as field installed accessory.
6. Through the base electric required when ordering disconnect/circuit breaker options.
7. Requires use of Disconnect or Circuit Breaker.

Not Available
High Efficiency
3-5 ton w/Standard Indoor Motor w/460V or 575V

8. Standard metering devices are TXVs.
9. The return air smoke detector may not fit up or work properly on the Precedent units when used in conjunction with 3rd party accessories such as bolt on heat wheels, economizers and power exhaust. Do not order the return air smoke detectors when using this type of accessory.
10. Return Air Smoke Detector cannot be ordered with Novar Controls.
11. These options are standard when ordering Novar Controls.
12. Includes gas piping and shutoff (field assembly required).
13. Not available with high temperature duct sensor accessory.
14. Available for T/Y 3,4,5 ton high efficiency models.
15. Requires selection of 2 inch Pleated Filters (option B or C) for Digit 16.
16. Demand Control Ventilation not available with electromechanical controls.
17. Demand Control Ventilation Option includes wiring only. The CO_2 sensor is a field-installed only option.
18. Discharge Air Sensing is also standard equipment on units with Single Zone and Supply Air Temperature Control VAV.
19. Must be used with BACnet® open protocol.
20. No 575V with Ultra Low NOx
21. Ultra Low NOx requires SSHX Option (Digit 10 = X or Y)
22. Ultra Low NOx has 3T Only available with LOW heat (digit 10=X)
23. Ultra Low NOx has NO High Heat Available
24. High Altitude kit is not available with Ultra Low NOx option
25. LP Conversion kit is not available with Ultra Low NOx option.

TRANE

General Data

Table 1. General data - 3 to 5 tons 17 Plus

	3 Tons	4 Tons	5 Tons
	T/YHC037E3,4,W[a]	T/YHC047E3,4,W[a]	T/YHC067E3,4,W[a]
Cooling Performance[b]			
Gross Cooling Capacity - High Stage	36,500	50,500	60,000
EER/SEER[c]	13.0/17.5	13.0/17.5	13.0/17.2
Nominal CFM-High Stage/AHRI Rated CFM	1,200/1,200	1,600/1,600	2,000/2,000
Nominal CFM-Low Stage	840	1,120	1,400
AHRI Net Cooling Capacity-High Stage	36,000	49,000	58,500
System Power-High Stage (KW)	2.78	3.67	4.57
Compressor			
No./Type	1/Scroll (2 Stage)	1/Scroll (2 Stage)	1/Scroll (2 Stage)
Outdoor Sound Rating (dB)[d]	81	87	87
Outdoor Coil - Type	Lanced	Lanced	Lanced
Tube Size (in.) OD	0.3125	0.3125	0.3125
Face Area (sq. ft)	17.00	17.00	17.00
Rows/FPI	3/17	3/16	3/16
Indoor Coil - Type	Lanced	Lanced	Lanced
Tube Size (in.) OD	0.3125	0.3125	0.3125
Face Area (sq. ft)	7.71	9.27	9.89
Rows/FPI	3/16	3/16	4/16
Refrigerant Control	Thermal Expansion Valve	Thermal Expansion Valve	Thermal Expansion Valve
Drain Connection No./Size (in.)	1 3/4 NPT	1 3/4 NPT	1 3/4 NPT
Outdoor Fan - Type	Propeller	Propeller	Propeller
No. Used / Diameter (in.)	1/22	1/26	1/26
Drive Type / No. Speeds	Direct/1	Direct/1	Direct/1
CFM	3064	3982	3953
Motor HP	0.2/0.4	0.4	0.4
Motor RPM	1075	1075	1075
Indoor Fan - Type (Optional)	FC Centrifugal	FC Centrifugal	FC Centrifugal
No. Used / Diameter (in.)	1/11 x 11	1/11 x 11	1/11 x 11
Drive Type / Number. Speeds	Direct/Variable	Direct/Variable	Direct/Variable
Number Motors	1	1	1
Motor HP (Standard/Oversized)	0.75	1.0	1.0
Motor Frame Size (Standard/Oversized)	48	48	48
Filters - Type Furnished[e]	Throwaway	Throwaway	Throwaway
(No.) Size Recommended	(2) 20 x 30 x 2	(4) 16 x 25 x 2	(4) 16 x 25 x 2
Optional Hot Gas Reheat Coil -Type			
Tube Size (in.)OD	0.3125	0.3125	0.3125
Face Area (sq. ft.)	5.23	6.28	6.28
Rows/FPI	1/16	1/16	1/16
Refrigerant Charge (Lbs of R-410A)[f]			
Standard	7.8	10.8	12.5
Optional Hot Gas Reheat Coil	10.5	15.2	15.3

TRANE

General Data

Table 1. General data - 3 to 5 tons 17 Plus

	3 Tons			4 Tons			5 Tons		
	T/YHC037E3,4,W[a]			T/YHC047E3,4,W[a]			T/YHC067E3,4,W[a]		
Gas/Electric Only									
Heating Performance[g]									
Heating Models	**Low**	**Med**	**High**	**Low**	**Med**	**High**	**Low**	**Med**	**High**
Heating Input (Btu)	60,000	80,000	100,000	60,000	80,000	120,000	60,000	80,000	130,000
Heating Output (Btu)	48,000	64,000	80,000	49,000	64,000	96,000	49,000	64,000	104,000
Steady State Efficiency (%)	80%	80%	81%	81%	80%	81%	81%	80%	80%
No. Burners	2	2	3	2	2	3	2	2	3
No. Stages	1	1	1	1	1	1	1	1	1
Gas Supply Line Pressure									
Natural (minimum / maximum)		4.5/14.0			4.5/14.0			4.5/14.0	
LP (minimum / maximum)		11/14.0			11/14.0			11/14.0	
Gas Connection Pipe Size (in.)	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2

(a) 575 (W voltage) is only available as YHC. No THC models available with 575V (W voltage).
(b) High Stage Cooling Performance is rated at 95°F ambient, 80°F entering dry bulb, 67°F entering wet bulb. Gross capacity does not include the effect of fan motor heat. AHRI capacity is net and includes the effect of fan motor heat. Units are suitable for operation to ±20% of nominal cfm. Units are certified in accordance with the Unitary Air-Conditioner Equipment certification program, which is based on AHRI standard 210/240.
(c) EER and/or SEER are rated at AHRI conditions and in accordance with DOE test procedures.
(d) Outdoor Sound Rating shown is tested in accordance with AHRI Standard 270. For additional information refer to Table 16, p. 44.
(e) Optional 2 inch MERV 8 and MERV 13 pleated filters also available.
(f) Refrigerant charge is an approximate value. For a more precise value, see unit nameplate and service instructions.
(g) Heating performance limit settings and rating data were established and approved under laboratory test conditions using American National Standards Institute standards. Ratings shown are for elevations up to 2000 feet. For elevations above 2000 feet, ratings should be reduced at the rate of 4% for each 1000 feet above sea level. Applicable to Gas/Electric units only.

Table 2. General data - 3 to 5 tons 17 Plus with Ultra Low NOx gas

Ultra Low NOx Digit 34 = A	3 Tons YHC037E3,4[a]	4 Tons YHC047E3,4[a]		5 Tons YHC067E3,4[a]	
Heating Performance[b]					
Heat Models	**Low**	**Low**	**Med**	**Low**	**Med**
Heating Input (Btu)	60,000	60,000	90,000	60,000	90,000
Heating Output (Btu)	48,600	48,600	72,900	48,600	72,900
Stead State Efficiency (%)	81%	81%	81%	81%	81%
No. Burners	2	2	3	2	3
No. Stages	1	1	1	1	1
Gas Supply Line Pressure					
Natural (minimum / maximum)	4.5/14.0	4.5/14.0		4.5/14.0	
Gas Connection Pipe Size (in.)	1/2	1/2	1/2	1/2	1/2

(a) No digit 8, W , 575 volt offered on Ultra Low NOx gas furnace option.
(b) Ultra Low NOx gas furnace option not available for High Altitude installations above 2000 feet.

TRANE

Performance Data

Table 3. Gross cooling capacities 3 tons 17 Plus - high stage - three phase T/YHC037E3,4,W

Air Flow	Ent DB	Ambient Temperature																	
		85						95						105					
		Entering Wet Bulb																	
		61		67		73		61		67		73		61		67		73	
cfm	(F)	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC
600	75	28.6	22.0	32.2	16.8	37.0	9.1	26.7	20.9	30.1	15.9	34.7	8.5	24.7	19.7	27.9	15.0	32.3	7.7
600	80	29.1	25.3	32.1	21.5	36.3	15.2	27.2	24.1	30.0	20.5	34.0	14.4	25.3	22.8	27.9	19.4	31.7	13.5
600	85	29.9	27.9	32.3	25.5	36.0	20.5	28.1	26.6	30.3	24.3	33.7	19.5	26.1	25.2	28.2	23.1	31.4	18.5
600	90	31.0	29.8	32.9	28.7	36.0	25.0	29.2	28.3	30.9	27.4	33.8	24.0	27.3	26.8	28.8	26.0	31.4	22.8
720	75	30.2	23.7	33.7	18.2	38.3	10.3	28.3	22.5	31.5	17.3	36.0	9.5	26.2	21.2	29.2	16.2	33.5	8.7
720	80	30.9	27.3	33.8	23.2	37.8	16.6	29.0	26.0	31.6	22.1	35.5	15.7	26.9	24.6	29.4	20.9	33.0	14.7
720	85	31.8	30.1	34.2	27.3	37.7	22.1	29.9	28.7	32.0	26.1	35.3	21.1	27.9	27.1	29.8	24.8	32.9	19.9
720	90	33.1	32.2	34.9	30.8	37.8	26.8	31.3	30.6	32.8	29.4	35.5	25.7	29.3	28.9	30.6	28.0	33.1	24.4
840	75	31.7	25.2	35.0	19.5	39.5	11.3	29.7	24.0	32.8	18.5	37.1	10.5	27.5	22.6	30.4	17.3	34.5	9.5
840	80	32.5	29.0	35.3	24.7	39.2	17.8	30.5	27.6	33.0	23.5	36.8	16.8	28.4	26.2	30.7	22.2	34.2	15.8
840	85	33.6	32.1	35.8	29.1	39.2	23.5	31.6	30.6	33.6	27.8	36.8	22.4	29.5	28.9	31.3	26.4	34.2	21.2
840	90	35.1	34.4	36.7	32.7	39.5	28.5	33.1	32.7	34.5	31.3	37.1	27.3	31.0	31.0	32.2	29.7	34.6	25.9
960	75	33.0	26.6	36.2	20.7	40.6	12.2	30.9	25.3	33.9	19.5	38.0	11.3	28.7	23.9	31.4	18.3	35.4	10.2
960	80	34.0	30.7	36.6	26.0	40.4	18.9	31.9	29.2	34.3	24.8	37.9	17.8	29.7	27.6	31.8	23.4	35.2	16.7
960	85	35.2	33.9	37.3	30.6	40.5	24.9	33.2	32.3	35.0	29.2	38.0	23.7	31.0	30.6	32.6	27.7	35.4	22.4
960	90	36.8	36.4	38.3	34.5	40.9	30.0	34.8	34.7	36.0	33.0	38.5	28.7	32.6	32.6	33.6	31.3	35.9	27.3
1080	75	34.2	27.9	37.2	21.7	41.4	12.9	32.0	26.5	34.8	20.4	38.8	11.9	29.6	24.9	32.2	19.1	36.0	10.8
1080	80	35.3	32.1	37.7	27.3	41.4	19.9	33.1	30.6	35.3	25.9	38.8	18.7	30.8	28.9	32.8	24.4	36.0	17.4
1080	85	36.7	35.6	38.6	32.1	41.7	26.0	34.5	33.9	36.2	30.6	39.1	24.7	32.2	32.1	33.7	29.0	36.4	23.3
1080	90	38.4	38.3	39.7	36.1	42.3	31.4	36.3	36.3	37.4	34.5	39.7	30.0	34.0	34.0	34.9	32.8	37.0	28.5
1200	75	35.1	29.0	38.0	22.5	42.1	13.5	32.9	27.5	35.5	21.2	39.4	12.4	30.4	25.9	32.9	19.8	36.5	11.2
1200	80	36.4	33.4	38.7	28.3	42.2	20.6	34.1	31.8	36.2	26.9	39.5	19.4	31.7	30.0	33.6	25.3	36.7	18.1
1200	85	37.9	37.1	39.7	33.3	42.6	27.0	35.7	35.4	37.2	31.8	40.0	25.6	33.3	33.3	34.6	30.1	37.2	24.2
1200	90	39.8	39.8	41.0	37.6	43.4	32.6	37.6	37.6	38.6	35.9	40.7	31.1	35.7	35.7	36.0	34.1	38.0	29.5
1320	75	35.9	30.0	38.7	23.2	42.6	13.9	33.5	28.3	36.1	21.8	39.8	12.7	31.0	26.6	33.4	20.3	36.9	11.4
1320	80	37.3	34.6	39.5	29.2	42.9	21.3	35.0	32.9	36.9	27.7	40.1	20.0	32.5	31.0	34.2	26.0	37.2	18.5
1320	85	39.0	38.5	40.6	34.5	43.4	27.9	36.7	36.7	38.1	32.8	40.7	26.4	34.2	34.2	35.4	31.0	37.8	24.9
1320	90	41.1	41.1	42.1	39.0	44.3	33.7	38.8	38.8	39.6	37.2	41.6	32.1	36.6	36.6	36.9	35.3	38.7	30.4
1440	75	36.5	30.8	39.1	23.8	42.9	14.2	34.1	29.1	36.5	22.3	40.0	12.9	31.5	27.3	33.7	20.7	37.0	11.5
1440	80	38.1	35.6	40.1	30.0	43.3	21.8	35.6	33.8	37.5	28.4	40.5	20.4	33.1	31.9	34.7	26.6	37.5	18.8
1440	85	39.9	39.8	41.4	35.4	44.1	28.6	37.5	37.5	38.8	33.7	41.2	27.0	35.0	35.0	36.0	31.8	38.3	25.4
1440	90	42.1	42.1	43.0	40.1	45.1	34.6	39.7	39.7	40.4	38.3	42.3	33.0	37.3	37.3	37.7	36.3	39.4	31.2

Performance Data

Table 3. Gross cooling capacities 3 tons 17 Plus - high stage - three phase T/YHC037E3,4,W (continued)

Air Flow cfm	Ent DB (F)	Ambient Temperature											
		115						125					
		Entering Wet Bulb											
		61		67		73		61		67		73	
		MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC
600	75	22.6	18.4	25.6	13.9	29.7	6.8	20.4	17.1	23.1	12.7	27.1	5.8
600	80	23.2	21.4	25.6	18.2	29.1	12.5	21.0	19.9	23.1	16.9	26.5	11.4
600	85	24.1	23.6	25.9	21.8	28.9	17.4	21.9	21.9	23.5	20.3	26.3	16.1
600	90	26.3	26.3	26.5	24.6	29.0	21.5	23.9	23.9	24.2	23.0	26.4	20.2
720	75	24.0	19.9	26.8	15.1	30.8	7.7	21.7	18.4	24.3	13.8	28.1	6.6
720	80	24.7	23.1	27.0	19.6	30.4	13.6	22.4	21.5	24.5	18.2	27.7	12.4
720	85	25.8	25.5	27.4	23.4	30.3	18.7	23.5	23.5	25.0	21.8	27.6	17.4
720	90	28.0	28.0	28.2	26.4	30.5	23.1	25.5	25.5	25.8	24.7	27.9	21.6
840	75	25.3	21.2	27.9	16.1	31.8	8.5	22.9	19.6	25.3	14.7	29.0	7.3
840	80	26.1	24.6	28.2	20.8	31.5	14.6	23.7	22.9	25.6	19.3	28.7	13.3
840	85	27.3	27.2	28.8	24.8	31.6	19.9	24.9	24.9	26.3	23.2	28.8	18.5
840	90	29.5	29.5	29.8	28.1	31.9	24.5	27.0	27.0	27.2	26.3	29.2	22.9
960	75	26.3	22.3	28.8	17.0	32.6	9.1	23.8	20.7	26.1	15.5	29.6	7.8
960	80	27.3	25.9	29.3	21.9	32.4	15.4	24.9	24.2	26.6	20.4	29.5	14.0
960	85	28.7	28.7	30.0	26.1	32.6	21.0	26.2	26.2	27.4	24.4	29.8	19.4
960	90	30.8	30.8	31.1	29.6	33.2	25.7	28.2	28.2	28.5	27.7	30.3	24.1
1080	75	27.2	23.3	29.6	17.7	33.2	9.5	24.6	21.6	26.8	16.1	30.1	8.2
1080	80	28.3	27.1	30.2	22.9	33.2	16.1	25.8	25.3	27.4	21.2	30.2	14.6
1080	85	29.8	29.8	31.1	27.3	33.5	21.8	27.3	27.3	28.3	25.5	30.6	20.2
1080	90	32.0	32.0	32.3	31.0	34.2	26.9	29.3	29.3	29.6	29.0	31.3	25.1
1200	75	27.9	24.1	30.1	18.3	33.6	9.9	25.2	22.3	27.2	16.6	30.5	8.4
1200	80	29.2	28.2	30.9	23.7	33.7	16.6	26.6	26.2	28.0	21.9	30.7	15.0
1200	85	30.8	30.8	31.9	28.3	34.2	22.6	28.2	28.2	29.1	26.4	31.2	20.9
1200	90	33.0	33.0	33.3	32.2	35.1	27.8	30.2	30.2	30.5	30.2	32.1	26.0
2200	75	28.4	24.8	30.5	18.7	33.8	10.0	25.7	22.9	27.5	17.0	30.6	8.5
2200	80	29.9	29.1	31.4	24.3	34.1	17.0	27.1	27.1	28.5	22.5	31.0	15.3
2200	85	31.7	31.7	32.6	29.2	34.8	23.2	29.0	29.0	29.7	27.2	31.7	21.4
2200	90	33.8	33.8	34.2	33.3	35.8	28.6	31.0	31.0	31.3	31.1	32.7	26.7
2400	75	28.8	25.4	30.7	19.0	33.9	10.0	25.9	23.4	27.7	17.2	30.6	8.4
2400	80	30.4	29.9	31.8	24.8	34.4	17.2	27.6	27.6	28.7	22.9	31.1	15.5
2400	85	32.3	32.3	33.1	29.9	35.2	23.6	29.5	29.5	30.1	27.8	31.9	21.8
2400	90	34.5	34.5	34.8	34.2	36.3	29.3	31.9	31.9	31.9	31.9	33.1	27.3

Notes:

1. All capacities shown are gross and have not considered indoor fan heat. To obtain **NET** cooling capacity subtract indoor fan heat. For indoor fan heat formula, refer to appropriate airflow table notes.
2. MBh = Total Gross Capacity
3. SHC = Sensible Heat Capacity

* Unit applications below 320 CFM/Ton are only applicable on THC models without electric heat. Electric and Gas heat applications are restricted to applications 320 CFM/Ton and above.

Table 4. Gross cooling capacities 3 tons 17 Plus - low stage - three phase T/YHC037E3,4,W

Air Flow cfm	Ent DB (F)	Ambient Temperature											
		85						95					
		Entering Wet Bulb											
		61		67		73		61		67		73	
		MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC
600	75	21.9	17.8	24.6	13.7	28.3	7.7	20.2	16.7	22.7	12.8	26.3	7.0
600	80	22.5	20.6	24.7	17.6	27.9	12.7	20.9	19.4	22.9	16.6	25.9	11.8
600	85	23.5	22.9	25.1	20.9	27.8	17.0	21.8	21.6	23.3	19.8	25.9	16.0
600	90	24.6	24.6	25.8	23.6	28.0	20.8	23.8	23.8	24.0	22.4	26.1	19.7
720	75	23.2	19.2	25.7	14.9	29.3	8.6	21.5	18.0	23.8	13.9	27.2	7.8
720	80	24.0	22.3	26.0	19.0	29.1	13.8	22.3	21.0	24.1	17.9	27.0	12.9
720	85	25.1	24.8	26.6	22.5	29.1	18.3	23.4	23.4	24.7	21.3	27.1	17.3
720	90	27.1	27.1	27.4	25.5	29.5	22.3	25.3	25.3	25.6	24.2	27.5	21.2
840	75	24.3	20.4	26.6	15.9	30.0	9.3	22.4	19.2	24.6	14.8	27.9	8.4
840	80	25.2	23.7	27.1	20.2	30.0	14.7	23.4	22.4	25.1	19.0	27.9	13.7
840	85	26.5	26.4	27.8	23.9	30.2	19.5	24.7	24.7	25.9	22.7	28.1	18.4
840	90	28.5	28.5	28.8	27.1	30.7	23.7	26.7	26.7	26.9	25.7	28.7	22.5
960	75	25.1	21.5	27.3	16.6	30.6	9.9	23.2	20.2	25.2	15.5	28.3	8.9
960	80	26.2	25.0	27.9	21.2	30.7	15.5	24.4	23.6	25.9	19.9	28.5	14.4
960	85	27.7	27.7	28.8	25.1	31.1	20.4	25.8	25.8	26.8	23.8	28.9	19.3
960	90	29.7	29.7	30.0	28.5	31.8	24.9	27.8	27.8	28.1	27.1	29.6	23.6

Notes:

1. All capacities shown are gross and have not considered indoor fan heat. To obtain **NET** cooling capacity subtract indoor fan heat. For indoor fan heat formula, refer to appropriate airflow table notes.
2. MBh = Total Gross Capacity
3. SHC = Sensible Heat Capacity

Performance Data

Table 5. Gross cooling capacities 4 tons 17 Plus - high stage - three phase T/YHC047E3,4,W

Air Flow	Ent DB	Ambient Temperature																	
		85						95						105					
		Entering Wet Bulb																	
		61		67		73		61		67		73		61		67		73	
cfm	(F)	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC
800	75	39.2	30.0	44.0	22.7	50.4	12.0	36.9	28.6	41.4	21.7	47.5	11.2	34.3	27.1	38.6	20.4	44.4	10.3
800	80	39.9	34.6	43.9	29.2	49.6	20.4	37.6	33.1	41.3	28.0	46.7	19.4	35.1	31.4	38.5	26.6	43.7	18.3
800	85	41.0	38.3	44.3	34.7	49.2	27.7	38.7	36.6	41.7	33.3	46.4	26.6	36.2	34.7	39.0	31.7	43.4	25.3
800	90	42.6	40.9	45.2	39.2	49.3	34.0	40.3	39.0	42.6	37.6	46.5	32.7	37.9	37.0	39.9	35.8	43.5	31.2
960	75	41.5	32.3	46.1	24.7	52.3	13.7	39.0	30.9	43.4	23.6	49.3	12.8	36.4	29.3	40.5	22.2	46.1	11.7
960	80	42.4	37.3	46.2	31.5	51.7	22.3	40.0	35.7	43.5	30.2	48.7	21.2	37.3	33.9	40.6	28.7	45.6	20.0
960	85	43.7	41.2	46.8	37.3	51.6	29.9	41.3	39.4	44.2	35.8	48.6	28.7	38.7	37.5	41.3	34.1	45.5	27.3
960	90	45.5	44.1	47.9	42.0	51.9	36.5	43.1	42.1	45.2	40.3	49.0	35.1	40.6	40.0	42.4	38.5	45.9	33.5
1120	75	43.6	34.5	48.0	26.5	54.0	15.1	41.0	32.9	45.1	25.2	50.9	14.1	38.2	31.2	42.1	23.8	47.6	13.0
1120	80	44.7	39.7	48.3	33.6	53.6	24.0	42.1	38.0	45.5	32.2	50.5	22.9	39.4	36.1	42.5	30.6	47.3	21.6
1120	85	46.2	43.9	49.1	39.7	53.7	32.0	43.7	42.0	46.3	38.0	50.6	30.6	41.0	40.0	43.4	36.3	47.4	29.1
1120	90	48.2	47.1	50.4	44.7	54.2	38.8	45.7	45.0	47.6	42.9	51.2	37.3	43.0	42.8	44.7	41.0	48.0	35.7
1280	75	45.4	36.4	49.6	28.1	55.5	16.4	42.7	34.7	46.6	26.7	52.2	15.2	39.8	32.9	43.5	25.2	48.8	14.0
1280	80	46.7	41.9	50.2	35.5	55.3	25.6	44.0	40.1	47.2	33.9	52.1	24.3	41.2	38.1	44.1	32.2	48.7	22.9
1280	85	48.5	46.5	51.2	41.8	55.6	33.8	45.8	44.4	48.3	40.1	52.4	32.3	43.0	42.3	45.2	38.2	49.1	30.7
1280	90	50.7	49.9	52.7	47.2	56.3	40.9	48.1	47.8	49.8	45.3	53.2	39.3	45.3	45.3	46.7	43.2	49.9	37.6
1440	75	46.9	38.1	51.0	29.5	56.7	17.4	44.1	36.4	47.9	28.0	53.3	16.2	41.2	34.5	44.7	26.4	49.8	14.8
1440	80	48.5	44.0	51.8	37.2	56.7	26.9	45.7	42.0	48.7	35.5	53.4	25.5	42.7	39.9	45.5	33.7	49.9	24.0
1440	85	50.5	48.8	53.0	43.8	57.2	35.4	47.7	46.6	50.0	42.0	53.9	33.8	44.8	44.4	46.8	40.0	50.5	32.1
1440	90	52.9	52.5	54.7	49.4	58.2	42.8	50.2	50.2	51.7	47.4	54.9	41.1	47.2	47.2	48.6	45.3	51.5	39.2
1600	75	48.3	39.7	52.2	30.7	57.7	18.2	45.4	37.8	49.0	29.1	54.2	16.9	42.3	35.8	45.6	27.3	50.6	15.4
1600	80	50.0	45.8	53.2	38.6	57.9	28.0	47.1	43.7	50.0	36.8	54.5	26.5	44.0	41.5	46.7	34.9	50.9	24.9
1600	85	52.2	50.9	54.6	45.5	58.6	36.8	49.3	48.6	51.5	43.6	55.2	35.1	46.3	46.3	48.2	41.5	51.7	33.3
1600	90	54.9	54.9	56.5	51.4	59.8	44.5	52.0	52.0	53.4	49.3	56.4	42.7	49.0	49.0	50.1	47.1	52.9	40.7
1760	75	49.4	41.0	53.1	31.6	58.4	18.8	46.3	39.0	49.8	29.9	54.8	17.4	43.1	36.9	46.3	28.1	51.1	15.8
1760	80	51.3	47.4	54.3	39.9	58.9	28.9	48.3	45.2	51.0	38.0	55.3	27.3	45.1	42.9	47.6	36.0	51.6	25.6
1760	85	53.7	52.7	56.0	47.1	59.8	38.0	50.7	50.4	52.7	45.0	56.3	36.2	47.6	47.6	49.3	42.9	52.6	34.3
1760	90	56.6	56.6	58.1	53.3	61.2	46.0	53.6	53.6	54.9	51.1	57.7	44.1	50.5	50.5	51.5	48.7	54.0	42.0
1920	75	50.2	42.1	53.8	32.4	58.9	19.2	47.1	40.0	50.4	30.6	55.2	17.7	43.8	37.8	46.8	28.6	51.4	16.0
1920	80	52.4	48.8	55.2	40.9	59.6	29.6	49.3	46.5	51.8	38.9	55.9	27.9	46.0	44.1	48.2	36.8	52.1	26.1
1920	85	55.0	54.4	57.1	48.4	60.7	38.9	51.9	51.9	53.7	46.3	57.1	37.1	48.6	48.6	50.2	44.0	53.3	35.1
1920	90	58.1	58.1	59.4	54.9	62.4	47.3	55.0	55.0	56.1	52.6	58.7	45.2	51.8	51.8	52.6	50.1	55.0	43.1

Table 5. Gross cooling capacities 4 tons 17 Plus - high stage - three phase T/YHC047E3,4,W (continued)

Air Flow cfm	Ent DB (F)	Ambient Temperature											
		115						125					
		Entering Wet Bulb											
		61		67		73		61		67		73	
		MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC
800	75	31.6	25.5	35.6	19.1	41.2	9.2	29.0	23.9	32.8	17.7	38.1	8.1
800	80	32.4	29.6	35.6	25.1	40.4	17.0	29.8	28.0	32.8	23.6	37.4	15.8
800	85	33.6	32.8	36.1	30.0	40.2	23.9	31.0	30.9	33.3	28.5	37.2	22.5
800	90	35.2	34.9	37.0	34.0	40.3	29.6	33.9	33.9	34.2	32.3	37.4	28.2
960	75	33.6	27.5	37.4	20.8	42.8	10.5	30.9	25.9	34.4	19.4	39.6	9.3
960	80	34.5	32.0	37.6	27.0	42.2	18.7	31.9	30.2	34.7	25.5	39.1	17.4
960	85	35.9	35.4	38.3	32.3	42.2	25.8	33.3	33.3	35.4	30.7	39.1	24.4
960	90	37.8	37.8	39.4	36.5	42.6	31.9	36.2	36.2	36.6	34.8	39.5	30.3
1120	75	35.3	29.4	38.9	22.3	44.1	11.7	32.5	27.6	35.9	20.7	40.9	10.4
1120	80	36.5	34.1	39.3	28.8	43.8	20.1	33.7	32.3	36.3	27.2	40.6	18.7
1120	85	38.1	37.8	40.2	34.4	44.0	27.5	35.4	35.4	37.3	32.6	40.8	26.0
1120	90	40.2	40.2	41.6	38.9	44.6	33.9	38.3	38.3	38.6	37.0	41.4	32.2
1280	75	36.8	31.0	40.2	23.5	45.3	12.6	33.9	29.2	37.1	21.9	41.9	11.2
1280	80	38.1	36.0	40.8	30.4	45.2	21.3	35.3	34.1	37.8	28.7	41.8	19.8
1280	85	40.0	40.0	41.9	36.2	45.5	29.0	37.2	37.2	38.9	34.4	42.2	27.4
1280	90	42.3	42.3	43.5	41.0	46.3	35.7	40.1	40.1	40.5	39.1	43.1	33.9
1440	75	38.0	32.4	41.3	24.6	46.1	13.3	35.0	30.5	38.0	22.9	42.7	11.8
1440	80	39.6	37.7	42.1	31.7	46.3	22.3	36.6	35.7	38.9	30.0	42.8	20.7
1440	85	41.6	41.6	43.4	37.9	46.8	30.3	38.7	38.7	40.3	36.0	43.4	28.6
1440	90	44.1	44.1	45.2	43.0	47.9	37.2	41.7	41.7	42.1	41.0	44.5	35.4
1600	75	39.0	33.6	42.1	25.4	46.8	13.8	35.9	31.6	38.8	23.7	43.2	12.2
1600	80	40.8	39.2	43.1	32.9	47.1	23.1	37.7	37.1	39.9	31.0	43.6	21.4
1600	85	43.1	43.1	44.7	39.3	47.9	31.4	40.1	40.1	41.4	37.3	44.4	29.6
1600	90	46.2	46.2	46.7	44.7	49.2	38.6	43.0	43.0	43.4	42.6	45.7	36.7
1760	75	39.8	34.6	42.7	26.1	47.2	14.1	36.6	32.5	39.2	24.2	43.5	12.4
1760	80	41.8	40.5	43.9	33.8	47.7	23.7	38.6	38.3	40.5	31.9	44.1	21.9
1760	85	44.2	44.2	45.7	40.5	48.7	32.3	41.1	41.1	42.3	38.5	45.1	30.4
1760	90	47.4	47.4	47.9	46.2	50.2	39.8	44.1	44.1	44.6	44.0	46.6	37.8
1920	75	40.3	35.4	43.0	26.5	47.4	14.2	37.0	33.2	39.5	24.6	43.6	12.4
1920	80	42.5	41.6	44.5	34.6	48.1	24.1	39.2	39.2	41.0	32.5	44.4	22.2
1920	85	45.2	45.2	46.5	41.6	49.3	32.9	42.0	42.0	43.0	39.4	45.6	30.9
1920	90	48.4	48.4	48.9	47.5	51.0	40.7	45.0	45.0	45.4	45.2	47.3	38.7

Notes:

1. All capacities shown are gross and have not considered indoor fan heat. To obtain **NET** cooling capacity subtract indoor fan heat. For indoor fan heat formula, refer to appropriate airflow table notes.
2. MBh = Total Gross Capacity
3. SHC = Sensible Heat Capacity

Performance Data

Table 6. Gross cooling capacities 4 tons 17 Plus - low stage - three phase T/YHC047E3,4,W

Air Flow cfm	Ent DB (F)	Ambient Temperature											
		85						95					
		Entering Wet Bulb											
		61		67		73		61		67		73	
		MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC
800	75	30.9	26.7	34.4	20.7	39.4	12.0	28.8	26.1	32.1	20.3	36.9	11.8
800	80	31.7	30.5	34.6	25.9	38.9	18.7	29.7	29.7	32.3	25.4	36.4	18.3
800	85	32.9	32.9	35.1	30.3	38.8	24.5	30.9	30.9	32.9	29.6	36.4	24.0
800	90	34.5	34.5	36.0	33.9	39.0	29.5	33.5	33.5	33.8	33.1	36.7	28.9
960	75	32.7	28.7	36.0	22.4	40.7	13.3	30.5	27.9	33.6	21.8	38.2	13.0
960	80	33.7	32.7	36.4	27.9	40.5	20.3	31.6	31.6	34.0	27.2	37.9	19.8
960	85	35.1	35.1	37.1	32.6	40.6	26.4	33.0	33.0	34.8	31.8	38.1	25.8
960	90	37.9	37.9	38.3	36.4	41.1	31.8	35.6	35.6	36.0	35.5	38.6	31.0
1120	75	34.1	30.3	37.2	23.7	41.8	14.3	31.9	29.4	34.8	23.0	39.1	13.9
1120	80	35.4	34.7	37.9	29.5	41.8	21.6	33.2	33.2	35.4	28.7	39.1	21.0
1120	85	37.1	37.1	38.9	34.5	42.1	28.1	34.8	34.8	36.5	33.6	39.5	27.4
1120	90	39.8	39.8	40.2	38.7	42.8	33.7	37.5	37.5	37.9	37.6	40.3	32.9
1280	75	35.3	31.7	38.2	24.8	42.6	15.1	32.9	30.7	35.6	24.0	39.8	14.5
1280	80	36.8	36.4	39.1	30.9	42.8	22.7	34.5	34.5	36.5	30.0	40.0	22.0
1280	85	38.7	38.7	40.3	36.2	43.3	29.4	36.4	36.4	37.8	35.1	40.6	28.6
1280	90	41.5	41.5	41.9	40.6	44.3	35.3	39.4	39.4	39.4	39.4	41.6	34.4

Notes:

1. All capacities shown are gross and have not considered indoor fan heat. To obtain **NET** cooling capacity subtract indoor fan heat. For indoor fan heat formula, refer to appropriate airflow table notes.
2. MBh = Total Gross Capacity
3. SHC = Sensible Heat Capacity

Table 7. Gross cooling capacities 5 tons 17 Plus - high stage - three phase T/YHC067E3,4,W

Air Flow	Ent DB	Ambient Temperature																	
		85						95						105					
		Entering Wet Bulb																	
		61		67		73		61		67		73		61		67		73	
cfm	(F)	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC
1000	75	47.6	36.8	53.6	28.2	61.6	15.4	44.5	35.0	50.2	26.7	57.9	14.3	41.3	33.0	46.6	25.1	54.0	13.1
1000	80	48.4	42.5	53.4	36.1	60.5	25.5	45.4	40.5	50.0	34.4	56.8	24.2	42.2	38.3	46.5	32.6	52.9	22.7
1000	85	49.9	46.9	53.8	42.7	59.9	34.4	46.8	44.7	50.5	40.9	56.3	32.9	43.7	42.3	47.0	38.8	52.5	31.2
1000	90	51.9	50.1	54.9	48.1	60.0	42.0	48.9	47.7	51.6	46.0	56.4	40.3	45.8	45.1	48.1	43.8	52.6	38.4
1200	75	50.3	39.7	56.0	30.7	63.8	17.5	47.1	37.7	52.5	29.1	60.0	16.3	43.7	35.6	48.8	27.3	55.9	14.9
1200	80	51.4	45.7	56.1	38.9	62.9	28.0	48.2	43.5	52.6	37.1	59.1	26.5	44.8	41.2	48.9	35.1	55.1	24.9
1200	85	53.0	50.5	56.8	45.9	62.6	37.2	49.9	48.1	53.3	43.9	58.9	35.5	46.6	45.6	49.7	41.7	54.9	33.7
1200	90	55.3	54.0	58.1	51.6	62.9	45.1	52.2	51.4	54.7	49.4	59.2	43.2	49.0	48.7	51.1	47.0	55.3	41.2
1400	75	52.7	42.3	58.2	32.9	65.7	19.4	49.3	40.2	54.5	31.2	61.7	18.0	45.8	38.0	50.7	29.3	57.6	16.5
1400	80	54.0	48.7	58.5	41.5	65.1	30.2	50.7	46.4	54.9	39.5	61.1	28.6	47.2	43.9	51.1	37.4	57.0	26.8
1400	85	55.9	53.7	59.5	48.8	65.0	39.7	52.7	51.2	55.9	46.6	61.2	37.9	49.3	48.6	52.1	44.3	57.1	35.9
1400	90	58.5	57.6	61.0	54.8	65.6	47.9	55.3	54.9	57.5	52.5	61.8	45.9	51.9	51.9	53.8	50.0	57.8	43.8
1600	75	54.8	44.7	60.0	34.9	67.3	21.0	51.3	42.5	56.2	33.0	63.2	19.5	47.7	40.1	52.3	31.0	59.0	17.8
1600	80	56.4	51.3	60.6	43.8	67.0	32.1	52.9	48.9	56.9	41.7	62.9	30.4	49.3	46.3	53.0	39.5	58.7	28.5
1600	85	58.5	56.7	61.8	51.4	67.2	41.9	55.2	54.1	58.1	49.1	63.2	40.0	51.6	51.3	54.3	46.7	59.0	37.9
1600	90	61.3	60.9	63.6	57.8	68.0	50.5	58.0	58.0	60.0	55.3	64.0	48.4	54.5	54.5	56.2	52.7	59.9	46.1
1800	75	56.6	46.8	61.6	36.6	68.7	22.3	53.0	44.4	57.7	34.6	64.4	20.7	49.2	41.9	53.6	32.5	60.0	18.9
1800	80	58.4	53.8	62.4	45.8	68.5	33.8	54.9	51.2	58.6	43.6	64.4	31.9	51.2	48.5	54.6	41.3	60.0	29.9
1800	85	60.9	59.5	63.9	53.8	69.0	43.9	57.4	56.7	60.1	51.4	64.9	41.9	53.7	53.7	56.1	48.8	60.6	39.7
1800	90	63.9	63.9	66.0	60.5	70.1	52.9	60.5	60.5	62.2	57.9	66.0	50.6	56.8	56.8	58.3	55.1	61.8	48.2
2000	75	58.1	48.6	62.9	38.1	69.7	23.4	54.4	46.1	58.8	36.0	65.4	21.6	50.5	43.5	54.6	33.7	60.8	19.7
2000	80	60.2	55.9	64.0	47.6	69.8	35.2	56.5	53.2	60.0	45.3	65.5	33.2	52.7	50.4	55.8	42.8	61.1	31.1
2000	85	62.9	62.0	65.7	55.9	70.6	45.7	59.3	59.1	61.8	53.4	66.3	43.5	55.5	55.5	57.7	50.7	61.9	41.2
2000	90	66.2	66.2	68.0	63.0	71.9	54.9	62.6	62.6	64.1	60.2	67.7	52.5	58.9	58.9	60.1	57.3	63.3	50.0
2200	75	59.3	50.2	63.9	39.3	70.5	24.3	55.5	47.6	59.7	37.0	66.0	22.3	51.5	44.8	55.4	34.6	61.4	20.3
2200	80	61.7	57.9	65.2	49.2	70.9	36.3	57.9	55.0	61.1	46.7	66.4	34.2	54.0	52.1	56.9	44.1	61.8	32.0
2200	85	64.7	64.3	67.2	57.8	71.9	47.2	60.9	60.9	63.2	55.1	67.5	44.8	57.0	57.0	58.9	52.3	62.9	42.4
2200	90	68.2	68.2	69.8	65.1	73.5	56.7	64.5	64.5	65.8	62.3	69.1	54.2	60.7	60.7	61.6	59.2	64.6	51.6
2400	75	60.3	51.6	64.6	40.3	70.9	24.8	56.3	48.8	60.3	37.9	66.3	22.8	52.2	45.9	55.9	35.3	61.6	20.6
2400	80	62.9	59.5	66.2	50.5	71.6	37.2	59.0	56.6	62.0	47.9	67.0	35.0	54.9	53.5	57.6	45.1	62.3	32.6
2400	85	66.1	66.1	68.4	59.4	72.8	48.4	62.3	62.3	64.3	56.6	68.3	45.9	58.2	58.2	59.9	53.6	63.7	43.4
2400	90	69.9	69.9	71.3	67.1	74.7	58.3	66.1	66.1	67.1	64.1	70.2	55.7	62.2	62.2	62.8	60.9	65.6	52.9

Performance Data

Table 7. Gross cooling capacities 5 tons 17 Plus - high stage - three phase T/YHC067E3,4,W (continued)

Air Flow cfm	Ent DB (F)	Ambient Temperature											
		115						125					
		Entering Wet Bulb											
		61		67		73		61		67		73	
		MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC
1000	75	37.8	30.9	42.8	23.4	49.9	11.7	34.2	28.7	38.9	21.5	45.7	10.1
1000	80	38.8	36.0	42.8	30.6	48.9	21.1	35.2	33.5	38.9	28.5	44.7	19.4
1000	85	40.3	39.8	43.4	36.6	48.5	29.4	36.8	36.8	39.5	34.3	44.3	27.4
1000	90	42.5	42.3	44.5	41.4	48.7	36.4	40.3	40.3	40.8	38.9	44.6	34.2
1200	75	40.1	33.4	44.9	25.5	51.7	13.4	36.4	31.0	40.8	23.4	47.4	11.7
1200	80	41.3	38.8	45.1	33.1	51.0	23.2	37.7	36.2	41.1	30.8	46.7	21.3
1200	85	43.1	42.9	45.9	39.4	50.8	31.7	39.5	39.5	42.0	37.0	46.6	29.7
1200	90	45.5	45.5	47.4	44.5	51.3	39.1	43.0	43.0	43.5	41.8	47.0	36.8
1400	75	42.1	35.6	46.7	27.3	53.3	14.8	38.3	33.1	42.5	25.1	48.8	13.0
1400	80	43.6	41.3	47.1	35.2	52.8	25.0	39.8	38.6	43.0	32.8	48.3	23.0
1400	85	45.7	45.7	48.2	41.9	52.9	33.9	41.9	41.9	44.2	39.3	48.5	31.6
1400	90	48.3	48.3	49.9	47.3	53.6	41.5	45.4	45.4	45.9	44.5	49.2	39.1
1600	75	43.9	37.6	48.2	28.9	54.5	16.0	39.9	34.9	43.9	26.6	49.9	14.1
1600	80	45.6	43.6	48.9	37.1	54.3	26.5	41.7	40.8	44.7	34.6	49.7	24.4
1600	85	47.9	47.9	50.2	44.1	54.6	35.7	44.0	44.0	46.0	41.4	50.1	33.4
1600	90	50.8	50.8	52.2	49.9	55.6	43.7	47.6	47.6	48.0	47.0	51.1	41.1
1800	75	45.3	39.3	49.4	30.2	55.5	17.0	41.2	36.5	44.9	27.8	50.8	14.9
1800	80	47.3	45.7	50.4	38.8	55.5	27.8	43.3	42.7	46.0	36.2	50.8	25.5
1800	85	49.9	49.9	52.0	46.1	56.1	37.3	45.9	45.9	47.6	43.3	51.5	34.9
1800	90	53.6	53.6	54.2	52.2	57.3	45.6	49.4	49.4	49.9	49.2	52.8	42.9
2000	75	46.5	40.7	50.3	31.3	56.2	17.7	42.3	37.8	45.7	28.7	51.3	15.5
2000	80	48.7	47.4	51.5	40.2	56.4	28.8	44.5	44.3	47.0	37.4	51.6	26.4
2000	85	51.5	51.5	53.4	47.9	57.3	38.7	47.4	47.4	49.0	44.9	52.6	36.1
2000	90	55.3	55.3	55.8	54.3	58.8	47.3	50.9	50.9	51.5	51.1	54.1	44.5
2200	75	47.3	41.9	50.9	32.1	56.6	18.1	43.0	38.9	46.3	29.4	51.6	15.8
2200	80	49.8	49.0	52.4	41.3	57.1	29.6	45.5	45.5	47.8	38.4	52.2	27.0
2200	85	52.9	52.9	54.5	49.3	58.2	39.8	48.7	48.7	50.0	46.2	53.3	37.0
2200	90	56.7	56.7	57.2	56.1	60.0	48.7	52.7	52.7	52.7	52.7	55.1	45.8
2400	75	47.9	42.9	51.2	32.7	56.7	18.3	43.5	39.7	46.5	29.8	51.6	15.8
2400	80	50.7	50.2	53.0	42.2	57.5	30.1	46.3	46.3	48.3	39.2	52.4	27.4
2400	85	54.0	54.0	55.4	50.5	58.8	40.6	49.7	49.7	50.7	47.3	53.8	37.7
2400	90	57.8	57.8	58.4	57.6	60.8	49.9	53.7	53.7	53.7	53.7	55.9	46.8

Notes:

1. All capacities shown are gross and have not considered indoor fan heat. To obtain **NET** cooling capacity subtract indoor fan heat. For indoor fan heat formula, refer to appropriate airflow table notes.
2. MBh = Total Gross Capacity
3. SHC = Sensible Heat Capacity

Table 8. Gross cooling capacities 5 tons 17 Plus - low stage - three phase T/YHC067E3,4,W

Air Flow cfm	Ent DB (F)	Ambient Temperature											
		85						95					
		Entering Wet Bulb											
		61		67		73		61		67		73	
		MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC	MBh	SHC
1000	75	36.8	30.0	41.2	23.3	47.4	13.4	34.1	28.4	38.2	22.0	44.2	12.3
1000	80	37.8	34.7	41.3	29.7	46.7	21.5	35.1	32.9	38.4	28.2	43.5	20.2
1000	85	39.2	38.4	41.9	35.2	46.4	28.7	36.7	36.5	39.1	33.5	43.3	27.2
1000	90	41.1	41.1	43.0	39.6	46.6	34.8	38.7	38.7	40.2	37.7	43.6	33.2
1200	75	38.9	32.4	43.0	25.4	49.0	15.0	36.1	30.6	40.0	23.8	45.7	13.8
1200	80	40.1	37.4	43.4	32.1	48.5	23.5	37.4	35.5	40.4	30.4	45.3	22.1
1200	85	41.9	41.5	44.3	37.8	48.5	31.0	39.2	39.2	41.4	36.0	45.4	29.4
1200	90	44.1	44.1	45.6	42.6	49.0	37.5	41.5	41.5	42.8	40.6	45.9	35.7
1400	75	40.6	34.5	44.5	27.1	50.2	16.4	37.7	32.6	41.3	25.4	46.8	15.0
1400	80	42.1	39.9	45.2	34.1	50.0	25.2	39.3	37.8	42.1	32.3	46.7	23.6
1400	85	44.2	44.2	46.3	40.2	50.3	33.0	41.4	41.4	43.3	38.2	47.0	31.2
1400	90	46.6	46.6	47.9	45.3	51.0	39.8	44.5	44.5	45.0	43.2	47.8	37.9
1600	75	42.0	36.3	45.6	28.5	51.0	17.4	39.0	34.2	42.3	26.7	47.5	15.9
1600	80	43.8	42.0	46.5	35.9	51.1	26.5	40.9	39.7	43.3	33.9	47.7	24.8
1600	85	46.1	46.1	48.0	42.3	51.7	34.7	43.2	43.2	44.8	40.1	48.3	32.8
1600	90	48.8	48.8	49.9	47.8	52.7	41.8	46.3	46.3	46.8	45.4	49.4	39.8

Notes:

1. All capacities shown are gross and have not considered indoor fan heat. To obtain **NET** cooling capacity subtract indoor fan heat. For indoor fan heat formula, refer to appropriate airflow table notes.
2. MBh = Total Gross Capacity
3. SHC = Sensible Heat Capacity

Evaporator Fan Performance

Table 9. Direct drive evaporator fan performance - 3 ton high efficiency - T/YHC037E3,E4,EW downflow airflow

External Static Pressure (Inches of Water)																				
	0.10		0.20		0.30		0.40		0.50		0.60		0.70		0.80		0.90		1.00	
cfm	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
960	—	—	615	0.15	655	0.18	695	0.22	735	0.26	775	0.29	815	0.33	855	0.37	896	0.41	936	0.44
1080	599	0.16	639	0.20	680	0.24	720	0.27	760	0.31	800	0.35	840	0.38	880	0.42	920	0.46	960	0.49
1200	624	0.21	664	0.25	704	0.29	744	0.32	784	0.36	824	0.40	865	0.43	905	0.47	945	0.51	985	0.54
1320	649	0.26	689	0.30	729	0.34	769	0.37	809	0.41	849	0.45	889	0.49	929	0.52	969	0.56	1009	0.60
1440	673	0.31	713	0.35	753	0.39	793	0.43	834	0.46	874	0.50	914	0.54	954	0.57	994	0.61	1034	0.65

External Static Pressure (Inches of Water)										
	1.10		1.20		1.30		1.40		1.50	
cfm	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
960	976	0.48	1016	0.52	1056	0.55	1096	0.59	1136	0.63
1080	1000	0.53	1040	0.57	1081	0.60	1121	0.64	—	—
1200	1025	0.58	1065	0.62	1105	0.66	—	—	—	—
1320	1050	0.63	1090	0.67	—	—	—	—	—	—
1440	1074	0.68	—	—	—	—	—	—	—	—

Notes:

1. For Constant CFM Direct Drive Fan, reference Table 15, p. 44 for Voltage vs. CFM setting.
2. Data includes pressure drop due to standard filters and wet coils.
3. Refer to Table 17, p. 44 to determine additional static pressure drop due to other options/accessories.
4. Direct Drive Fan Motor Heat (MBH) = 2.9245xFan BHP + 0.055
5. Factory supplied motors, in equipment, are definite purpose motors, specifically designed and tested to operate at all cataloged conditions. Using the full horsepower range of our fan motors as shown in our tabular data will not result in nuisance tripping or premature motor failure. Our product's warranty will not be affected.

Table 10. Direct drive evaporator fan performance - 3 ton high efficiency - T/YHC037E3,E4,EW horizontal airflow

External Static Pressure (Inches of Water)																				
	0.10		0.20		0.30		0.40		0.50		0.60		0.70		0.80		0.90		1.00	
cfm	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
960	596	0.11	634	0.15	673	0.18	711	0.22	750	0.26	788	0.29	827	0.33	865	0.36	904	0.40	942	0.44
1080	618	0.16	656	0.20	695	0.23	733	0.27	772	0.31	810	0.34	849	0.38	887	0.42	926	0.45	964	0.49
1200	640	0.21	678	0.25	717	0.29	755	0.32	794	0.36	832	0.40	871	0.43	909	0.47	948	0.51	986	0.54
1320	662	0.27	700	0.30	739	0.34	777	0.38	816	0.41	854	0.45	893	0.49	931	0.52	970	0.56	1008	0.59
1440	684	0.32	722	0.36	761	0.39	799	0.43	838	0.46	876	0.50	915	0.54	953	0.57	992	0.61	1030	0.65

External Static Pressure (Inches of Water)										
	1.10		1.20		1.30		1.40		1.50	
cfm	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
960	981	0.47	—	—	—	—	—	—	—	—
1080	—	—	—	—	—	—	—	—	—	—
1200	—	—	—	—	—	—	—	—	—	—
1320	—	—	—	—	—	—	—	—	—	—
1440	—	—	—	—	—	—	—	—	—	—

Notes:

1. For Constant CFM Direct Drive Fan, reference Table 15, p. 44 for Voltage vs. CFM setting.
2. Data includes pressure drop due to standard filters and wet coils.
3. Refer to Table 17, p. 44 to determine additional static pressure drop due to other options/accessories.
4. Direct Drive Fan Motor Heat (MBH) = 2.9245xFan BHP + 0.055
5. Factory supplied motors, in equipment, are definite purpose motors, specifically designed and tested to operate at all cataloged conditions. Using the full horsepower range of our fan motors as shown in our tabular data will not result in nuisance tripping or premature motor failure. Our product's warranty will not be affected.

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Evaporator Fan Performance

Table 11. Direct drive evaporator fan performance - 4 ton high efficiency - T/YHC047E3,E4,EW downflow airflow

External Static Pressure (Inches of Water)																				
	0.10		0.20		0.30		0.40		0.50		0.60		0.70		0.80		0.90		1.00	
cfm	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
1280	541	0.07	585	0.12	628	0.18	672	0.23	715	0.28	759	0.33	802	0.39	846	0.44	889	0.49	933	0.55
1440	564	0.15	608	0.20	651	0.25	695	0.30	738	0.36	782	0.41	825	0.46	869	0.51	912	0.57	956	0.62
1600	587	0.22	631	0.27	674	0.33	718	0.38	761	0.43	805	0.48	848	0.54	892	0.59	935	0.64	979	0.70
1760	610	0.30	654	0.35	697	0.40	741	0.45	784	0.51	828	0.56	871	0.61	915	0.66	958	0.72	1002	0.77
1920	634	0.37	677	0.42	721	0.48	764	0.53	808	0.58	851	0.63	895	0.69	938	0.74	982	0.79	1025	0.85

External Static Pressure (Inches of Water)										
	1.10		1.20		1.30		1.40		1.50	
cfm	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
1280	976	0.60	1020	0.65	1063	0.70	1107	0.76	1150	0.81
1440	999	0.67	1043	0.73	1086	0.78	1130	0.83	1173	0.88
1600	1022	0.75	1066	0.80	1109	0.85	1153	0.91	1196	0.96
1760	1045	0.82	1089	0.88	1132	0.93	1176	0.98	1219	1.03
1920	1069	0.90	1112	0.95	1156	1.00	1199	1.06	1243	1.11

Notes:

1. For Constant CFM Direct Drive Fan, reference Table 15, p. 44 for Voltage vs. CFM setting.
2. Data includes pressure drop due to standard filters and wet coils.
3. Refer to Table 17, p. 44 to determine additional static pressure drop due to other options/accessories.
4. Direct Drive Fan Motor Heat (MBH) = 2.9245xFan BHP + 0.055
5. Factory supplied motors, in equipment, are definite purpose motors, specifically designed and tested to operate at all cataloged conditions. Using the full horsepower range of our fan motors as shown in our tabular data will not result in nuisance tripping or premature motor failure. Our product's warranty will not be affected.

Table 12. Direct drive evaporator fan performance - 4 ton high efficiency - T/YHC047E3,E4,EW horizontal airflow

External Static Pressure (Inches of Water)																				
	0.10		0.20		0.30		0.40		0.50		0.60		0.70		0.80		0.90		1.00	
cfm	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
1280	591	0.10	632	0.15	674	0.20	715	0.26	756	0.31	798	0.36	839	0.41	880	0.47	922	0.52	963	0.57
1440	621	0.19	663	0.24	704	0.30	745	0.35	787	0.40	828	0.45	869	0.51	911	0.56	952	0.61	993	0.66
1600	652	0.28	693	0.33	734	0.39	776	0.44	817	0.49	858	0.55	900	0.60	941	0.65	982	0.70	1023	0.76
1760	682	0.37	723	0.43	765	0.48	806	0.53	847	0.58	889	0.64	930	0.69	971	0.74	1012	0.80	1054	0.85
1920	712	0.47	754	0.52	795	0.57	836	0.62	878	0.68	919	0.73	960	0.78	1001	0.83	1043	0.89	1084	0.94

External Static Pressure (Inches of Water)										
	1.10		1.20		1.30		1.40		1.50	
cfm	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
1280	1004	0.62	1045	0.68	1087	0.73	1128	0.78	1169	0.83
1440	1034	0.72	1076	0.77	1117	0.82	1158	0.87	1200	0.93
1600	1065	0.81	1106	0.86	1147	0.91	1189	0.97	1230	1.02
1760	1095	0.90	1136	0.95	1178	1.01	1219	1.06	1260	1.11
1920	1125	0.99	1167	1.05	1208	1.10	1249	1.15	1291	1.20

Notes:

1. For Constant CFM Direct Drive Fan, reference Table 15, p. 44 for Voltage vs. CFM setting.
2. Data includes pressure drop due to standard filters and wet coils.
3. Refer to Table 17, p. 44 to determine additional static pressure drop due to other options/accessories.
4. Direct Drive Fan Motor Heat (MBH) = 2.9245xFan BHP + 0.055
5. Factory supplied motors, in equipment, are definite purpose motors, specifically designed and tested to operate at all cataloged conditions. Using the full horsepower range of our fan motors as shown in our tabular data will not result in nuisance tripping or premature motor failure. Our product's warranty will not be affected.

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Table 13. Direct drive evaporator fan performance - 5 ton high efficiency - T/YHC067E3,E4,EW downflow airflow

External Static Pressure (Inches of Water)																				
	0.10		0.20		0.30		0.40		0.50		0.60		0.70		0.80		0.90		1.00	
cfm	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
1600	618	0.13	656	0.18	693	0.23	731	0.28	769	0.33	806	0.38	844	0.43	881	0.48	919	0.53	957	0.58
1800	651	0.24	689	0.29	727	0.34	764	0.39	802	0.44	839	0.49	877	0.54	915	0.59	952	0.64	990	0.69
2000	685	0.35	722	0.40	760	0.45	798	0.50	835	0.55	873	0.60	910	0.65	948	0.70	986	0.75	1023	0.80
2200	718	0.46	756	0.51	793	0.56	831	0.61	869	0.66	906	0.71	944	0.76	981	0.81	1019	0.86	1057	0.91
2400	752	0.57	789	0.62	827	0.67	864	0.72	902	0.77	940	0.82	977	0.87	1015	0.92	1052	0.97	1090	1.02

External Static Pressure (Inches of Water)										
	1.10		1.20		1.30		1.40		1.50	
cfm	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
1600	994	0.63	1032	0.68	1069	0.73	1107	0.79	1145	0.84
1800	1027	0.74	1065	0.79	1103	0.84	1140	0.89	—	—
2000	1061	0.85	1098	0.90	1136	0.95	—	—	—	—
2200	1094	0.96	1132	1.01	—	—	—	—	—	—
2400	—	—	—	—	—	—	—	—	—	—

Notes:

1. For Constant CFM Direct Drive Fan, reference Table 15, p. 44 for Voltage vs. CFM setting.
2. Data includes pressure drop due to standard filters and wet coils.
3. Refer to Table 17, p. 44 to determine additional static pressure drop due to other options/accessories.
4. Direct Drive Fan Motor Heat (MBH) = 2.9245xFan BHP + 0.055
5. Factory supplied motors, in equipment, are definite purpose motors, specifically designed and tested to operate at all cataloged conditions. Using the full horsepower range of our fan motors as shown in our tabular data will not result in nuisance tripping or premature motor failure. Our product's warranty will not be affected.

Table 14. Direct drive evaporator fan performance - 5 ton high efficiency - T/YHC067E3,E4,EW horizontal airflow

External Static Pressure (Inches of Water)																				
	0.10		0.20		0.30		0.40		0.50		0.60		0.70		0.80		0.90		1.00	
cfm	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
1600	680	0.14	717	0.19	753	0.25	790	0.31	827	0.36	864	0.42	901	0.47	937	0.53	974	0.59	1011	0.64
1800	716	0.27	753	0.32	789	0.38	826	0.44	863	0.49	900	0.55	937	0.61	973	0.66	1010	0.72	1047	0.78
2000	752	0.40	789	0.46	825	0.51	862	0.57	899	0.63	936	0.68	973	0.74	1009	0.80	1046	0.85	1083	0.91
2200	788	0.53	825	0.59	861	0.65	898	0.70	935	0.76	972	0.82	1009	0.87	1045	0.93	1082	0.99	1119	1.04
2400	824	0.67	861	0.72	897	0.78	934	0.84	971	0.89	1008	0.95	1045	1.01	1081	1.06	1118	1.12	1155	1.18

External Static Pressure (Inches of Water)										
	1.10		1.20		1.30		1.40		1.50	
cfm	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
1600	—	—	—	—	—	—	—	—	—	—
1800	—	—	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—
2200	—	—	—	—	—	—	—	—	—	—
2400	—	—	—	—	—	—	—	—	—	—

Notes:

1. For Constant CFM Direct Drive Fan, reference Table 15, p. 44 for Voltage vs. CFM setting.
2. Data includes pressure drop due to standard filters and wet coils.
3. Refer to Table 17, p. 44 to determine additional static pressure drop due to other options/accessories.
4. Direct Drive Fan Motor Heat (MBH) = 2.9245xFan BHP + 0.055
5. Factory supplied motors, in equipment, are definite purpose motors, specifically designed and tested to operate at all cataloged conditions. Using the full horsepower range of our fan motors as shown in our tabular data will not result in nuisance tripping or premature motor failure. Our product's warranty will not be affected.

Fan Performance

Table 15. Voltage vs. CFM table

T/YHC037E, T/YHC047E, T/YHC067E		
PWM% Value	**Potentiometer Voltage (Vdc)**	**CFM/Ton**
70	<0.1	320
75	0.7	347
80	1.25	373
85	1.65	400
90	1.95	427
95	2.17	453
100	>2.4	480

Table 16. Outdoor sound power level - dB (ref. 10 - 12 W)

	Unit Model				Octave Center Frequency					Overall
Tons	**Number**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dBA**
3	T/YHC037E	79	85	79	79	77	71	67	58	81
4	T/YHC047E	80	86	84	85	83	79	73	67	87
5	T/YHC067E	80	86	84	85	83	79	73	67	87

Note: Tests follow AHRI 270-95.

Table 17. Static pressure drop through accessories (inches water column) - 3-5 tons

							Economizer with OA/RA Dampers[a]						Electric Heater Accessory (kW)[b],[c]			
							100% OA	100% RA	100% OA	100% RA	100% OA	100% RA				
Tons	**Unit Model Number**	**cfm**	**Standard Filters[d]**	**2-in MERV 8 Filter**	**2-in MERV 13 Filter**	**Reheat Coil**	**Downflow**		**Low Leak[e]**		**Horizontal**		**5-6**	**9-18**	**23-36**	**54**
3	T/YHC037E3,4,W	600	0.01	0.02	0.03	0.04	0.03	0.01	0.03	0.02	0.03	0.01	—	—	—	—
3	T/YHC037E3,4,W	960	0.01	0.03	0.04	0.08	0.04	0.01	0.09	0.03	0.04	0.01	0.01	0.01	0.01	—
3	T/YHC037E3,4,W	1200	0.02	0.04	0.05	0.10	0.06	0.01	0.13	0.05	0.06	0.01	0.02	0.02	0.02	—
3	T/YHC037E3,4,W	1440	0.03	0.05	0.06	0.14	0.08	0.02	0.19	0.07	0.08	0.01	0.02	0.03	0.03	—
4	T/YHC047E3,4,W	800	0.01	0.03	0.04	0.03	0.06	0.00	0.03	0.01	0.03	0.01	—	—	—	—
4	T/YHC047E3,4,W	1280	0.02	0.04	0.03	0.07	0.08	0.00	0.07	0.03	0.04	0.01	0.01	0.00	0.01	—
4	T/YHC047E3,4,W	1600	0.03	0.06	0.05	0.09	0.09	0.01	0.10	0.05	0.05	0.02	0.02	0.01	0.02	—
4	T/YHC047E3,4,W	1920	0.05	0.08	0.07	0.12	0.10	0.01	0.15	0.08	0.07	0.02	0.02	0.01	0.03	—
5	T/YHC067E3,4,W	1000	0.01	0.04	0.03	0.05	0.06	0.01	0.04	0.02	0.06	0.01	—	—	—	—
5	T/YHC067E3,4,W	1600	0.03	0.06	0.08	0.09	0.09	0.01	0.10	0.05	0.05	0.01	0.02	0.01	0.02	—
5	T/YHC067E3,4,W	2000	0.05	0.08	0.11	0.13	0.11	0.01	0.16	0.08	0.07	0.02	0.02	0.02	0.03	—
5	T/YHC067E3,4,W	2400	0.07	0.10	0.13	0.17	0.12	0.03	0.23	0.12	0.09	0.04	0.03	0.02	0.04	—

(a) OA = Outside Air and RA = Return Air.
(b) Nominal kW ratings at 240, 480, 600 volts. Heaters only available on T units.
(c) Electric heaters restricted on applications below 320 cfm/Ton.
(d) Tested with standard filters. Difference in pressure drop should be considered when utilizing optional 2 inch MERV 8 and MERV 13 filters.
(e) Low Leak - Downflow only.

Table 18. Gas fired heating capacities - high efficiency

Tons	Unit Model Number	Heating Input MBh	Heating Output MBh	Air Temp. Rise, F
3	YHC037E(3,4,W)*(L,X)	60	48.0	25-55
3	YHC037E(3,4)*X and Digit 34 = A	60	48.6	25-55
3	YHC037E(3,4,W)*(M,Y)	80	64.0	35-65
3	YHC037E(3,4,W)*(H,Z)	100	80.0	55-85
4	YHC047E(3,4,W)*(L,X)	60	48.0	10-40
4	YHC047E(3,4)*X and Digit 34 = A	60	48.6	15-45
4	YHC047E(3,4,W)*(M,Y)	80	64.0	20-50
4	YHC047E(3,4)*Y and Digit 34 = A	90	72.9	30-60
4	YHC047E(3,4,W)*(H,Z)	120	96.0	40-70
5	YHC067E(3,4,W)*(L,X)	60	48.0	10-40
5	YHC067E(3,4)*X and Digit 34 = A	60	48.6	10-40
5	YHC067E(3,4,W)*(M,Y)	80	64.0	15-45
5	YHC067E(3,4)*Y and Digit 34 = A	90	72.9	20-50
5	YHC067E(3,4,W)*(H,Z)	130	104.0	35-65

Note: Ratings shown are for elevations up to 2,000 ft. For higher elevations, reduce ratings at a rate of 4% per 1,000 ft. elevation.
Note: For high altitude installations above 2000 feet, Ultra Low NOx gas option is not available.

Table 19. Auxiliary electric heat capacity

Tons	Unit Model Number	Total[a]		No. of Stages	Stage1		Stage 2	
		kW Input[b]	MBh Output		kW Input	MBh Output	kW Input	MBh Output
3	THC037E3, E4	6.00	20.48	1	6.00	20.48	—	—
3	THC037E3, E4	12.00	40.97	2	6.00	20.48	6.00	20.48
3	THC037E3, E4	17.40	59.40	2	8.70	29.70	8.70	29.70
4	THC047E3, E4	6.00	20.48	1	6.00	20.48	—	—
4	THC047E3, E4	12.00	40.97	2	6.00	20.48	6.00	20.48
4	THC047E3, E4	17.40	59.40	2	8.70	29.70	8.70	29.70
5	THC067E3, E4	6.00	20.48	1	6.00	20.48	—	—
5	THC067E3, E4	12.00	40.97	2	6.00	20.48	6.00	20.48
5	THC067E3, E4	17.40	59.40	2	8.70	29.70	8.70	29.70
5	THC067E3, E4	23.00	78.52	2	8.70	29.70	14.30	48.82

(a) Heaters are rated at 240V,380V,480V and 600V. For other than rated voltage, CAP= (voltage/rated voltage)^2 x rated cap.
(b) All input/output does not include indoor fan power or heat.

Table 20. Electric heater voltage correction factors (applicable to auxiliary heat capacity)

Nominal Voltage	Distribution Voltage	Capacity Multiplier
240	208	0.751
240	230	0.918
240	240	1.000
480	440	0.840
480	460	0.918
480	480	1.000

Fan Performance

Table 20. Electric heater voltage correction factors (applicable to auxiliary heat capacity) (continued)

Nominal Voltage	Distribution Voltage	Capacity Multiplier
600	540	0.810
600	575	0.918
600	600	1.000

Table 21. Air temperature rise across electric heaters (°F)

		3 Tons[a] 1200 cfm	4 Tons 1600 cfm	5 Tons[b] 2000 cfm
kW	Stages	Three Phase THC037E3,E4	Three Phase THC047E3, E4	Three Phase THC067E3, E4
6.00	1	18.5	10.5	11.4
12.00	2	36.2	22.3	21.5
17.40	2	48.2	33.0	30.0
23.0	2	—	—	38.8

Notes:
1. For minimum design airflow, see airflow performance table for each unit.
2. To calculate temp rise at different airflow, use the following formula: Temp. rise across Electric Heater = kWx3414/1.08xCFM.

(a) The minimum allowable airflow for a 3 ton with a 17.4 kW heater is 1080 cfm.
(b) The minimum allowable airflow for a 5 ton unit with a 23.0 kW heater is 1900 cfm.

Table 22. Reheat temperature rise table

			Leaving Evaporator Dry Bulb						
Tons	Unit Model No.	SCFM	35	40	45	50	55	60	65
3	T/YHC	960	20.6	19.6	18.5	17.3	16.1	14.8	13.5
3	T/YHC	1080	18.8	18.1	17.2	16.2	15.1	13.9	12.8
3	T/YHC	1200	17.4	16.9	16.1	15.2	14.2	13.1	11.9
3	T/YHC	1320	16.1	15.7	15.1	14.3	13.3	12.3	11.3
3	T/YHC	1440	14.9	14.6	14.0	13.3	12.5	11.5	10.6
4	T/YHC	1280	20.7	19.6	18.4	17.1	15.8	14.5	13.2
4	T/YHC	1440	19.4	18.4	17.4	16.2	14.9	13.6	12.4
4	T/YHC	1600	18.1	17.3	16.3	15.2	14.1	13.0	11.8
4	T/YHC	1760	16.8	16.2	15.4	14.5	13.5	12.4	11.3
4	T/YHC	1920	15.7	15.1	14.5	13.7	12.9	12.0	11.1
5	T/YHC	1600	19.4	17.8	16.3	14.9	13.5	12.1	10.8
5	T/YHC	1800	18.2	16.8	15.4	14.0	12.7	11.4	10.2
5	T/YHC	2000	17.2	15.9	14.6	13.3	12.1	10.8	9.7
5	T/YHC	2200	16.3	15.1	13.9	12.6	11.5	10.3	9.2
5	T/YHC	2400	15.6	14.4	13.2	12.1	10.9	9.8	8.8

Controls

ReliaTel™

Zone sensors are the building occupant's comfort control devices. The following zone sensor options are available for units with ReliaTel ™ control.

Note: *Zone sensor required for units configured for single zone VAV indoor fan control to enable single zone VAV functionality.*

Economizer Controls

The standard equipment offering is a fixed dry bulb changeover control. In addition, there are two optional controls, enthalpy and differential enthalpy control.

Enthalpy Control

Replaces the dry bulb control with a wet bulb changeover controller which has a fully adjustable setpoint. Enthalpy control offers a higher level of comfort control, along with energy savings potential, than the standard dry bulb control. This is due to the additional wet bulb sensing capability.

Differential Enthalpy

Differential enthalpy replaces the standard dry bulb control with two enthalpy sensors that compare total heat content of the indoor air and outdoor air to determine the most efficient air source. This control option offers the highest level of comfort control, plus energy efficiency, available.

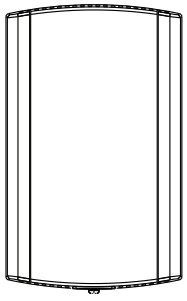
Remote Potentiometer

Minimum position setting of economizer can be remotely adjusted with this accessory.

Differential Pressure Switches

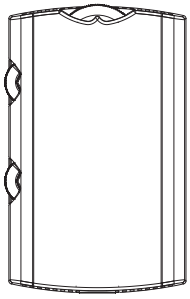
This factory or field-installed option allows individual fan failure and dirty filter indication. The fan failure switch will disable all unit functions and "flash" the Service LED on the zone sensor. The dirty filter switch will light the Service LED on the zone sensor and will allow continued unit operation.

Remote Sensor



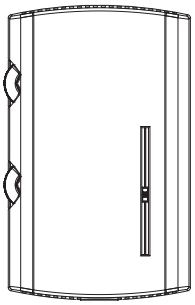
Sensor(s) available for all zone sensors to provide remote sensing capabilities.

Manual Changeover



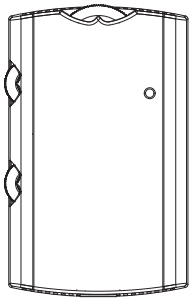
Heat, Cool or Off System Switch. Fan Auto or Off Switch. One temperature setpoint lever.

Manual/Automatic Changeover



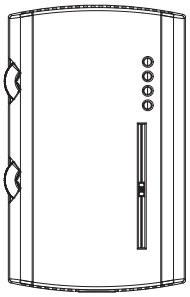
Auto, Heat, Cool or Off System Switch. Fan Auto or Off Switch. Two temperature setpoint levers.

Manual/Automatic Changeover — Status Indicator



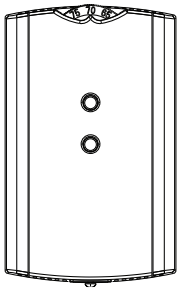
Auto, Heat, Cool or Off System Switch. Fan Auto or Off Switch. Two temperature setpoint levers. Includes a status indicator.

Manual/Automatic Changeover — LED Status



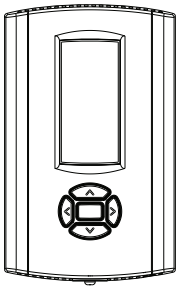
Auto, Heat, Cool or Off System Switch. Fan Auto or Off Switch. Two temperature setpoint levers. Status Indication LED lights, System On, Heat, Cool, or Service.

Integrated Comfort™ System



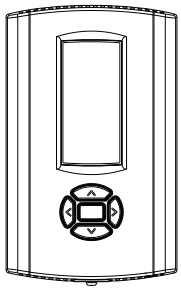
Sensor(s) available with optional temperature adjustment and override buttons to provide central control through a Trane® Integrated Comfort™ system.

Digital Display Programmable Thermostat (1H/1C)



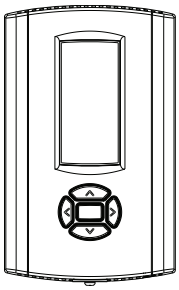
One heat/One Cool Auto changeover digital display thermostat.
Not compatible with VAV units.

Digital Display Thermostat (3H/2C)



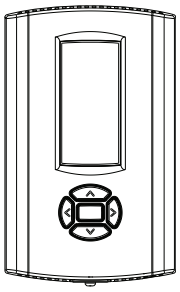
Three Heat, Two Cool Auto changeover digital display thermostat.
Not compatible with VAV units.

Digital Display Programmable Thermostat (3H/2C)



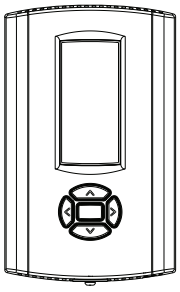
Three Heat/Two Cool Auto changeover digital display thermostat. 7-day programmable stat with night setback is available.
Not compatible with VAV units.

Programmable Night Setback



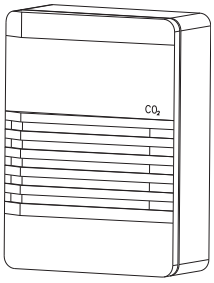
Auto or manual changeover with seven-day programming. Keyboard selection of Heat, Cool, Fan, Auto, or On. All programmable sensors have System On, Heat, Cool, Service LED/ indicators as standard. Night Setback Sensors have one (1) Occupied, one (1) Un-occupied, and one (1) Override program per day.

Wireless Zone Sensor



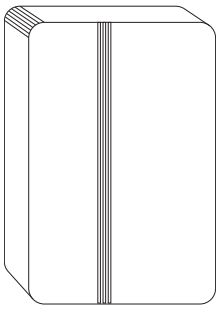
LCD display that provides heat, cool, auto or off. Includes two temperature setpoints and a lockable setting with °F or °C indicators.

CO_2 Sensing



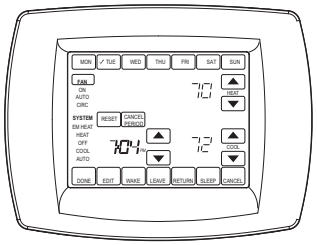
The CO_2 sensor shall have the ability to monitor the concentration (parts per million, ppm) of CO_2 (Carbon Dioxide) in the air. As the CO_2 concentration changes, the outside air damper modulates to meet the current ventilation needs of the zone.

Humidity Sensor



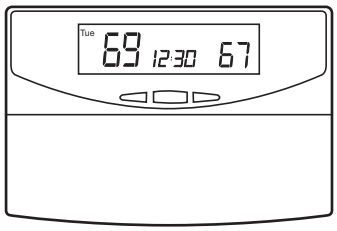
Field installed, wall-mounted or duct-mounted humidity sensor is used to control activation of the hot gas reheat dehumidification option. The humidity sensor can be set for humidity levels between 40% and 60% relative humidity by adjusting the ReliaTel™ Options Module.

Touchscreen Programmable Thermostat (2H/2C)



Two Heat/Two Cool programmable thermostat with touch screen digital display. Menu-driven programming. Effortless set-up. Program each day separately with no need to copy multiple days. All programming can be done on one screen. Easy to read and use. Large, clear backlit digital display.

Digital Display Programmable Thermostat with Built-In Relative Humidity Sensing (3H/2C)



Three Heat, Two Cool digital display thermostat with built-in humidity control and display. This thermostat combines both humidity and dry bulb into one. Fully programmable with night setback.

Dual Thermistor Remote Zone Sensor

Space Remote Sensor which can be mounted on the wall to report/control from a remote location in the space.

RA Remote Sensor

Return air remote sensor which can be mounted in the return air duct to report return air temperature.

Room Remote Sensor

Space remote sensor which can be mounted on the wall to report/control from a remote location in the space.

Communication Interfaces

BACnet® Communication Interface

This option shall be provided to allow the unit to communicate directly with a generic open protocol BACnet MS/TP Network Building Automation System Controls.

LonTalk® Communications Interface - Factory or Field Installed

The LonTalk® communications interface allows the unit to communicate as a Tracer® LCI-V device or directly with a generic open protocol BACnet® MS/TP Network Building Automation System Controls.

Trane® Air-Fi® Wireless Communication - Factory Installed

Air-Fi Wireless communication shall be factory installed and tested. Air-Fi Wireless conforms to ANSI/ASHRAE Standard 135-2016 (BACnet®/ZigBee®[1]).

Trane® Communication Interface (TCI)

This factory or field-installed micro-processor interface allows the unit to communicate through a Trane® Integrated Comfort™ system. TCI communication is only for constant volume units. Multi-speed and VAV units require either a BACnet® or LON communication if a BAS is used for control.

[1] ZigBee is a registered trademark of the ZigBee Alliance.

Electrical Data

Table 23. Unit wiring with cooling (no electric heat) - high efficiency - 3-5 tons

Tons	Unit Model Number	Unit Operating Voltage Range	Standard Indoor Motor	
			MCA	Max Fuse Size or Max Circuit Breaker
3	THC037E3	208 - 230	24	30
3	THC037E4	460	12	15
4	THC047E3	208 - 230	30	40
4	THC047E4	460	14	20
5	THC067E3	208 - 230	33	45
5	THC067E4	460	16	20

Table 24. Unit wiring with gas heat - high efficiency - 3-5 tons

Tons	Unit Model Number	Unit Operating Voltage Range	Standard Indoor Motor	
			MCA	Max Fuse Size or Max Circuit Breaker
3	YHC037E3	230	24	30
3	YHC037E4	460	12	15
3	YHC037EW	517–633	9	15
4	YHC047E3	230	30	40
4	YHC047E4	460	14	20
4	YHC047EW	517–633	11	15
5	YHC067E3	230	33	45
5	YHC067E4	460	16	20
5	YHC067EW	517–633	12	15

Table 25. Unit wiring with electric heat (single point connection) - high efficiency - 3-5 tons

Tons	Unit Model Number	Heater Model Number	Heater kW Rating[a]	Control Stages	Heater Amps	Standard Indoor Motor	
						MCA	Max Fuse Size or Max Circuit Breaker
208/230 Volts Three Phase							
3	THC037E3	BAYHTRE306*	4.5/6.0	1	12.5/14.4	26/29	30.0/30.0
3	THC037E3	BAYHTRE312*	9.0/12.0	2	25.0/28.9	42/47	45.0/50.0
3	THC037E3	BAYHTRE318*	13.1/17.4	2	36.3/41.9	56/63	60.0/70.0
4	THC047E3	BAYHTRX306*	4.5/6.0	1	12.5/14.4	30/31	40.0/40.0
4	THC047E3	BAYHTRX312*	9.0/12.0	2	25.0/28.9	45/49	45.0/50.0
4	THC047E3	BAYHTRX318*	13.1/17.4	2	36.3/41.9	59/66	60.0/70.0
5	THC067E3	BAYHTRX306*	4.5/6.0	1	12.5/14.4	33/33	45.0/45.0
5	THC067E3	BAYHTRX312*	9.0/12.0	2	25.0/28.9	45/49	45.0/50.0
5	THC067E3	BAYHTRX318*	13.1/17.4	2	36.3/41.9	59/66	60.0/70.0
5	THC067E3	BAYHTRX323*	17.3/23.0	2	48.0/55.3	73/82	80.0/90.0

Table 25. Unit wiring with electric heat (single point connection) - high efficiency - 3-5 tons (continued)

Tons	Unit Model Number	Heater Model Number	Heater kW Rating[a]	Control Stages	Heater Amps	Standard Indoor Motor	
						MCA	Max Fuse Size or Max Circuit Breaker
460 Volts Three Phase							
3	THC037E4	BAYHTRE406*	6.0	1	7.2	15	15.0
3	THC037E4	BAYHTRE412*	12.0	2	14.4	24	25.0
3	THC037E4	BAYHTRE418*	17.4	2	20.9	32	35.0
4	THC047E4	BAYHTRX406*	6.0	1	7.2	16	20.0
4	THC047E4	BAYHTRX412*	12.0	2	14.4	25	25.0
4	THC047E4	BAYHTRX418*	17.4	2	20.9	34	35.0
460 Volts Three Phase							
5	THC067E4	BAYHTRX406*	6.0	1	7.2	16	20.0
5	THC067E4	BAYHTRX412*	12.0	2	14.4	25	25.0
5	THC067E4	BAYHTRX418*	17.4	2	20.9	34	35.0
5	THC067E4	BAYHTRX423*	23.0	2	27.7	42	45.0

(a) Heater kW ratings are at 208/240V for 208/230V units, 480V for 460V units.

Table 26. Electrical characteristics - compressor motor and condenser fan motor - 60 cycle - high efficiency

Ton	Unit Model Number	Compressor Motors							Condenser Fan Motors					
		No.	Volts	Phase	hp	rpm	RLA	LRA	MCC	No.	Volts	Phase	hp	FLA	LRA
3	T/YHC037E3	1	208-230	3	2.8	3500	11.6	73.0	18.1	1	208-230	1	0.20	1.5	2.4
3	T/YHC037E4	1	460	3	2.7	3500	5.7	38.0	8.9	1	460	1	0.20	0.6	1.3
3	T/YHC037EW	1	575	3	4.0	3500	4.0	25.6	6.2	1	575	1	0.40	0.8	2.0
4	T/YHC047E3	1	208-230	3	3.6	3500	14.0	83.1	21.9	1	208-230	1	0.40	2.5	4.3
4	T/YHC047E4	1	460	3	3.6	3500	6.4	41.0	10.0	1	460	1	0.40	1.0	2.2
4	T/YHC047EW	1	575	3	5.3	3500	4.6	33.0	7.1	1	575	1	0.40	0.8	2.0
5	T/YHC067E3	1	208-230	3	4.3	3500	16.2	110.0	25.3	1	208-230	1	0.40	2.5	4.3
5	T/YHC067E4	1	460	3	4.3	3500	7.6	52.0	11.9	1	460	1	0.40	1.0	2.2
5	T/YHC067EW	1	575	3	6.1	3500	5.3	38.9	8.3	1	575	1	0.40	0.8	2.0

Electrical Data

Table 27. Electrical characteristics - evaporator fan motor - 60 cycle - direct drive - high efficiency

Ton	Unit Model Number	Volts	Hz	Motor Phase	No.	FLA	LRA	bhp
3	T/YHC037E3	208-230	60	1	1	7.3	—	0.75
3	T/YHC037E4	208-230(a)	60	1	1	3.7	—	0.75
3	T/YHC037EW	575(b)	60	1	1	2.9	—	0.75
4	T/YHC047E3	208-230	60	1	1	9.4	—	1.00
4	T/YHC047E4	208-230(a)	60	1	1	4.7	—	1.00
4	T/YHC047EW	575(b)	60	1	1	3.8	—	1.00
5	T/YHC067E3	208-230	60	1	1	9.4	—	1.00
5	T/YHC067E4	208-230(a)	60	1	1	4.7	—	1.00
5	T/YHC067EW	575(b)	60	1	1	3.8	—	1.00

(a) Precedent models with 460 volt supply power will utilize a high efficiency (208-230)volt powered evaporator fan motor. Amperage draw is measured at transformer input.
(b) 575V rated units utilize a high efficiency 230V evaporator fan motor powered through a 575/230V transformer. Motor voltage/ FLA rated at transformer input.

Table 28. Electrical characteristics - inducer motor

Unit Model Number	Stage	hp	rpm	Volts	Motor Phase	LRA
YHC037-067E	1	1/35	3000	208-230	1	0.6

Table 29. Electrical characteristics - premix blower motor (ultra low NOx gas furnace option)

Unit Model Number	Stage	hp	rpm	Volts	Motor Phase	LRA
Models with digit 34 = A	1	1/12	7500	115	1	n/a

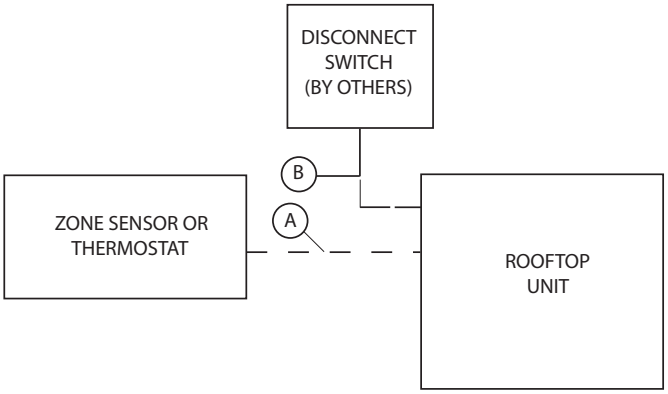
Table 30. Electrical characteristics — power exhaust (cooling and gas/electric)

Tons	Volts	Motor Phase	hp	rpm	FLA	LRA
3-5	208-230	1	0.33	1075	2.2	3.9
3-5	460	1	0.33	1075	1.1	2.0
3-5	575	1	0.33	1075	1.0	1.8

Jobsite Connections

Table 31. Typical number of wires

	Zone Sensors	
A	Manual Changeover.....	4
	Manual/Auto Changeover.....	5
	Manual/Auto Changeover with Status Indication LED's.....	10
	Programmable Night Setback with Status Indication LED's.....	7
	Thermostats	
A	3 Wires, 24V, Cooling only	
	4 Wires, 24V, with Electric Heat	
B	3 Power Wires + 1 Ground Wire (3-phase)	
	2 Power Wires + 1 Ground Wire (1-phase)	



For specific wiring information, see the installation instructions.
All wiring except power wire is low voltage.
All customer supplied wiring to be copper and must conform to applicable electrical codes (such as NEC or CEC) and local electric codes. Wiring shown dotted is to be furnished and installed by the customer.

Dimensional Data

Figure 4. Cooling and gas/electric - 3 tons high efficiency

Notes:
1. All dimensions are in inches/millimeters.
2. ½ NPT Gas Connection = (Y_C Models only); 2 inch Electrical Connection: Single Point Power When Heat Installed (T_C Models only.)

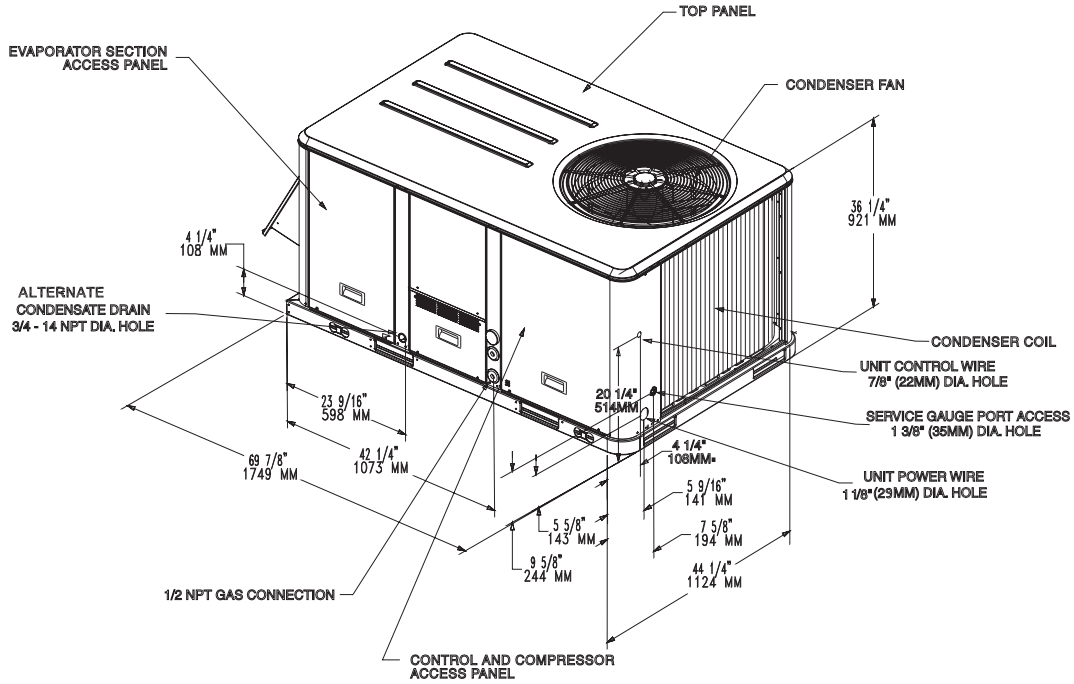


Figure 5. Cooling and gas/electric - 3 tons high efficiency, downflow airflow supply/return - through the base utilities

Note: All dimensions are in inches/millimeters.

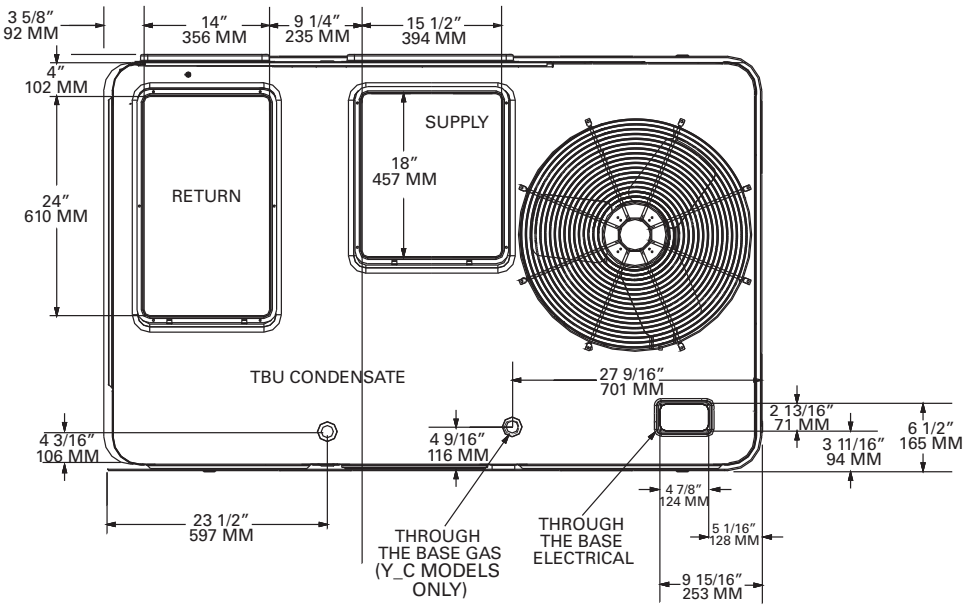


Figure 6. Cooling and gas/electric - 3 tons high efficiency - horizontal airflow supply/return

Note: All dimensions are in inches/millimeters.

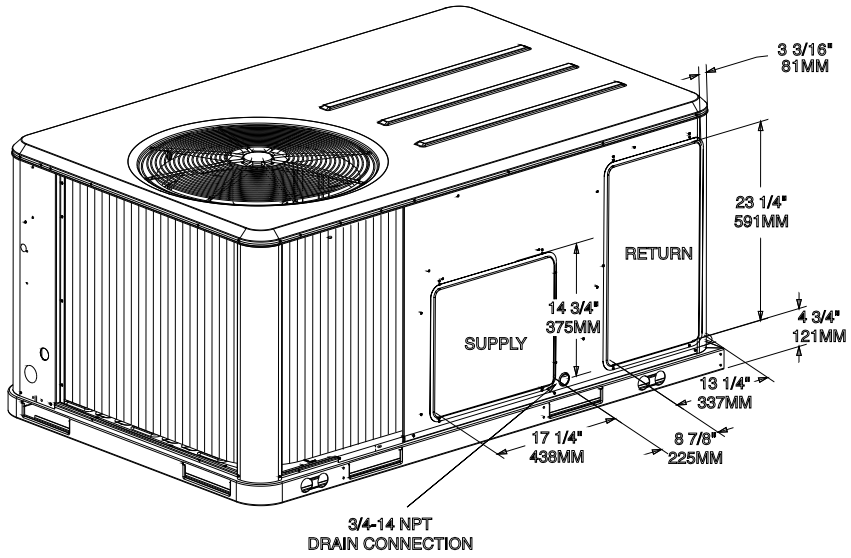
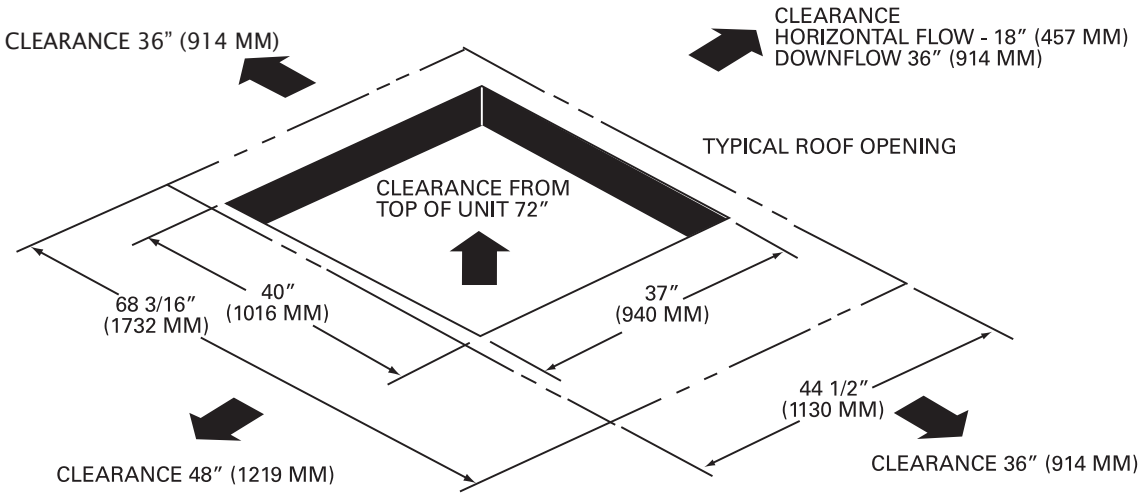


Figure 7. Cooling and gas/electric - 3 tons high efficiency, unit clearance and roof opening

Note: All dimensions are in inches/millimeters.



Dimensional Data

Figure 8. Cooling and gas/electric - 3 tons high efficiency - roof curb

Note: All dimensions are in inches/millimeters.

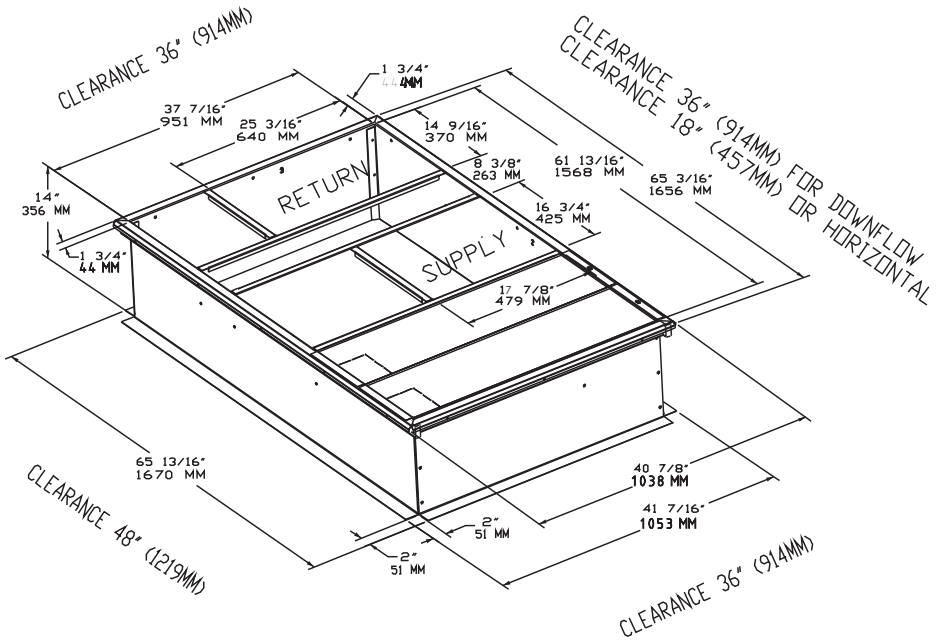


Figure 9. Cooling and gas/electric - 3 tons high efficiency - downflow duct connections - field fabricated

Note: All dimensions are in inches/millimeters.

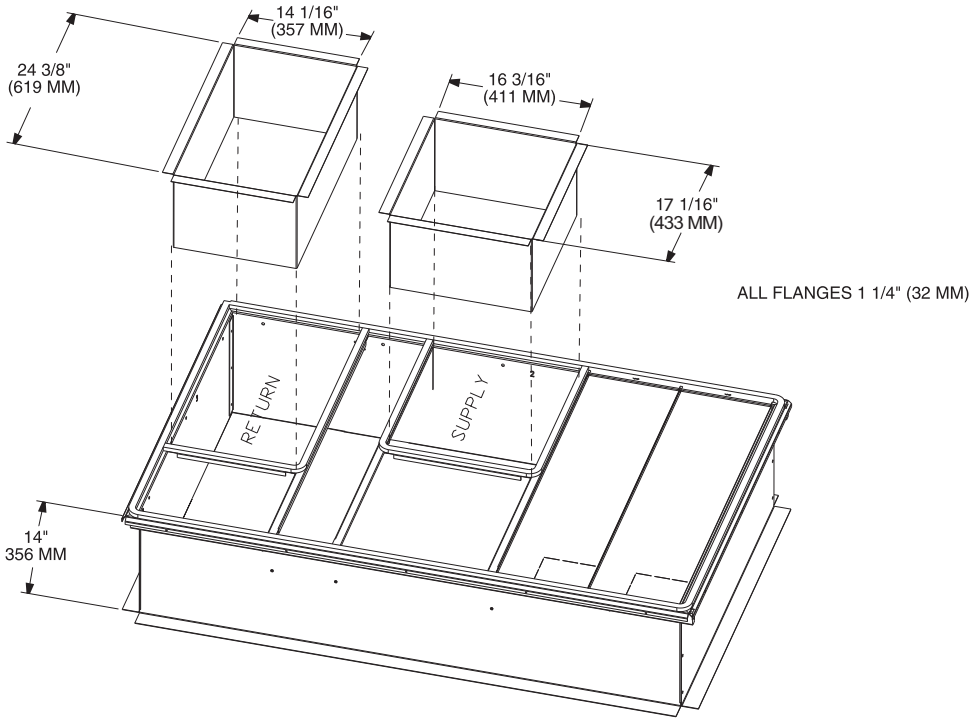


Figure 10. Cooling and gas/electric - 3 tons high efficiency - economizer, manual or motorized fresh air damper; power exhaust

Note: All dimensions are in inches/millimeters.

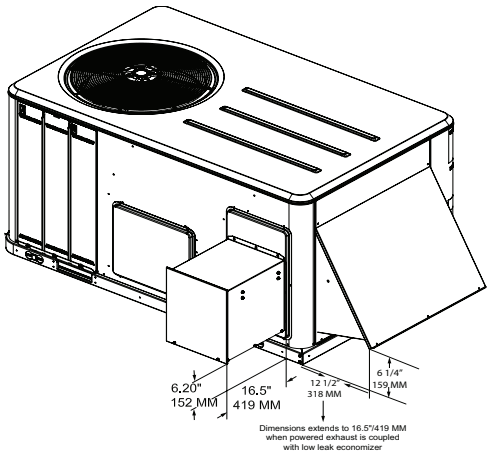


Figure 11. Cooling and gas/electric - 3 tons high efficiency economizer and barometric relief damper hood

Note: All dimensions are in inches/millimeters.

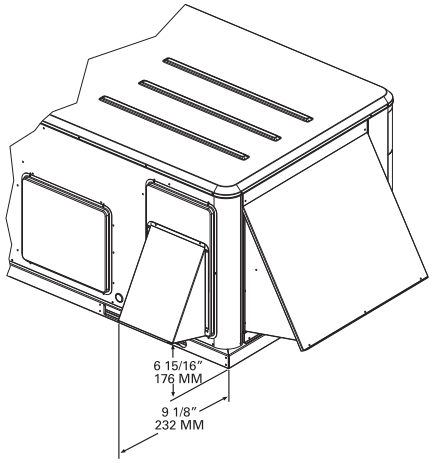


Figure 12. Cooling and gas/electric models - 3 tons high efficiency - swing diameter for hinged door(s) option

Note: All dimensions are in inches/millimeters.

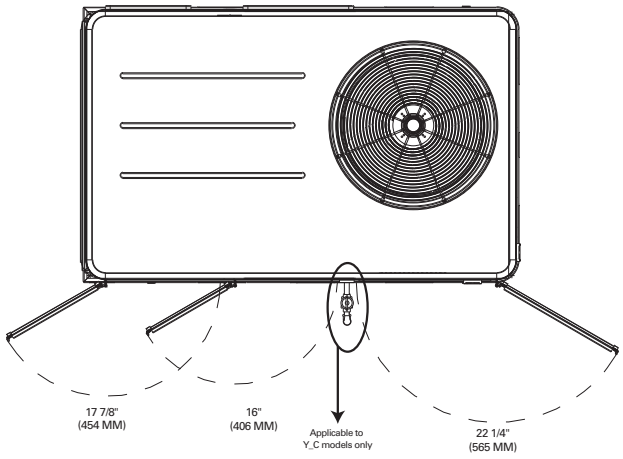
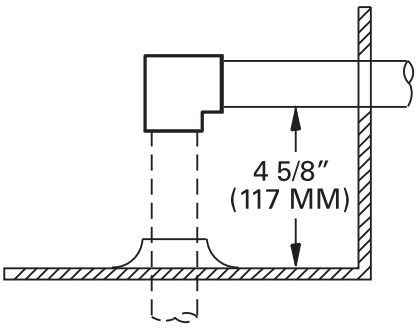


Figure 13. Gas/electric models - 3 tons high efficiency height of gas pipe required from inside base of unit to gas shut off assembly (factory provided) - Y_C models only

Note: All dimensions are in inches/millimeters.



TRANE

Dimensional Data

Figure 14. Cooling and gas/electric - 4-5 tons high efficiency

Note: All dimensions are in inches/millimeters.

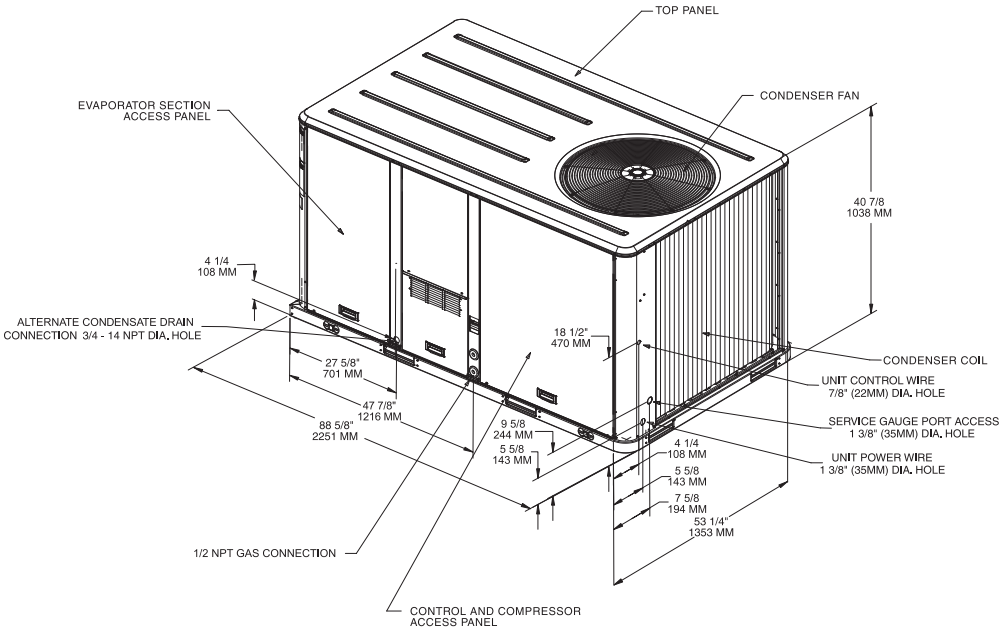


Figure 15. Cooling and gas/electric - 4-5 tons high efficiency - downflow airflow supply/return - through the base utilities

Note: All dimensions are in inches/millimeters.

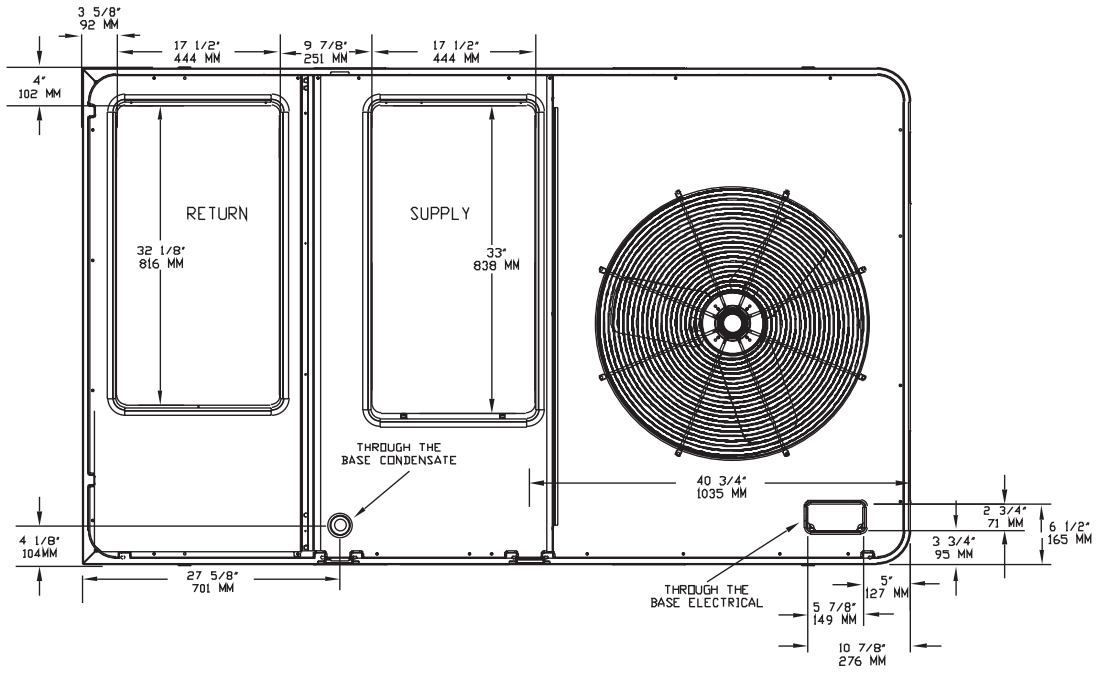


Figure 16. Cooling and gas/electric - 4-5 tons high efficiency - horizontal airflow supply and return

Note: All dimensions are in inches/millimeters.

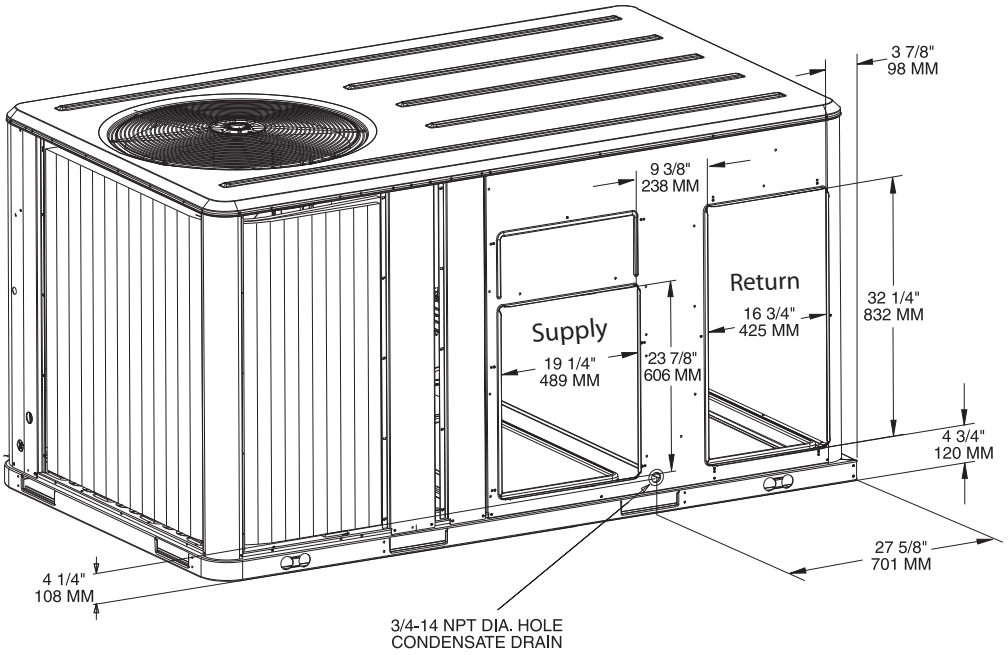


Figure 17. Cooling and gas/electric - 4-5 tons high efficiency - unit clearance and roof opening

Note: All dimensions are in inches/millimeters.

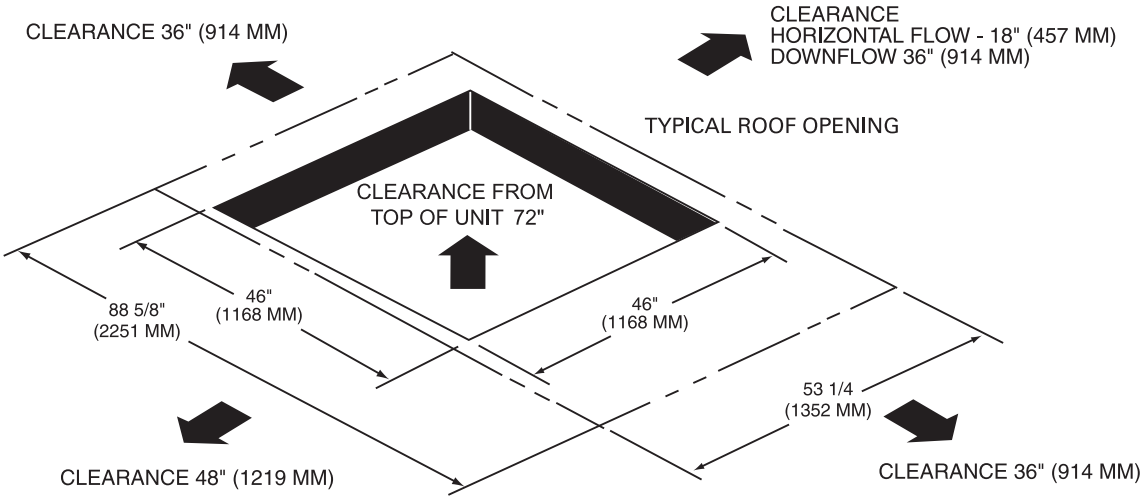


Figure 18. Cooling and gas/electric - 4-5 tons high efficiency - roof curb

Note: All dimensions are in inches/millimeters.

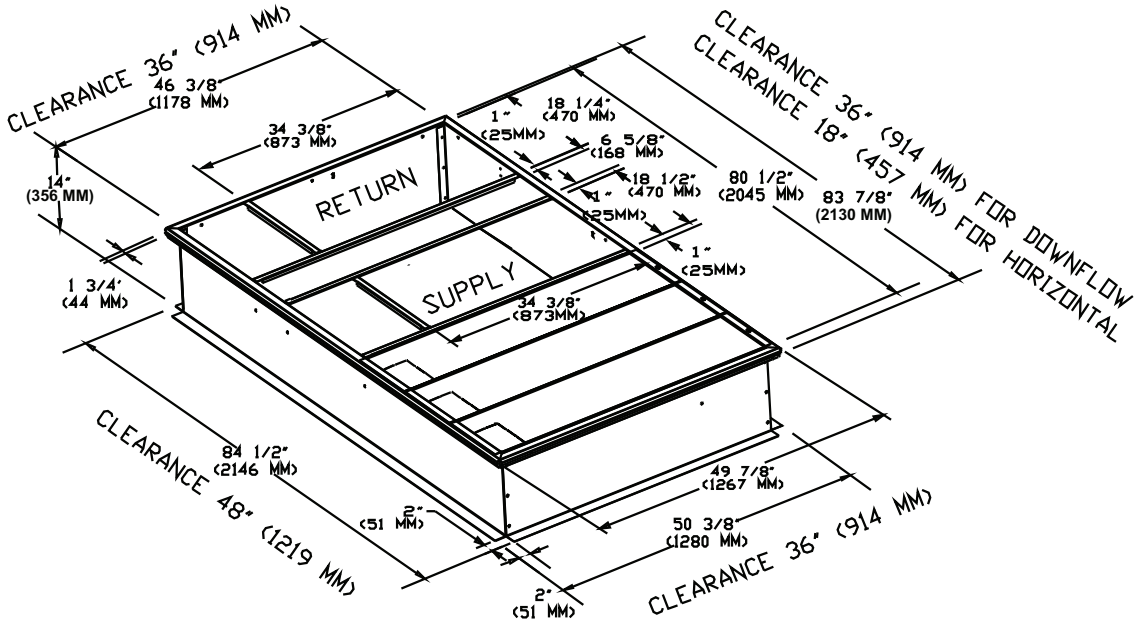


Figure 19. Cooling and gas/electric - 4-5 tons high efficiency - downflow duct connections field fabricated

Notes:
1. All dimensions are in inches/millimeters.
2. See "Clearance required from duct to combustible surfaces (inches)," p. 19 for duct clearance to combustible materials.

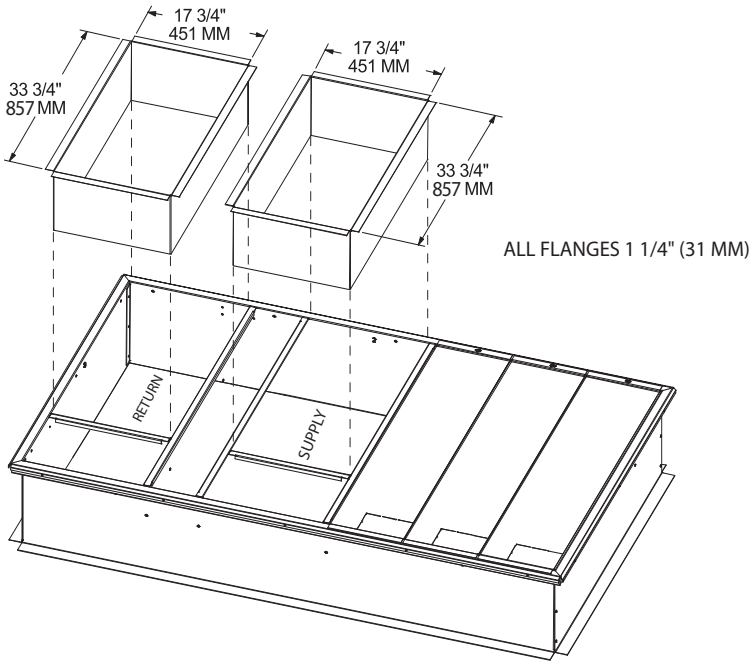


Figure 20. Cooling and gas/electric - 4-5 tons high efficiency - economizer, manual or motorized fresh air damper

Note: All dimensions are in inches/millimeters.

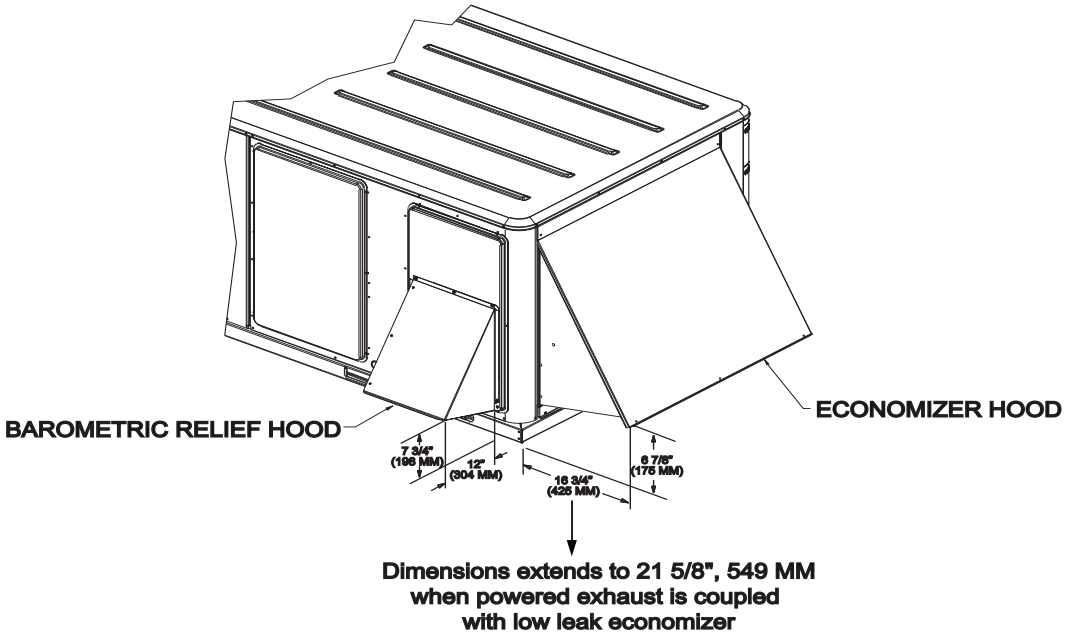
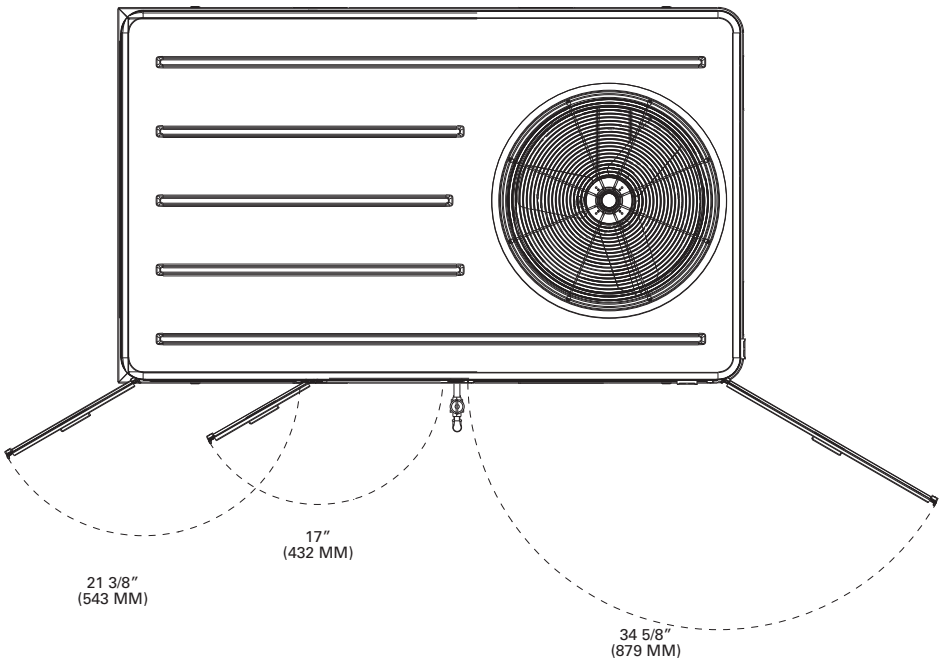


Figure 21. Cooling and gas/electric - 4-5 tons high efficiency - swing diameter for hinged door(s) option

Note: All dimensions are in inches/millimeters.



Weights

Table 32. Maximum unit and corner weights (lbs) and center of gravity dimensions (in.) - cooling models

	Unit	Maximum Model Weights[a]		Corner Weights[b]				Center of Gravity (in.)	
Tons	Model No.	Shipping	Net	A	B	C	D	Length	Width
3	THC037E	614	544	163	144	111	125	33	19
4	THC047E	787	692	220	178	132	163	40	23
5	THC067E	841	746	241	193	139	173	39	22

(a) Weights are approximate.
(b) Corner weights are given for information only.

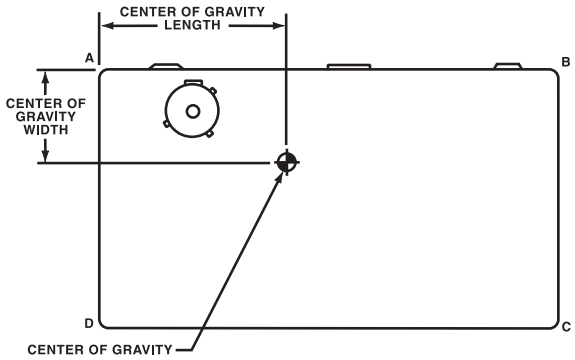


Table 33. Maximum unit and corner weights (lbs) and center of gravity dimensions (in.) - gas/electric models

	Unit	Maximum Model Weights[a]		Corner Weights[b]				Center of Gravity (in.)	
Tons	Model No.	Shipping	Net	A	B	C	D	Length	Width
3	YHC037E	676	606	178	162	126	139	33	19
4	YHC047E	858	763	238	200	148	176	40	23
5	YHC067E	917	822	261	218	156	187	40	22

(a) Weights are approximate.
(b) Corner weights are given for information only.

Table 34. Factory installed options (fiops)/accessory net weights (lbs)[a],[b]

	T/YHC037E	T/YHC047E-067E
	Net Weight	Net Weight
Accessory	3 Tons	4-5 Tons
460V/575V IDM Transformer[c]	29	29
Barometric Relief	7	10
Belt Drive Option (3 phase only)	31	31
Coil Guards	12	20
Economizer	26	36
Electric Heaters[d]	15	30
Hinged Doors	10	12
Low Leak Economizer	70	91
Manual Outside Air Damper	16	26

Table 34. Factory installed options (fiops)/accessory net weights (lbs)[a],[b] (continued)

	T/YHC037E	T/YHC047E-067E
	Net Weight	Net Weight
Accessory	3 Tons	4-5 Tons
Motorized Outside Air Damper	20	30
Novar Control	8	8
Oversized Motor	5	8
Powered Convenience Outlet	38	38
Powered Exhaust	40	40
Reheat Coil	12	14
Roof Curb	61	78
Smoke Detector, Supply	5	5
Smoke Detector, Return	7	7
Stainless Steel Heat Exchanger[e]	4	6
Through the Base Electrical	8	13
Through the Base Gas	5	5
Traq Dampers	10	15
Unit Mounted Circuit Breaker	5	5
Unit Mounted Disconnect	5	5
Ultra Low NOx Gas Furnace	22	22

(a) Weights for options not listed are <5 lbs.
(b) Net weight should be added to unit weight when ordering factory-installed accessories.
(c) Apply weight with all 460V/575V units.
(d) Applicable to Cooling units only.
(e) Applicable to Gas/Electric units only.

Mechanical Specifications

Standard

General

The units shall be convertible airflow. The operating range shall be between 125°F and 0°F in cooling as standard from the factory for units with microprocessor controls. Cooling performance shall be rated in accordance with AHRI testing procedures. All units shall be factory assembled, internally wired, fully charged with R-410A, and 100 percent run tested to check cooling operation, fan and blower rotation, and control sequence before leaving the factory. Wiring internal to the unit shall be colored and numbered for simplified identification. Units shall be cULus listed and labeled, classified in accordance for Central Cooling Air Conditioners.

Casing

Unit casing shall be constructed of zinc coated, heavy gauge, galvanized steel. Exterior surfaces shall be cleaned, phosphatized, and finished with a weather-resistant baked enamel finish. Unit's surface shall be tested 672 hours in a salt spray test in compliance with ASTM B117. Cabinet construction shall allow for all maintenance on one side of the unit. Service panels shall have lifting handles and be removed and reinstalled by removing two fasteners while providing a water and air tight seal. All exposed vertical panels and top covers in the indoor air section shall be insulated with a cleanable foil-faced, fire-retardant permanent, odorless glass fiber material. The base of the unit shall be insulated with 1/8 inch, foil-faced, closed-cell insulation. All insulation edges shall be either captured or sealed. The unit's base pan shall have no penetrations within the perimeter of the curb other than the raised 1 1/8 inch high downflow supply/return openings to provide an added water integrity precaution, if the condensate drain backs up. The base of the unit shall have provisions for forklift and crane lifting, with forklift capabilities on three sides of the unit.

Compressors

All units shall have direct-drive, hermetic, variable stage scroll type compressors with centrifugal type oil pumps. Motor shall be suction gas-cooled and shall have a voltage utilization range of plus or minus 10 percent of unit nameplate voltage. Internal overloads shall be provided with the scroll compressors.

Crankcase heaters shall be included on all 3-5 ton units.

Variable speed compressors are outstanding for humidity control and light load cooling conditions.

Controls

Unit shall be completely factory-wired with necessary controls and contactor pressure lugs or terminal block for power wiring. Unit shall provide an external location for mounting a fused disconnect device.

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

Enhanced Dehumidification

Enhanced Dehumidification will be available on all units equipped with a Space Humidity sensor, regardless of whether the unit is configured with traditional Hot Gas Reheat (see p. 10). Humidity levels are decreased while increasing the comfort level in an air space through advanced controls of compressor and indoor fan operation.

Evaporator and Condenser Coils

Internally finned, 5/16 inch copper tubes mechanically bonded to a configured aluminum plate fin shall be standard. Coils shall be leak tested at the factory to ensure the pressure integrity. The evaporator coil and condenser coil shall be leak tested to 600 psig. The assembled unit shall be leak tested to 465 psig. The condenser coil shall have a patent pending 1+1+1 hybrid coil designed with slight gaps for ease of cleaning. A plastic, dual-sloped, removable and reversible condensate drain pan with through-the-base condensate drain is standard.

Filters

Throwaway filters shall be standard on all units. Optional 2-inch MERV 8 and MERV 13 filters shall also be available.

Gas Heating Section

The heating section shall have a progressive tubular heat exchanger design using corrosion resistant steel throughout. An induced draft combustion blower shall be used to pull the combustion products through the firing tubes. The heater shall use a direct spark ignition (DSI) system. On initial call for heat, the combustion blower shall purge the heat exchanger for 20 seconds before ignition After three unsuccessful ignition attempts, the entire heating system shall be locked out until manually reset at the thermostat/zone sensor.

High Pressure Control

All units include High Pressure Cutout as standard.

Indoor Fan

All 3-5 ton units have variable speed, direct drive motors. All motors shall be thermally protected. All indoor fan motors meet the U.S. Energy Policy Act of 1992 (EPACT).

Outdoor Fans

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

Phase Monitoring Protection

Precedent™ units with 3-phase power are equipped with phase monitoring protection as standard. These devices protect motors and compressors against problems caused by phase loss, phase imbalance and phase reversal indication.

Refrigerant Circuits

Each refrigerant circuit offer thermal expansion valve as standard. Service pressure ports, and refrigerant line filter driers are factory-installed as standard. An area shall be provided for replacement suction line driers.

Unit Top

The top cover shall be one piece construction or where seams exist, it shall be outside the indoor air-conditioned section. The ribbed top adds extra strength and prevents water from pooling on unit top.

Factory Installed Options

Black Epoxy Pre-Coated Coils

The black epoxy coils have a thermoset vinyl coating that is bonded to the aluminum fin stock prior to the fin-stamping process. The pre-coated coils are an economical option for protection in mildly corrosive environments.

CO_2 Sensor Wiring

The unit wiring for field installed $C0_2$ sensors. Factory-installed $C0_2$ sensor wiring saves time and ensures proper unit connections for the field installed $C0_2$ sensor kits.

Condensate Overflow Switch

This option shall shut the unit down in the event that a clogged condensate drain line prevents proper condensate removal from the unit.

CompleteCoat™ Coils

The cathodic epoxy type electrodisposition coating is formulated for high edge build to plate fin and tube heat exchangers. The coating is selected to provide excellent resistance and durability to corrosive effects of alkalies, acids, alcohols, petroleum, seawater, salt air and corrosive environments.

Dehumidification (Hot Gas Reheat Option)

When a unit is configured with the dehumidification option, the unit will attempt to satisfy space humidity requirements utilizing the enhanced dehumidification control sequence (see p. 7).

This option allows for increased outdoor air ventilation. It reduces humidity levels while increasing comfort level in the air space. Cooling can operate without a demand for dehumidification. The hot gas reheat coil is designed to deliver maximum reheat temperatures.

Fault Detection and Diagnostics (FDD)

This offering meets the mandatory requirement of CA Title 24 of fully configurable diagnostics allowing fault history and reading fault codes at the unit. This option provides detection of the following faults: Air temperature sensor failure/fault and notification of acceptable economizer mode. The FDD system shall be certified by the Energy Commission as meeting the requirements.

Heat Exchanger

The compact cabinet features a tubular heat exchanger in low, medium and high heat capacities.

The heat exchanger is fabricated using corrosion-resistant aluminized steel tubes and burners as standard on all models. It has an induced draft blower to pull the gas mixture through the burner tubes. The heater has a direct spark ignition system which doubles as a safety device to prove the flame.

Hinged Access Doors

Sheet metal hinges are available on the Filter/Evaporator, Supply Fan/Heat, and the Compressor/ Control Access Doors.

Human Interface

The Human Interface shall have a 5 inch color touchscreen display that conforms to FCC Part 15 Class B with an Ingress Protection Rating of IP24.The display text shall be readable by a person with 20/20 vision at a distance of 3 feet and 60° angle at lighting levels ranging from 100 lux - 25,000 lux. Also, the display shall operate at temperatures of -40° C to 70° C. Firmware and unit configurations shall be able to be restored via a USB storage device.

Multiple-Zone VAV Control

Multiple-zone VAV control shall vary the speed of the indoor fan to maintain the duct static pressure at a setpoint. In cooling mode, the compressors shall be cycled (or economizer modulated) to maintain the supply air temperature (SAT) at the desired setpoint. In heating mode, the indoor fan shall operate at maximum speed whenever the heater operating.

Powered or Unpowered Convenience Outlet

This is a GFCI, 120V/15amp, 2 plug, convenience outlet, either powered or unpowered. When the convenience outlet is powered, a service receptacle disconnect will be available. The convenience outlet is powered from the line side of the disconnect or circuit breaker, and therefore will not be affected by the position of the disconnect or circuit breaker. This option can only be ordered when the Through-the-Base Electrical with either the Disconnect Switch or Circuit Breaker option is ordered.

Single Zone VAV[2] – One Zone Variable Air Volume Mode

Single-zone VAV shall vary the indoor fan speed as the zone cooling or heating load changes, while cooling capacity is cycled to maintain the supply air temperature at setpoint.The indoor fan shall operate at maximum speed whenever the heater operating.

Note: *SZVAV requires the use of a zone temperature sensor.*

Stainless Steel Drain Pan

This option provides excellent corrosion and oxidation resistance. Drain pan shall be reversible and constructed of 304 stainless steel.

Stainless Steel Heat Exchanger

The optional stainless steel heat exchanger is constructed of 409 stainless steel tubes and 439 stainless steel burners. It is resistant to corrosion and oxidation and easy to clean.

The high strength to weight ratio allows for high ventilation rates with gas units. It is an excellent option to compliment the dehumidification option as a high outside air ventilation unit.

With this option, a 10-year stainless steel heat exchanger warranty is standard.

Note: *Stainless steel heat exchanger is standard with Ultra Low NOx gas furnace option.*

Supply, Return, and Plenum Air Smoke Detector

With this option installed, if smoke is detected, all unit operation will be shut down. Reset will be manual at the unit. In order for the supply air smoke detector or return air smoke detector to properly sense smoke in the supply air stream or the return air stream, the air velocity entering the smoke detector unit must be between 500 - 4000 feet per minute. Equipment covered in this manual will develop an airflow velocity that falls within these limits over the entire airflow range specified in the evaporator fan performance table. Supply and/or Return Smoke Detectors may not be used with the Plenum Smoke Detector.

Thermal Expansion Valve

Thermal Expansion Valve is standard for all models.

[2] Single-Zone VAV requires the use of a zone temperature sensor. If a unit is configured for SZVAV, but is connected to a conventional thermostat, the unit will revert to multiple-speed (two-speed) indoor fan control

Through-the-Base Electrical Access

An electrical service entrance shall be provided allowing electrical access for both control and main power connections inside the curb and through the base of the unit. Option will allow for field installation of liquid-tight conduit and an external field-installed disconnect switch.

Through-the-Base Electrical with Circuit Breaker

This option is a thermal magnetic, molded case, HACR Circuit Breaker with provisions for through the base electrical connections. The circuit breaker will be installed in a water tight enclosure in the unit with access through a swinging door. Wiring will be provided from the switch to the unit high voltage terminal block. The circuit breaker will provide overcurrent protection, be sized per NEC and cULus guidelines, and be agency recognized by cULus.

Through-the-Base Electrical with Disconnect Switch

This 3-pole, molded case, disconnect switch with provisions for through the base electrical connections are available. The disconnect switch will be installed in the unit in a water tight enclosure with access through a swinging door. Wiring will be provided from the switch to the unit high voltage terminal block. The switch will be cULus agency recognized.

Note: *The disconnect switch will be sized per NEC and cULus guidelines but will not be used in place of unit overcurrent protection.*

Through-the-Base Gas Piping

The unit shall include a standard through the base gas provision. This option shall have all piping necessary including, black steel, manual gas shut-off valve, elbows, and union. The manual shut-off valve shall include a 1/8 inch NPT pressure tap. This assembly will require minor field labor to install (Gas/Electric Only).

Note: *Through-the-Base gas is not available with Ultra Low NOx gas furnace option.*

Trane® Air-Fi® Wireless

Air-Fi Wireless communication shall be factory installed and tested. Air-Fi Wireless conforms to ANSI/ASHRAE Standard 135-2016 (BACnet®/ZigBee®[3]).

Two-Inch Filters

Two-inch MERV 8 and MERV 13 media filters shall be available on all models.

Ultra Low NOx Gas Furnace (CA Only)

Gas heat models that provide 14 ng/J NOx furnace emissions to comply with California's South Coast Air Quality Management District (SCAQMD) and San Joaquin Valley Air Pollution Control District (SJVAPCD) requirements.

Factory or Field Installed Options

Clogged Filter/Fan Failure Switch

A dedicated differential pressure switch is available to achieve active fan failure indication and/or clogged filter indication. These indications will be registered with either a zone sensor with status indication lights or an Integrated Comfort™ System. This option is available for microprocessor controlled units.

[3] ZigBee is a registered trademark of the ZigBee Alliance.

Differential Pressure Switches

These sensors allow individual fan failure and dirty filter indication for microprocessor controlled units. The fan failure switch will disable all unit functions and “flash” the Service LED on the zone sensor. The dirty filter switch will light the Service LED on the zone sensor and will allow continued unit operation.

Discharge Air Temperature Sensing

This option provides true discharge air temperature sensing in heating models. This sensor is a status indicator readable through Tracer® or Tracker™ . This option is available for microprocessor controlled units.

Economizer (Standard)

This accessory shall be available with or without barometric relief. The assembly includes fully modulating 0-100 percent motor and dampers, minimum position setting, preset linkage, wiring harness with plug, spring return actuator and fixed dry bulb control. The barometric relief shall provide a pressure operated damper that shall be gravity closing and shall prohibit entrance of outside air during the equipment “off” cycle. Optional solid state or differential enthalpy control shall be available for either factory or field installation. The economizer arrives in the shipping position and shall be moved to the operating position by the installing contractor.

Electric Heaters

Electric heat modules shall be available for installation within basic unit. Electric heater elements shall be constructed of heavy-duty nickel chromium elements internally delta connected for 240V, wye connected for 480V and 600 V. Staging shall be achieved through ReliaTel™ . Each heater package shall have automatically reset high limit control operating through heating element contactors. All heaters shall be individually fused from the factory, where required, and shall meet all NEC and CEC requirements when properly installed. Power assemblies shall provide single-point connection. Electric heat modules shall be cULus listed.

Frostat™

This option is to be utilized as a safety device. The Frostat opens when temperatures on the evaporator coil fall below 10°F. The temperature will need to rise to 50°F before closing. This option should be utilized in low airflow or high outside air applications (cooling only).

LonTalk® Communication Interface

This option shall be provided to allow the unit to communicate as a Tracer® LCI-R device or directly with generic LonTalk Network Building Automation System Controls.

BACnet® Communication Interface

This option shall be provided to allow the unit to communicate directly with a generic open protocol BACnet MS/TP Network Building Automation System Controls.

Reference or Comparative Enthalpy

Reference Enthalpy is used to measure and communicate outdoor humidity. The unit receives and uses this information to provide improved comfort cooling while using the economizer. Comparative Enthalpy measures and communicates humidity for both outdoor and return air conditions, and return air temperature. The unit receives and uses this information to maximize use of economizer cooling, and to provide maximum occupant comfort control. Reference or Comparative Enthalpy option shall be available when a factory or field installed Downflow Economizer is ordered. This option is available on all downflow models.

Tool-less Hail Guards

Tool-less, hail protection quality coil guards are available for condenser coil protection.

Field Installed Options

CO_2 Sensor

The CO_2 sensor shall have the ability to monitor the concentration (parts per million, ppm) of CO_2 (Carbon Dioxide) in the air. As the CO_2 concentration changes, the outside air damper modulates to meet the current ventilation needs of the zone.

Two field installed kits are offered; CO_2 sensor and wiring or CO_2 sensor only. The CO_2 sensor only kit should be ordered with factory installed CO_2 sensor wiring. Factory installed CO_2 sensor wiring saves set-up time and ensures proper unit connections for the CO_2 sensor.

Duct Mounted Humidity Sensor

This duct-mounted humidity sensor is used to control activation of the hot gas reheat dehumidification option. The humidity sensor can be set for humidity levels between 40% and 60% relative humidity by adjusting the ReliaTel Options Module.

High Static Drive

The high static drive option shall allow the standard motor to operate with improved external static capabilities.

Manual Outside Air Damper

This rain hood and screen shall provide up to 50 percent outside air.

Motorized Outside Air Damper

Manually set outdoor air dampers shall provide up to 50 percent outside air. Once set, outdoor air dampers shall open to set position when indoor fan starts. The damper shall close to the full closed position when indoor fan shuts down.

Outside Air Measuring/Monitoring Control (Traq Dampers)

- Requires Low Leak Economizer (Factory or Field Installed)
- Includes
  - UC400 Controller
  - Damper Actuator
  - Pressure Sensors

Powered Exhaust

The powered exhaust, available for 3-5 ton units, shall provide exhaust of return air, when using an economizer, to maintain better building pressurization.

Programmable Night Setback

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 one (1) Occupied, one (1) Un-occupied, and one (1) Override program per day.

Remote Potentiometer

The minimum position setting of the economizer shall be adjusted with this accessory.

Roof Curb

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

Thermostat

Variable stage heating and cooling operation or one stage heating and cooling shall be available in either manual or automatic changeover. Automatic programmable electronic with night set back shall also be available.

Ventilation Override Accessory

With the Ventilation Override Accessory installed, the unit can be set to transition up to 3 different pre-programmed sequences for Smoke Purge, Pressurization, and Exhaust. The transition occurs when a binary input on the RTOM is closed (shorted). This would typically be a hard wired relay output from a smoke detector or fire control panel. The ventilation override accessory shall be available as field installed.

Wall Mounted Humidity Sensor

This wall-mounted humidity sensor is used to control activation of the hot gas reheat dehumidification option. The humidity sensor can be set for humidity levels between 40% and 60% relative humidity by adjusting the ReliaTel Options Module.

Wireless Zone Sensor

LCD display that provides heat, cool, auto or off. Includes two temperature setpoints and a lockable setting with °F or °C indicators.

Zone Sensor

This control shall be provided to interface with the Micro equipped units and shall be available in either manual, automatic programmable with night setback, with system malfunction lights, or remote sensor options.

ATTACHMENT 7

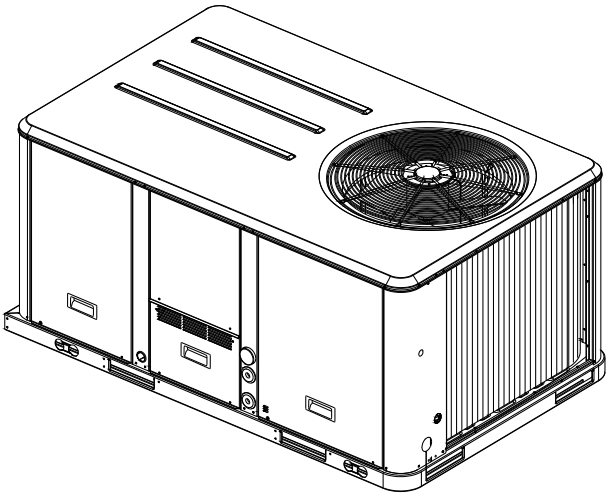
Trane - by Trane Technologies (NYSE: TT), a global climate innovator - creates comfortable, energy efficient indoor environments for commercial and residential applications. For more information, please visit trane.com or tranetechnologies.com.

RT-PRC048Q-EN 13 Sep 2021
Supersedes RT-PRC048P-EN (Jan 2021)

ATTACHMENT 7

Installation, Operation, and Maintenance

Packaged Rooftop Air Conditioners
Precedent™ — Gas/Electric
5 – 10 Tons – 50 Hz



Model Numbers YSC060ED - YSC120ED

⚠ SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

September 2012 **RT-SVX38B-EN**

Warnings, Cautions and Notices

Warnings, Cautions and Notices. Note that warnings, cautions and notices appear at appropriate intervals throughout this manual. Warnings are provide to alert installing contractors to potential hazards that could result in death or personal injury. Cautions are designed to alert personnel to hazardous situations that could result in personal injury, while notices indicate a situation that could result in equipment or property-damage-only accidents.

Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

Read this manual thoroughly before operating or servicing this unit.

ATTENTION: Warnings, Cautions and Notices appear at appropriate sections throughout this literature. Read these carefully:

⚠WARNING Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠CAUTION Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.

NOTICE: Indicates a situation that could result in equipment or property-damage only

Important Environmental Concerns!

Scientific research has shown that certain man-made chemicals can affect the earth's naturally occurring stratospheric ozone layer when released to the atmosphere. In particular, several of the identified chemicals that may affect the ozone layer are refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those containing Hydrogen, Chlorine, Fluorine and Carbon (HCFCs). Not all refrigerants containing these compounds have the same potential impact to the environment. Trane advocates the responsible handling of all refrigerants-including industry replacements for CFCs such as HCFCs and HFCs.

Responsible Refrigerant Practices!

Trane believes that responsible refrigerant practices are important to the environment, our customers, and the air conditioning industry. All technicians who handle refrigerants must be certified. The Federal Clean Air Act (Section 608) sets forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants and the equipment that is used in these service procedures. In addition, some states or municipalities may have additional requirements that must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.

⚠WARNING

Proper Field Wiring and Grounding Required!

All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes. Failure to follow code could result in death or serious injury.

⚠WARNING

Personal Protective Equipment (PPE) Required!

Installing/servicing this unit could result in exposure to electrical, mechanical and chemical hazards.

- **Before installing/servicing this unit, technicians MUST put on all Personal Protective Equipment (PPE) recommended for the work being undertaken. ALWAYS refer to appropriate MSDS sheets and OSHA guidelines for proper PPE.**
- **When working with or around hazardous chemicals, ALWAYS refer to the appropriate MSDS sheets and OSHA guidelines for information on allowable personal exposure levels, proper respiratory protection and handling recommendations.**
- **If there is a risk of arc or flash, technicians MUST put on all Personal Protective Equipment (PPE) in accordance with NFPA 70E or other country-specific requirements for arc flash protection, PRIOR to servicing the unit.**

Failure to follow recommendations could result in death or serious injury.

Revision Summary

RT-SVX38B-EN (10 September 2012)

- MERV 8 filter with filter removal tool
- Stainless steel drain pan, condensate overflow switch
- Updated Model Number Description, Maintenance, Troubleshooting

ATTACHMENT 7

Table of Contents

ATTACHMENT 7

Model Number Description

Y	S	C	0	3	6	E	3	R	Z	B	*	*
1	2	3	4	5	6	7	8	9	10	11	12	13

Digit 1 - Unit Type

Y DX Cooling, Gas Heat

Digit 2 - Efficiency

S Standard Efficiency
H High Efficiency

Digit 3 - Airflow

C Convertible

Digit 4,5,6 - Nominal Gross Cooling Capacity (MBh)

036 3 Ton
048 4 Ton
060 5 Ton
072 6 Ton
090 7½ Ton, Single Compressor
092 7½ Ton, Dual Compressor
102 8½ Ton
120 10 Ton

Digit 7 - Major Design Sequence

E R-410A Refrigerant
F Microchannel Type Condenser Coils[24]

Digit 8 - Voltage Selection

1 208/230/60/1
3 208-230/60/3
4 460/60/3
W 575/60/3

Digit 9 - Unit Controls

E Electromechanical
R ReliaTel™ Microprocessor

Digit 10 - Heating Capacity

L Low Heat
M Medium Heat
H High Heat
X Low Heat, Stainless Steel Heat Exchanger
Y Medium Heat, Stainless Steel Heat Exchanger
Z High Heat, Stainless Steel Heat Exchanger

Digit 11 - Minor Design Sequence

A First Sequence[21]
B Second Sequence[20]

Digit 12,13 - Service Sequence

** Factory Assigned

Digit 14 - Fresh Air Selection

0 No Fresh Air
A Manual Outside Air Damper 0-50%[4]
B Motorized Outside Air Damper 0-50%[28]
C Economizer, Dry Bulb 0-100% without Barometric Relief[7]
D Economizer, Dry Bulb 0-100% with Barometric Relief[7]
E Economizer, Reference Enthalpy 0-100% without Barometric Relief[3,7]
F Economizer, Reference Enthalpy 0-100% with Barometric Relief[3,7]
G Economizer, Comparative Enthalpy 0-100% without Barometric Relief[3,7]
H Economizer, Comparative Enthalpy 0-100% with Barometric Relief[3,7]

Digit 15 - Supply Fan/Drive Type/ Motor

0 Standard Drive[6]
1 Oversized Motor
2 Optional Belt Drive Motor[18]
6 Single Zone VAV[26]
7 Multi-Speed Indoor Fan[27]

Digit 16 - Hinged Service Access/Filters

0 Standard Panels/Standard Filters
A Hinged Access Panels/Standard Filters
B Standard Panels/2" MERV 8 Filters
C Hinged Access Panels/2" MERV 8 Filters
D Standard Panels/2" MERV 13 Filters
E Hinged Access Panels/2" MERV 13 Filters

Digit 17 - Condenser Coil Protection

0 Standard Coil
1 Standard Coil with Hail Guard
2 Black Epoxy Pre-Coated Condenser Coil[25]
3 Black Epoxy Pre-Coated Condenser Coil with Hail Guard[25]
4 CompleteCoat™ Condenser Coil
5 CompleteCoat™ Condenser Coil with Hail Guard

Digit 18 - Through the Base Provisions

0 No Through-the-Base Provisions
A Through-the-Base Electric[8]
B Through-the-Base Gas Piping[16]
C Through-the-Base Electric and Gas Piping[16]

Digit 19 - Disconnect/Circuit Breaker (three-phase only)

0 No Disconnect/No Circuit Breaker
1 Unit Mounted Non-Fused Disconnect[8]
2 Unit Mounted Circuit Breaker[8]

Digit 20 - Convenience Outlet

0 No Convenience Outlet
A Unpowered Convenience Outlet
B Powered Convenience Outlet (three-phase only)[9]

Digit 21 - Communications Options[3]

0 No Communications Interface
1 Trane Communications Interface
2 LonTalk® Communications Interface
3 Novar 2024 Controls[30]
4 Novar 3051 Controls without Zone Sensor[30]
5 Novar 3051Controls Interface with DCV[30]
6 BACnet™ Communications Interface

Digit 22 - Refrigeration System Option

0 Standard Refrigeration System[10]
B Dehumidification Option[22,23]

Digit 23 - Refrigeration Controls

Note: *Applicable to Digit 7 = E, F*

0 No Refrigeration Control[5]
1 Frostat[11,29]
2 Crankcase Heater[2]
3 Frostat[11,29] and Crankcase Heater[2]

Digit 24 - Smoke Detector[17]

0 No Smoke Detector
A Return Air Smoke Detector[12,13]
B Supply Air Smoke Detector
C Supply and Return Air Smoke Detectors[12,13]
D Plenum Smoke Detector

Digit 25 - System Monitoring Controls

0 No Monitoring Control[14]
1 Clogged Filter Switch[14]
2 Fan Failure Switch[14]
3 Discharge Air Sensing Tube[14]
4 Clogged Filter Switch and Fan Failure Switch[14]
5 Clogged Filter Switch and Discharge Air Sensing Tube[14]
6 Fan Failure Switch and Discharge Air Sensing Tube[14]
7 Clogged Filter Switch, Fan Failure Switch and Discharge Air Sensing Tube[14]
8 Novar Return Air Sensor (NOVAR 2024)[15,30]
9 Novar Zone Temp Sensor (NOVAR 3051)[19,30]
A Condensate Drain Pan Overflow Switch
B Clogged Filter Switch[14] and Condensate Drain Pan Overflow Switch
C Fan Failure Switch[14] and Condensate Drain Pan Overflow Switch
D Discharge Air Sensing[14] and Condensate Drain Pan Overflow Switch

Model Number Description

E Clogged Filter Switch[14], Fan Failure Switch[14] and Condensate Drain Pan Overflow Switch
F Clogged Filter Switch[14], Discharge Air Sensing Tube[14] and Condensate Drain Pan Overflow Switch
G Fan Failure Switch, Discharge Air Sensing Tube[14] and Condensate Drain Pan Overflow Switch
H Clogged Filter Switch[14], Fan Failure Switch[14], Discharge Air Sensing[14] and Condensate Drain Pan Overflow Switch

Digit 26 - System Monitoring Controls

0 No Monitoring Controls
A Demand Control Ventilation (CO_2)[31,32]

Digit 27 - Unit Hardware Enhancements

0 No Enhancements
1 Stainless Steel Drain Pan

Model Number Notes

1. Available on 3-5 ton models.
2. Standard on 4-5 Ton E3,4,W and 6-10 Ton Heat Pumps and all High Efficiency models.
3. Not available with electromechanical controls.
4. Manual outside air damper will ship factory supplied within the unit, but must be field installed.
5. High pressure control is standard on all units.
6. On 3-5 ton, multispeed direct drive is standard on single phase and 15 SEER. On 6-10 ton, multispeed direct drive is standard on all 10 ton and 7.5-8.5 ton high efficiency. Belt drive is standard on all other units.

Digit 15 = 0
Standard Efficiency
1 Phase = High Efficiency Multispeed Direct Drive Motor
3 Phase (3-8½ Ton) = Belt Drive
3 Phase (10 Ton) = Ultra High Efficiency Direct Drive Plenum Fan
High Efficiency
1 Phase = High Efficiency Multispeed Direct Drive Motor
3 Phase (3-5 ton) = High Efficiency Multispeed Direct Drive Motor
3 Phase (3-5 ton w/Dehumidification) = Belt Drive Motor
3 Phase (7½-10 ton) = Ultra High Efficiency Direct Drive Plenum Fan

7. Economizer with Barometric Relief is for downflow configured units only. Order Economizer without Barometric Relief for horizontal configuration. Barometric Relief for horizontal configured units must be ordered as field installed accessory.
8. Through the base electric required when ordering disconnect/circuit breaker options.
9. Requires use of Disconnect or Circuit Breaker.

Not Available
Standard Efficiency
10 Ton w/575V
High Efficiency
3-5 ton w/Standard Indoor Motor w/460V

10. Standard metering devices are TXVs.
11. Frostat cannot be field installed in electro-mechanical units.
12. The return air smoke detector may not fit up or work properly on the Precedent units when used in conjunction with 3rd party accessories such as bolt on heat wheels, economizers and power exhaust. Do not order the return air smoke detectors when using this type of accessory.
13. Return Air Smoke Detector cannot be ordered with Novar Controls.
14. These options are standard when ordering Novar Controls.
15. This option is used when ordering Novar Controls.
16. Includes gas piping and shutoff (field assembly required).
17. Not available with high temperature duct sensor accessory.
18. Digit 15 = 2

Standard Efficiency
1 Phase = Not Available
3 Phase = Not Available
High Efficiency
1 Phase = Not Available
3 Phase (3-5 ton) = **May be Ordered**
3 Phase (3-5 ton w/Dehumidification) = Not Available
3 Phase (6-10 ton) = Not Available

19. Novar Sensor utilized with Digit 21 = (4) Novar 3051 Controls without Zone Sensor.
20. Available for 10 ton standard efficiency models only.
21. Available for 3, 4, 5, 6, 7½, 8½ ton standard/high efficiency models only.
22. Requires selection of 2" Pleated Filters (option B or C) for Digit 16.
23. Not available on 6 ton units and all single phase or standard efficiency.
24. Standard on YSC 6, 7½ (single and dual systems), 8½, 10 ton standard efficiency models and YHC 4, 5, 6, 7½ ton high efficiency models (except for dehumidification models).
25. Epoxy coil and epoxy with hailguard options are not available for units with microchannel condenser coil.
26. Single Zone VAV is only available on 7.5-10 ton high efficiency and 10 ton standard efficiency products with ReliaTel™ controls.
27. Multi-speed indoor fan available only on 7.5 & 8.5 ton high efficiency, and 10 ton products with ReliaTel™ controls.
28. Motorized Outside Air Damper is not available on Multi-Speed or SZVAV (Single Zone Variable Air Volume) products.
29. Frostat standard on Multi-Speed and SZVAV (Single Zone Variable Air Volume) products.
30. Novar is not available with SZVAV products.
31. Demand Control Ventilation not available with electromechanical controls.
32. Demand Control Ventilation Option includes wiring only. The $C0_2$ sensor is a field-installed only option.

General Information

Unit Inspection

As soon as the unit arrives at the job site

- Verify that the nameplate data matches the data on the sales order and bill of lading (including electrical data).
- Verify that the power supply complies with the unit nameplate specifications.
- Visually inspect the exterior of the unit, including the roof, for signs of shipping damage.

If the job site inspection of the unit reveals damage or material shortages, file a claim with the carrier immediately. Specify the type and extent of the damage on the "bill of lading" before signing.

- Visually inspect the internal components for shipping damage as soon as possible after delivery and before it is stored. Do not walk on the sheet metal base pans.
- If concealed damage is discovered, notify the carrier's terminal of damage immediately by phone and by mail. Concealed damage must be reported within 15 days.
- Request an immediate joint inspection of the damage by the carrier and the consignee. Do not remove damaged material from the receiving location. Take photos of the damage, if possible. The owner must provide reasonable evidence that the damage did not occur after delivery.
- Notify the appropriate sales representative before installing or repairing a damaged unit.

Storage

Take precautions to prevent condensate from forming inside the unit's electrical compartments and motors if:

1. The unit is stored before it is installed; or,
2. The unit is set on the roof curb, and temporary heat is provided in the building. Isolate all side panel service entrances and base pan openings (e.g., conduit holes, Supply Air and Return Air openings, and flue openings) from the ambient air until the unit is ready for start-up.

Note: *Do not use the unit's heater for temporary heat without first completing the start-up procedure detailed under "Unit Start-Up," p. 32.*

The manufacturer will not assume any responsibility for equipment damage resulting from condensate accumulation on the unit's electrical and/or mechanical components.

Unit Nameplate

A Mylar unit nameplate is located on the unit's corner support next to the filter access panel. It includes the unit model number, serial number, electrical characteristics, refrigerant charge, as well as other pertinent unit data.

Compressor Nameplate

The nameplate for the compressors are located on the side of the compressor.

Unit Description

Before shipment, each unit is leak tested, dehydrated, charged with refrigerant and compressor oil, and run tested for proper control operation.

The condenser coils are either aluminum fin, mechanically bonded to copper tubing or all aluminum microchannel.

Direct-drive, vertical discharge condenser fans are provided with built-in thermal overload protection.

There are two control systems offered for these units. The electromechanical control option uses a thermostat to perform unit functions. The ReliaTel™ Control Module is a microelectronic control system that is referred to as "Refrigeration Module" (RTRM). The acronym RTRM is used extensively throughout this document when referring to the control system network.

These modules through Proportional/Integral control algorithms perform specific unit functions that governs unit operation in response to; zone temperature, supply air temperature, and/or humidity conditions depending on the application. The stages of capacity control for these units are achieved by starting and stopping the compressors.

The RTRM is mounted in the control panel and is factory wired to the respective internal components. The RTRM receives and interprets information from other unit modules, sensors, remote panels, and customer binary contacts to satisfy the applicable request for cooling.

Economizer Control Actuator (Optional)

ReliaTel™ Control

The ECA monitors the mixed air temperature, return air temperature, minimum position setpoint (local or remote), power exhaust setpoint, CO_2 setpoint, CO_2, and ambient dry bulb/enthalpy sensor or comparative humidity (return air humidity against ambient humidity) sensors, if selected, to control dampers to an accuracy of +/- 5% of stroke. The actuator is spring returned to the closed position any time that power is lost to the unit. It is capable of delivering up to 25 inch pounds of torque and is powered by 24 VAC.

RTCI - ReliaTel™ Trane Communication Interface (Optional)

This module is used when the application calls for an ICSTM building management type control system. It allows the control and monitoring of the system through an ICS panel. The module can be ordered from the factory or ordered as a kit to be field installed. Follow the installation instruction that ships with each kit when field installation is necessary.

RLCI - ReliaTel™ LonTalk® Communication Interface (Optional)

This module is used when the application calls for an ICSTM building management type control system that is LonTalk. It allows the control and monitoring of the system through an ICS panel. The module can be ordered from the factory or ordered as a kit to be field installed. Follow the installation instruction that ships with each kit when field installation is necessary.

RBCI - ReliaTel™ BACnet Communications Interface (Optional)

This module is used when the application calls for an open BACnet protocol. It allows the control and monitoring of the system through an ICS panel. The module can be ordered from the factory or as a kit to be field installed. Follow the installation instructions that ships with each kit when field installation is necessary.

RTOM - ReliaTel™ Options Module (Optional)

The RTOM monitors the supply fan proving, clogged filter, supply air temperature, exhaust fan setpoint, supply air tempering, Frostat™ and smoke detector. Refer to system input devices and functions for operation.

System Input Devices & Functions

The RTRM must have a zone sensor or thermostat input in order to operate the unit. The flexibility of having several mode capabilities depends upon the type of zone sensor or thermostat selected to interface with the RTRM.

The descriptions of the following basic Input Devices used within the RTRM network are to acquaint the operator with their function as they interface with the various modules. Refer to the unit's electrical schematic for the specific module connections.

The following controls are available from the factory for field installation.

Supply Fan Failure Input (Optional)

The Fan Failure Switch can be connected to sense indoor fan operation:

FFS (Fan Failure Switch) If air flow through the unit is not proven by the differential pressure switch connected to the RTOM (factory set point 0.07 "w.c.) within 40 seconds nominally, the RTRM will shut off all mechanical operations, lock the system out, send a diagnostic to ICS, and the SERVICE output will flash. The system will remain locked out until a reset is initiated either manually or through ICS.

Clogged Filter Switch (Optional)

The unit mounted clogged filter switch monitors the pressure differential across the return air filters. It is mounted in the filter section and is connected to the RTOM. A diagnostic SERVICE signal is sent to the remote panel if the pressure differential across the filters is at least 0.5" w.c. The contacts will automatically open when the pressure differential across the filters decreases to approximately 0.4" w.c. The clogged filter output is energized when the supply fan is operating and the clogged filter switch has been closed for at least 2 minutes. The system will continue to operate regardless of the status of the filter switch.

Note: *On units equipped with factory installed MERV 13 filters, a clogged filter switch with different pressure settings will be installed. This switch will close when the differential pressure is approximately 0.8' w.c. and open when the differential falls to 0.7" w.c.*

Condensate Drain Pan Overflow Switch (Optional)

ReliaTel Option

This input incorporates the Condensate Overflow Switch (COF) mounted on the drain pan and the ReliaTel Options Module (RTOM). When the condensate level reaches the trip point for 6 continuous seconds, the RTOM will shut down all unit functions until the overflow condition has cleared. The unit will return to normal operation after 6 continuous seconds with the COF in a non-tripped condition. If the condensate level causes unit shutdown more than 2 times in a 3 days period, the unit will be locked-out of operation requiring manual reset of diagnostic system through Zone Sensor or Building Automation System (BAS). Cycling unit power will also clear the fault.

Compressor Disable (CPR1/2)

This input incorporates the low pressure control (LPC) of each refrigeration circuit and can be activated by opening a field supplied contact installed on the LTB.

If this circuit is open before the compressor is started, the compressor will not be allowed to operate. Anytime this circuit is opened for 1 continuous second during compressor operation, the compressor for that circuit is immediately turned "Off". The compressor will not be allowed to restart for a minimum of 3 minutes should the contacts close.

If four consecutive open conditions occur during the first three minutes of operation, the compressor for that circuit will be locked out, a diagnostic communicated to the remote panel (if installed), and a manual reset will be required to restart the compressor.

Low Pressure Control

ReliaTel Control

When the LPC is opened for 1 continuous second, the compressor for that circuit is turned off immediately. The compressor will not be allowed to restart for a minimum of 3 minutes.

If four consecutive open conditions occur during an active call for cooling, the compressor will be locked out, a diagnostic communicated to ICS™, if applicable, and a

manual reset required to restart the compressor. On dual compressor units only the affected compressor circuit is locked out.

High Pressure Control

ReliaTel Control

The high pressure controls are wired in series between the compressor outputs on the RTRM and the compressor contactor coils. If the high pressure control switch opens, the RTRM senses a lack of current while calling for cooling and locks the compressor out.

If four consecutive open conditions occur during an active call for cooling, the compressor will be locked out, a diagnostic communicated to ICS™, if applicable, and a manual reset required to restart the compressor. On dual compressor units only the affected compressor circuit is locked out.

Lead/Lag Control (Dual Circuit Only)

ReliaTel Control Only

Lead/Lag is a selectable input located on the RTRM. The RTRM is configured from the factory with the Lead/Lag control disabled. To activate the Lead/Lag function, simply cut the wire connected to J3-8 at the RTRM. When it is activated, each time the designated lead compressor is shut off due to the load being satisfied, the lead compressor or refrigeration circuit switches. When the RTRM is powered up, i.e. after a power failure, the control will default to the number one circuit compressor.

Zone Sensor Module (ZSM) (BAYSENS106*)

This electronic sensor features three system switch settings (Heat, Cool, and Off) and two fan settings (On and Auto). It is a manual changeover control with single setpoint. (Cooling Setpoint Only)

Zone Sensor Module (ZSM) (BAYSENS108*)

This electronic sensor features four system switch settings (Heat, Cool, Auto, and Off) and two fan settings (On and Auto). It is a manual or auto changeover control with dual setpoint capability. It can be used with a remote zone temperature sensor BAYSENS077*.

Zone Sensor (BAYSENS110*)

This electronic sensor features four system switch settings (Heat, Cool, Auto, and Off) and two fan settings (On and Auto) with four system status LED's. It is a manual or auto changeover control with dual setpoint capability. It can be used with a remote zone temperature sensor BAYSENS077*.

Programmable Zone Sensor - (BAYSENS119*)

This 7 day programmable sensor features 2, 3 or 4 periods for Occupied or Unoccupied programming per day. If the power is interrupted, the program is retained in permanent memory. If power is off for an extended period of time, only the clock and day may have to be reset.

The Zone Sensor allows selection of 2, 3 or 4 system modes (Heat, Cool, Auto, and Off), two fan modes (On and Auto). It has dual temperature selection with programmable start time capability.

The occupied cooling set point ranges between 45 and 98 ° F. The heating set point ranges between 43 and 96°F.

A liquid crystal display (LCD) displays zone temperature, temperature set points, day of the week, time, and operational mode symbols.

The Option Menu is used to enable or disable applicable functions, i.e.; Morning Warm-up, Economizer minimum position override during unoccupied status, Fahrenheit or Centigrade, Supply air tempering, Remote zone temperature sensor, 12/24 hour time display, Smart fan, and Computed recovery.

During an occupied period, an auxiliary relay rated for 1.25 amps @ 30 volts AC with one set of single pole double throw contacts is activated.

Status Inputs (4 Wires Optional)

The ZSM can be wired to receive four (4) operating status signals from the RTRM (HEAT, COOL, SYSTEM "ON", SERVICE).

Four (4) wires from the RTRM should be connected to the appropriate terminals (7, 8, 9 & 10) on the ZSM.

Remote Zone Sensor (BAYSENS073*)

This electronic sensor features remote zone sensing and timed override with override cancellation. It is used with a Trane Integrated Comfort™ building management system.

Remote Zone Sensor (BAYSENS074*)

This electronic sensor features single setpoint capability and timed override with override cancellation. It is used with a Trane Integrated Comfort™ building management system.

Remote Zone Sensor (BAYSENS016*)

This bullet type temperature sensor can be used for outside air (ambient) sensing, return air temperature sensing, supply air temperature sensing, remote temperature sensing (uncovered). Wiring procedures vary according to the particular application and equipment involved. Refer to the unit's wiring diagrams for proper connections.

Remote Zone Sensor (BAYSENS077*)

This electronic sensor can be used with BAYSENS106*, 108*, 110*, 119* Remote Panels. When this sensor is wired to a BAYSENS119* Remote Panel, wiring must be 18 AWG ShieldedTwisted Pair (Belden 8760 or equivalent). Refer to the specific Remote Panel for wiring details.

Wireless Zone Sensor (BAYSENS050)

This electronic sensor features five system settings (Auto, Off, Cool, Heat, and Emergency Heat) and with On and

Auto fan settings. It is a manual or auto changeover control with dual setpoint capability. Other features include a timed override function, lockable system settings, and Fahrenheit or Celsius temperature display. Included with the wireless zone sensor will be a receiver that is to be mounted inside the unit, a mounting bracket, and a wire harness.

High Temperature Sensor (BAYFRST001*)

This sensor connects to the RTRM Emergency Stop Input on the LTB and provides high limit "shutdown" of the unit. The sensor is used to detect high temperatures due to a high thermal event in the air conditioning or ventilation ducts. The sensor is designed to mount directly to the sheet metal duct. Each kit contains two sensors. The return air duct sensor (X1310004001) is set to open at 135°F. The supply air duct sensor (X1310004002) is set to open at 240°F. The control can be reset after the temperature has been lowered approximately 25°F below the cutout setpoint.

Evaporator Frost Control

ReliaTel™ Option

This input incorporates the Frostat™ control (FOS) mounted in the indoor coil circuit and can be activated by closing a field supplied contact installed in parallel with the FOS.

If this circuit is open before the compressor is started, the compressor will not be allowed to operate. Anytime this circuit is opened for 1 continuous second during compressor operation, the compressor for that circuit is immediately turned "Off". The compressor will not be allowed to restart for a minimum of 3 minutes should the FOS close.

Discharge Line Temp Switch (DLTS)

The DLTS is looped in series with HPC and LPC. It prevents compressor from overheating (over 300 F° dome temp) in case of indoor fan failure (cooling) or outdoor fan failure (heating).

Phase Monitor

This sensor monitors voltage between the 3 conductors of the 3 phase power supply. Two LED lights are provided:

- The green light indicates that a balanced 3 phase supply circuit is properly connected.
- The red light indicates that unit operation has been prevented. There are two conditions that will prevent unit operation:
  - The power supply circuit is not balanced with the proper phase sequence of L1, L2, L3 for the 3 conductors of a 3 phase circuit.
  - The line to line voltage is not between 180 volts and 633 volts.

Unit Dimensions

Figure 1 illustrates the minimum operating and service clearances for either a single or multiple unit installation. These clearances are the minimum distances necessary to assure adequate serviceability, cataloged unit capacity, and peak operating efficiency.

Providing less than the recommended clearances may result in condenser coil starvation, “short-circuiting” of exhaust and economizer airflows, or recirculation of hot condenser air.

Figure 1. Typical installation clearances for single & multiple unit applications

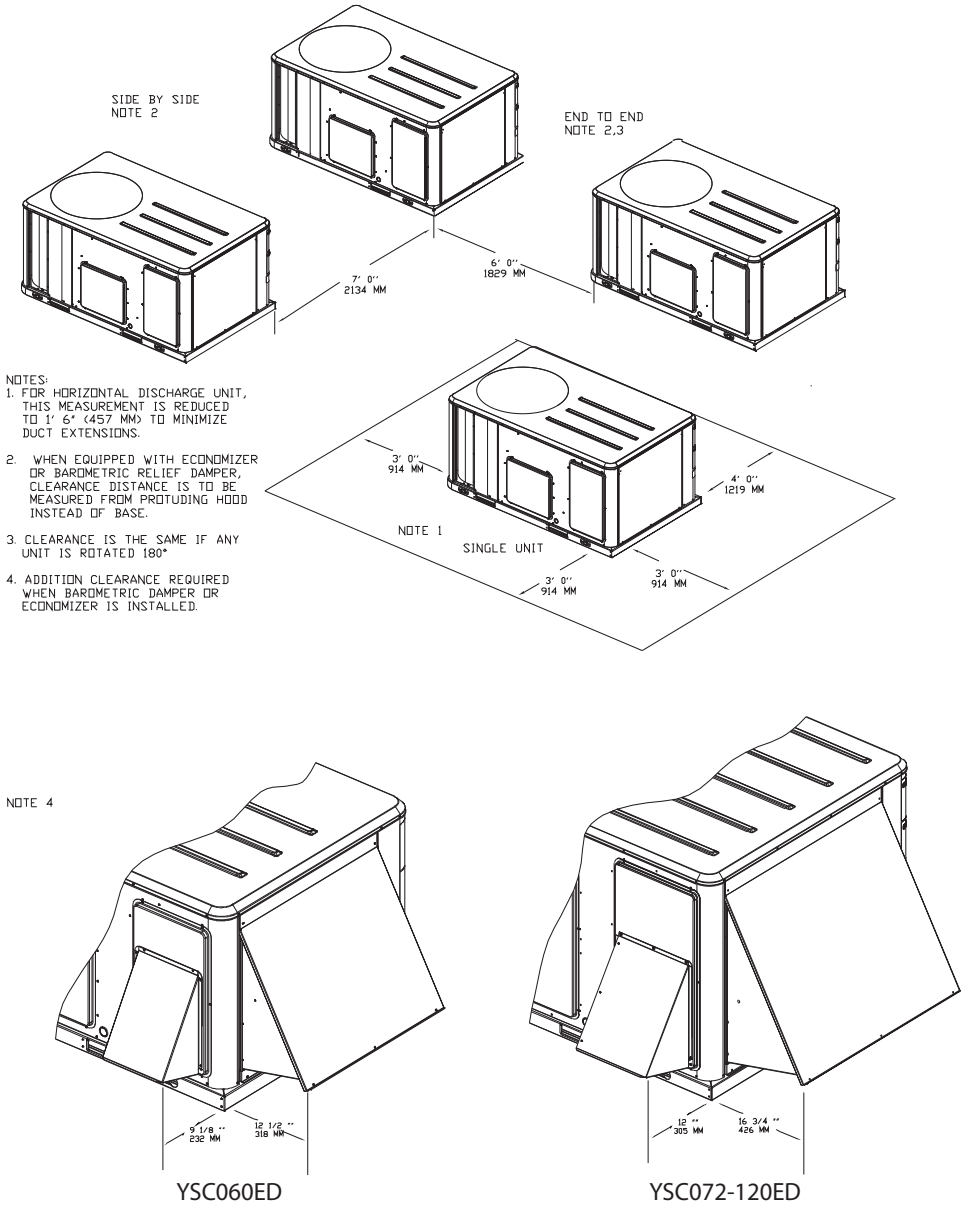


Figure 2. 5 tons standard efficiency

Notes:
1. All dimensions are in inches/millimeters.
2. ½ NPT Gas Connection

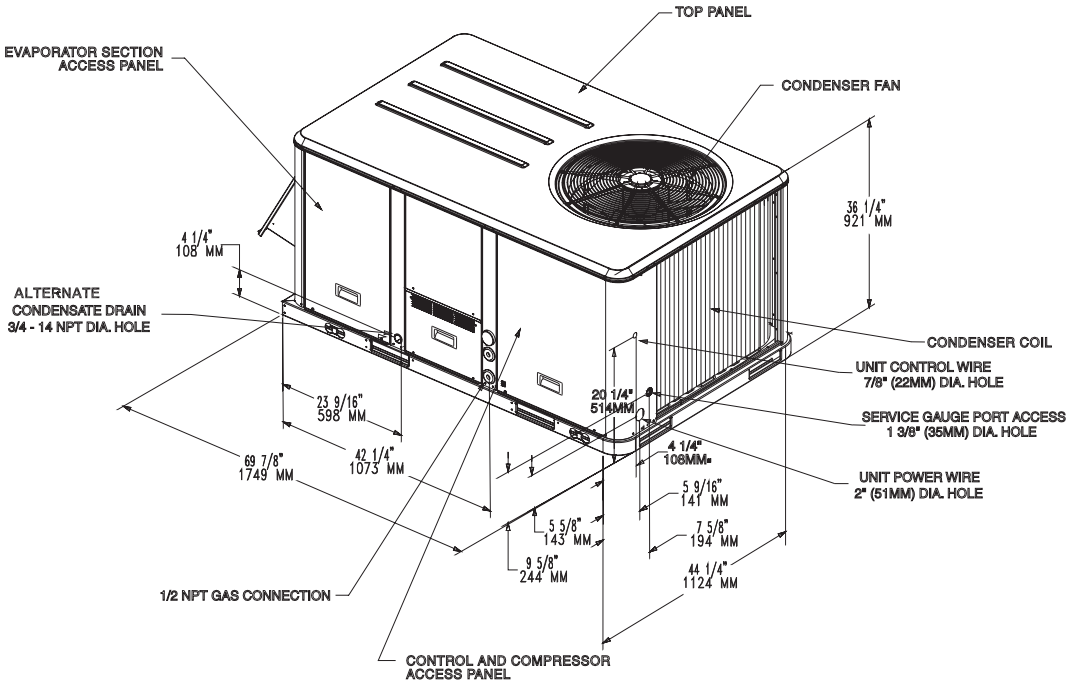
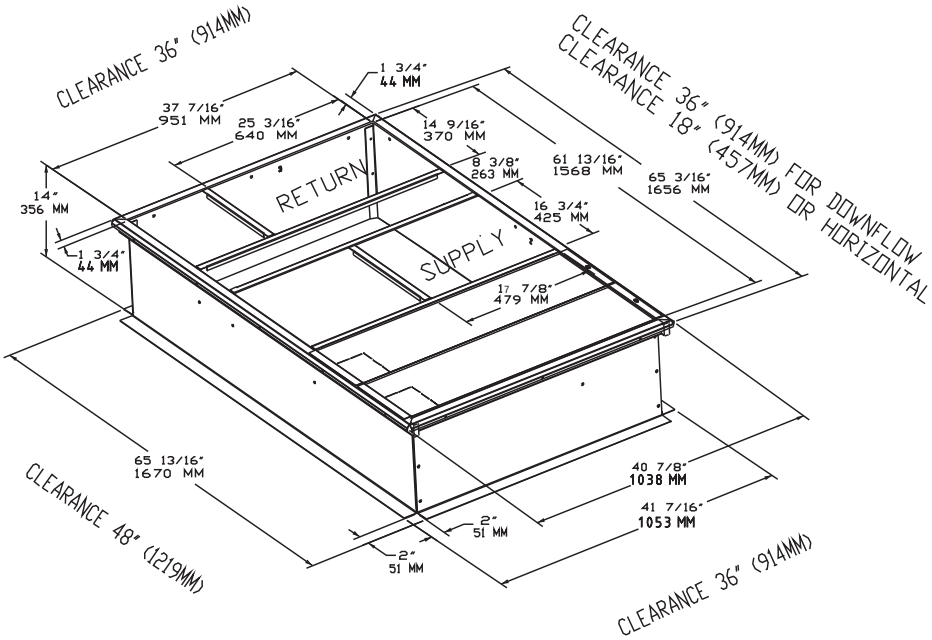


Figure 3. 5 tons standard efficiency - roof curb

Note: All dimensions are in inches/millimeters.



Unit Dimensions

Figure 4. 5 tons standard efficiency - unit clearance and roof opening

Note: All dimensions are in inches/millimeters.

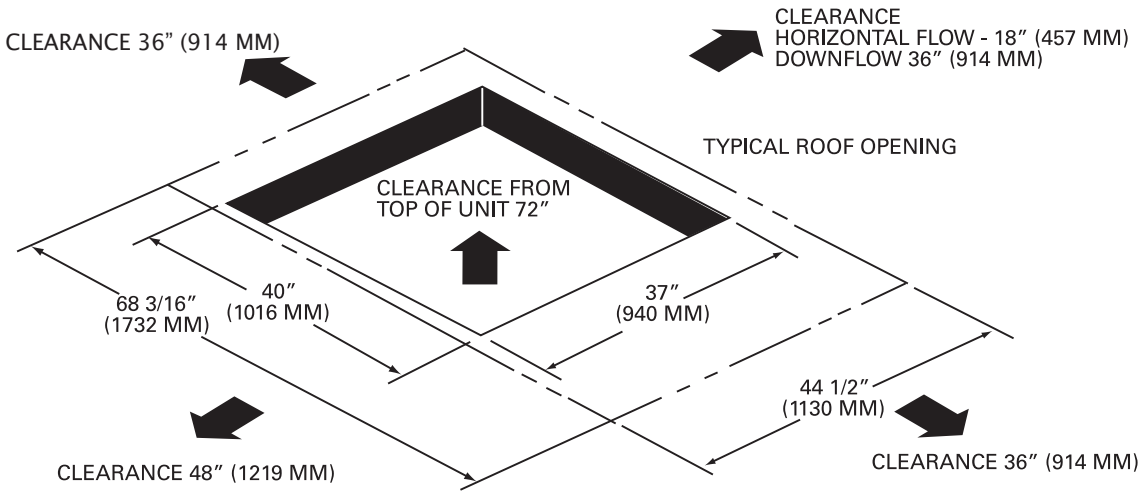


Figure 5. 6, 7½ tons standard efficiency

Note: All dimensions are in inches/millimeters.

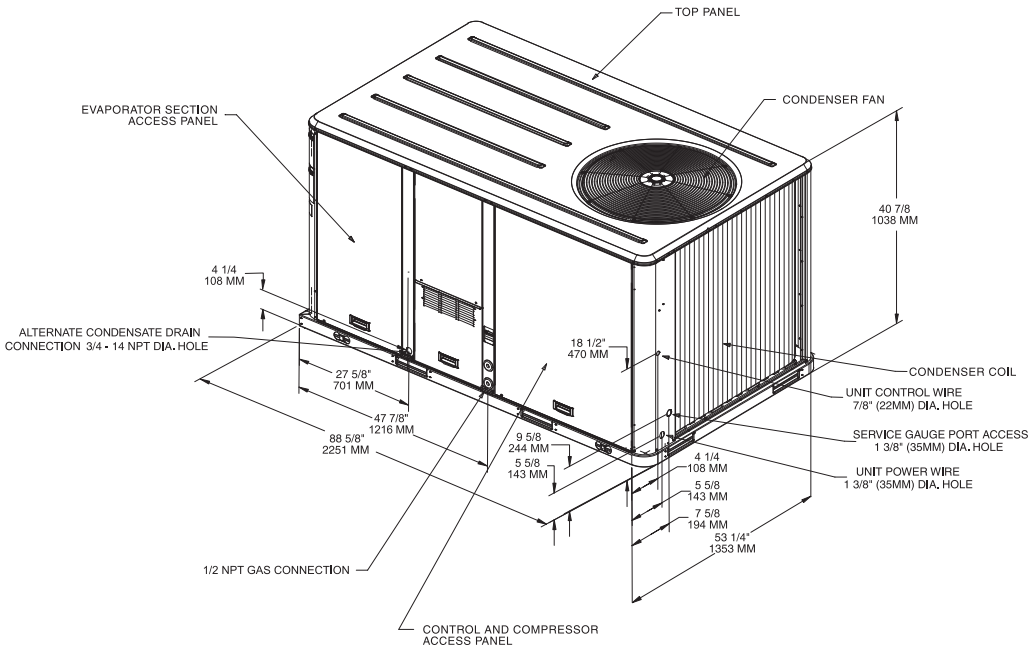


Figure 6. 6, 7½ tons standard efficiency - roof curb
Note: All dimensions are in inches/millimeters.

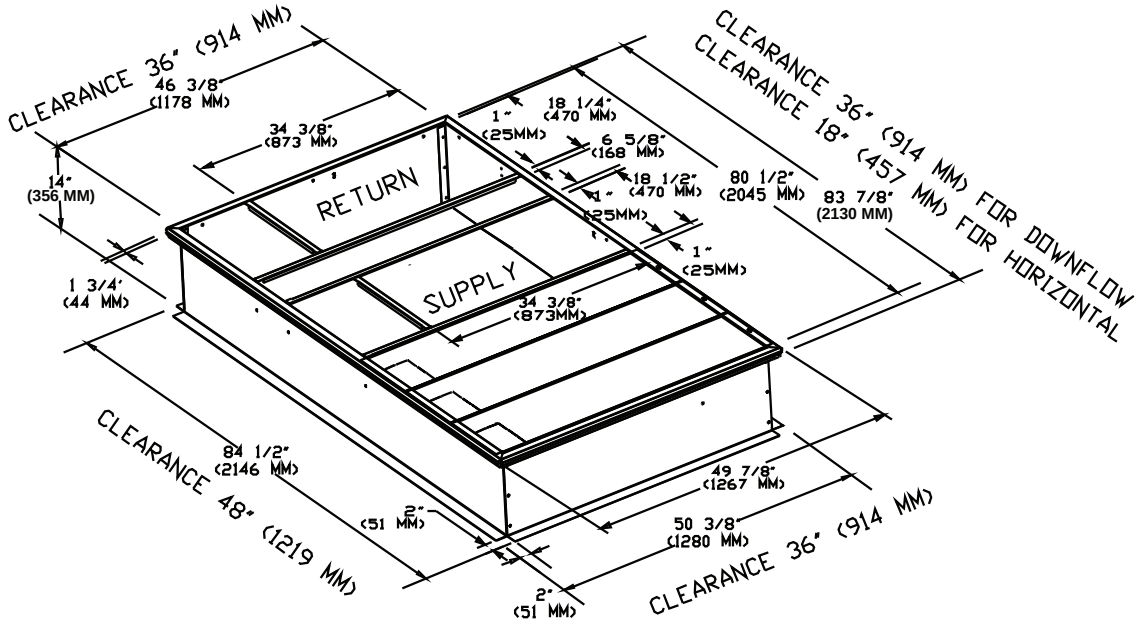
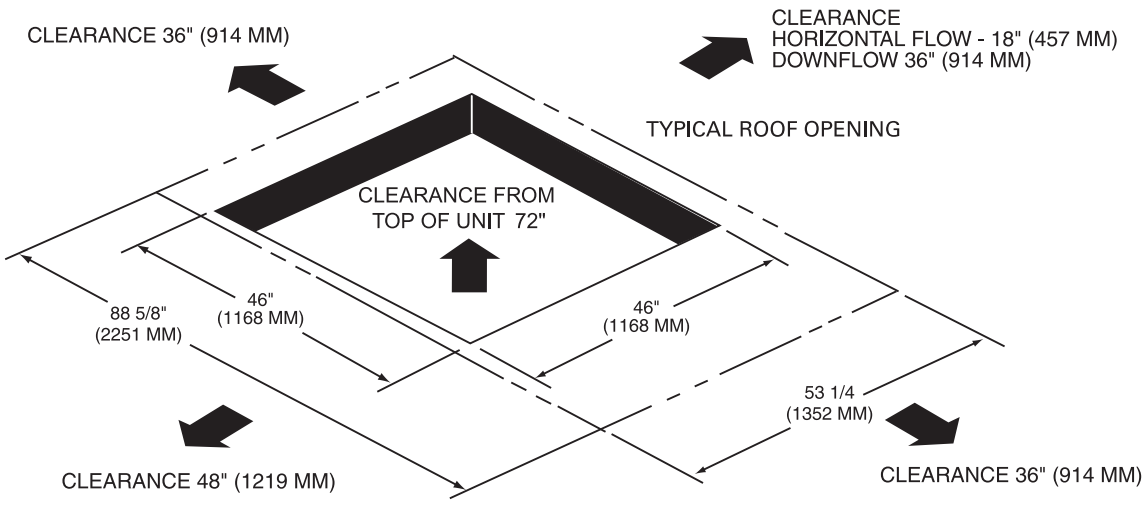


Figure 7. 6, 7½ tons standard efficiency - unit clearance and roof opening
Note: All dimensions are in inches/millimeters.



Unit Dimensions

Figure 8. 8½ - 10 tons standard efficiency
Note: All dimensions are in inches/millimeters.

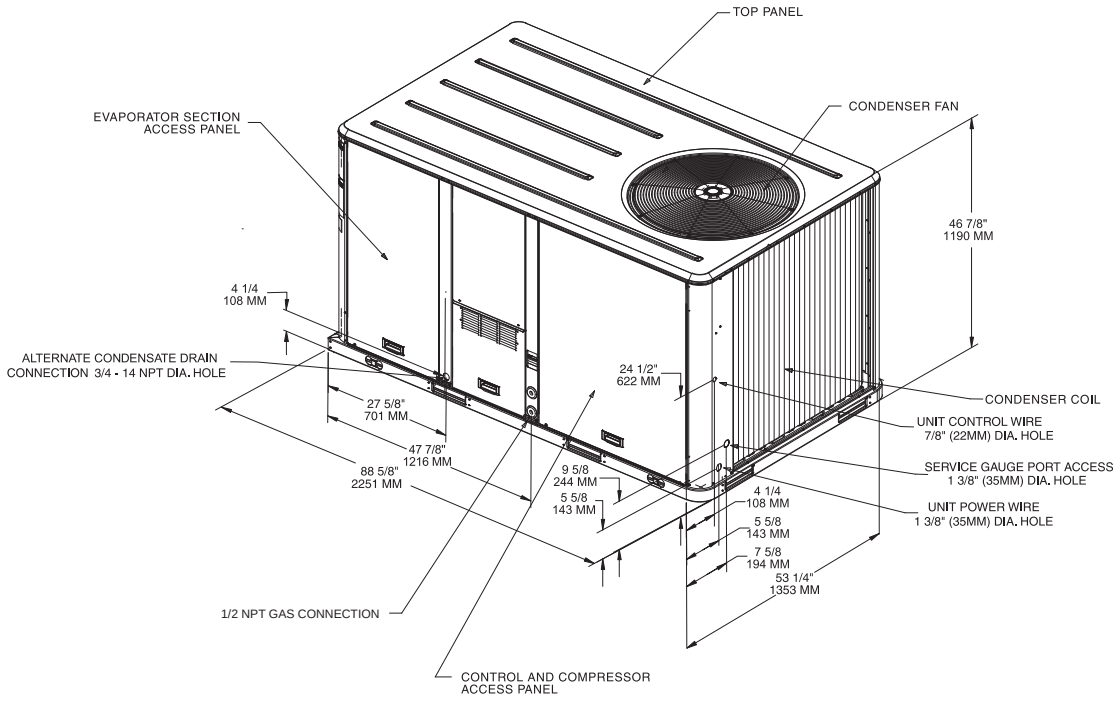


Figure 9. 8½ - 10 tons standard efficiency - roof curb
Note: All dimensions are in inches/millimeters.

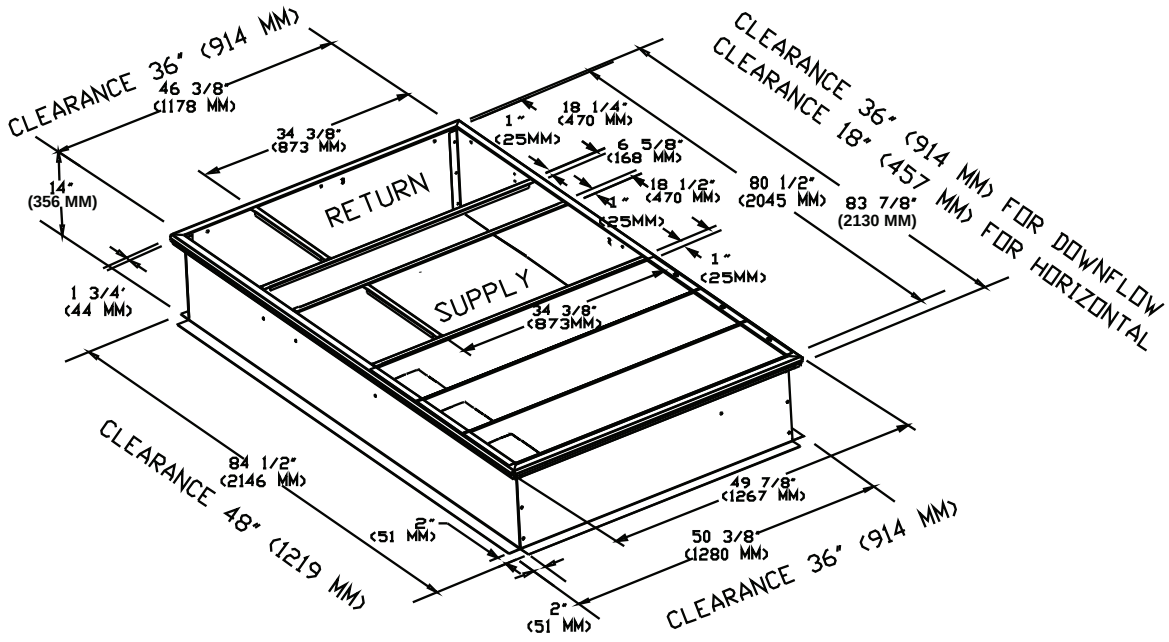
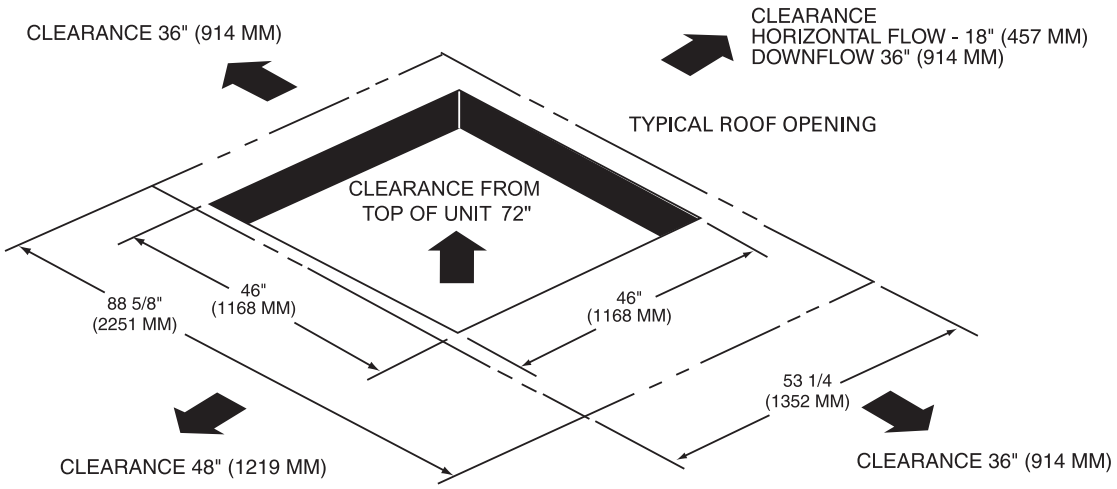


Figure 10. 8½ - 10 tons standard efficiency - unit clearance and roof opening
Note: All dimensions are in inches/millimeters.



Installation

Pre-Installation

⚠WARNING

Fiberglass Wool!

Product contains fiberglass wool. Disturbing the insulation in this product during installation, maintenance or repair will expose you to airborne particles of glass wool fibers and ceramic fibers known to the state of California to cause cancer through inhalation. Glass wool fibers may also cause respiratory, skin or eye irritation.

Precautionary Measures

- Avoid breathing fiberglass dust.
- Use a NIOSH approved dust/mist respirator.
- Avoid contact with the skin or eyes. Wear long-sleeved, loose-fitting clothing, gloves, and eye protection.
- Wash clothes separately from other clothing: rinse washer thoroughly.
- Operations such as sawing, blowing, tear-out, and spraying may generate fiber concentrations requiring additional respiratory protection. Use the appropriate NIOSH approved respiration in these situations.

First Aid Measures

Eye Contact - Flush eyes with water to remove dust. If symptoms persist, seek medical attention.

Skin Contact - Wash affected areas gently with soap and warm water after handling.

Procedure

⚠WARNING

Heavy Objects!

Ensure that all the lifting equipment used is properly rated for the weight of the unit being lifted. Each of the cables (chains or slings), hooks, and shackles used to lift the unit must be capable of supporting the entire weight of the unit. Lifting cables (chains or slings) may not be of the same length. Adjust as necessary for even unit lift. Other lifting arrangements could cause equipment or property damage. Failure to follow instructions above or properly lift unit could result in unit dropping and possibly crushing operator/ technician which could result in death or serious injury.

⚠WARNING

Improper Unit Lift!

Test lift unit approximately 24 inches to verify proper center of gravity lift point. To avoid dropping of unit, reposition lifting point if unit is not level. Failure to properly lift unit could result in unit dropping and possibly crushing operator/technician which could result in death or serious injury and possible equipment or property-only damage.

Figure 11. Corner weights

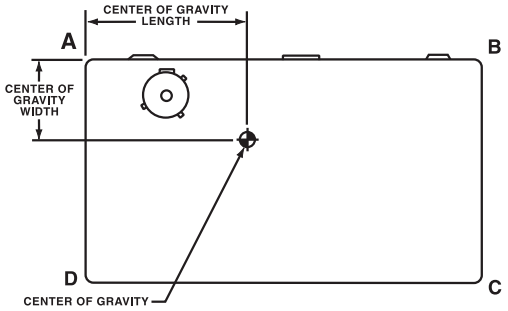


Table 1. Maximum unit & corner weights (lbs/kgs) and center of gravity dimensions (in/mm) - gas/electric models

Tons	Unit Model No.	Maximum Model Weights[a]		Corner Weights[b]				Center of Gravity (in./mm)	
		Shipping	Net	A	B	C	D	Length	Width
5	YSC060E	689/312	584/264	181/82	144/65	122/55	137/62	40/1025	24/600
6	YSC072E	975/443	843/383	296/134	209/95	158/72	180/82	39/980	21/542
7½	YSC090E	1016/461	884/401	346/157	198/90	159/72	181/82	36/909	20/519
8½	YSC102E	1125/510	987/447	325/147	278/126	174/79	210/95	41/1031	21/526
10	YSC120E	1149/522	1011/459	344/156	265/120	193/88	209/95	40/1020	21/538

(a) Weights are approximate.
(b) Corner weights are given for information only.

Figure 12. Rigging and center of gravity

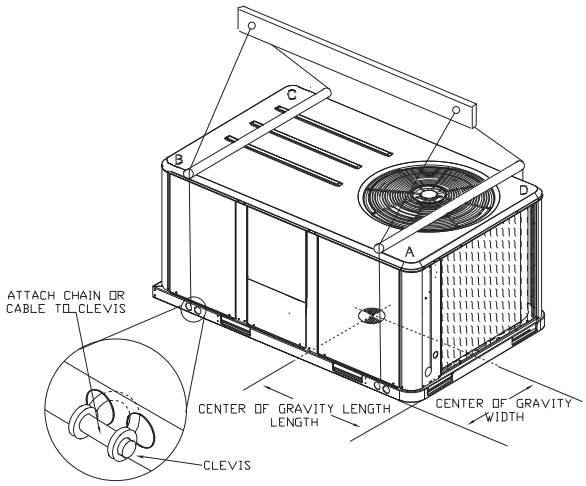


Table 2. Factory installed options (fiops)/accessory net weights (lbs)[a],[b]

Accessory	YSC060ED Net Weight 5 Ton	YSC072E-120ED Net Weight 6-10 Ton
Barometric Relief	7/3	10/5
Coil Guards	12/5	20/9
Economizer	26/12	36/16
Hinged Doors	10/5	12/5
Manual Outside Air Damper	16/7	26/12
Motorized Outside Air Damper	20/9	30/14
Oversized Motor	–	8/4
Roof Curb	61/28	78/35

(a) Weights for options not listed are <5 lbs.
(b) Net weight should be added to unit weight when ordering factory-installed accessories.

Foundation

Horizontal Units

If the unit is installed at ground level, elevate it above the snow line. Provide concrete footings at each support location with a “full perimeter” support structure or a slab foundation for support. Refer to Table 1, p. 17 for the unit’s operating and point loading weights when constructing a footing foundation.

If anchoring is required, anchor the unit to the slab using hold down bolts or isolators. Isolators should be installed to minimize the transmission of vibrations into the building.

For rooftop applications, ensure the roof is strong enough to support the combined unit and support structural weight. Refer to Table 1, p. 17 for the unit operating weights. If anchoring is required, anchor the unit to the roof with hold-down bolts or isolators.

Check with a roofing contractor for proper waterproofing procedures.

Ductwork

Figure 13, p. 18 to Figure 16, p. 18 illustrate the supply and return air openings as viewed from the rear of the unit.

Figure 13. 5 ton unit - Horizontal supply & return air openings

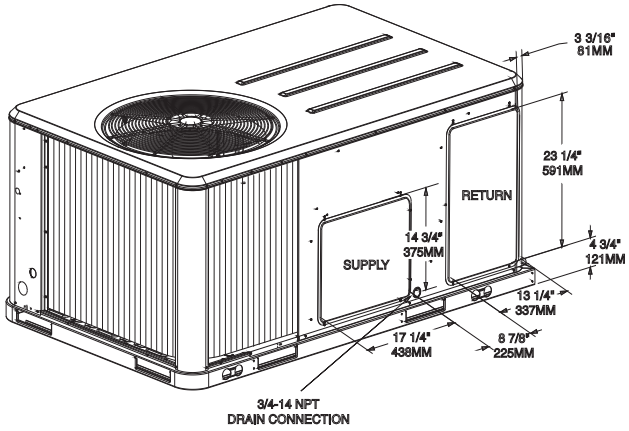


Figure 14. 6-10 ton high units - horizontal supply & return air openings

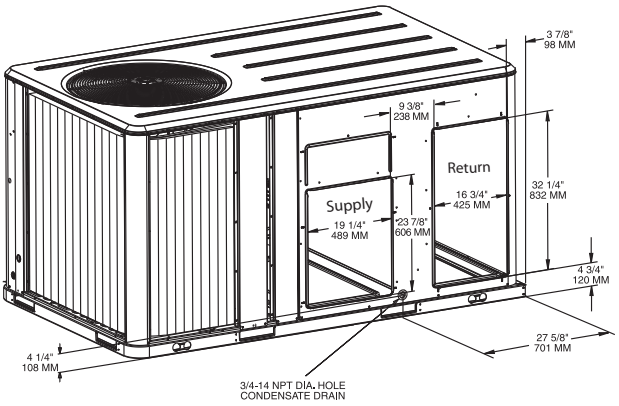


Figure 15, p. 18 to Figure 16, p. 18 illustrate the supply and return air openings in a downflow configuration.

Elbows with turning vanes or splitters are recommended to minimize air noise due to turbulence and to reduce static pressure.

When attaching the ductwork to the unit, provide a water tight flexible connector at the unit to prevent operating sounds from transmitting through the ductwork.

All outdoor ductwork between the unit and the structure should be weather proofed after installation is completed.

Figure 15. 5 ton unit - Downflow supply & return air openings w/ through the base utilities

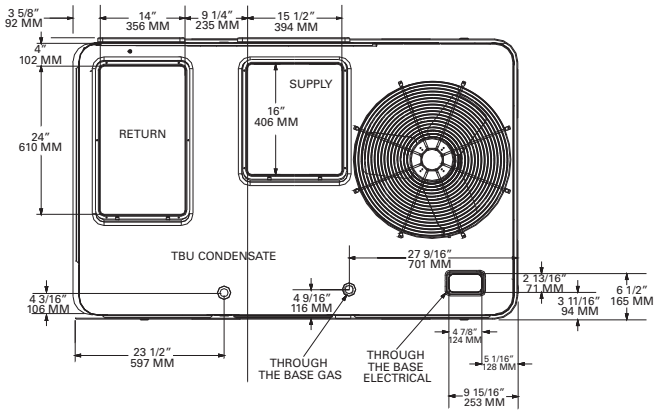
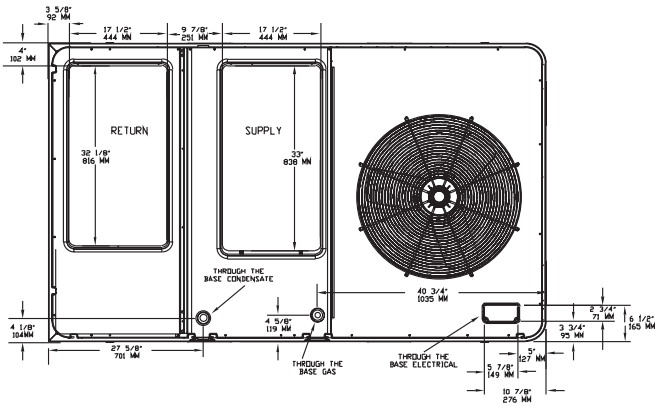


Figure 16. 6-10 ton units - downflow supply & return air openings w/ through the base utilities



Roof Curb

Downflow

The roof curbs for these units consists of a "full perimeter" enclosure to support the unit just inside of the unit base rail.

Before installing any roof curb, verify;

- It is the correct curb for the unit,
- It includes the necessary gaskets and hardware,
- The installation location provides the required clearance for proper operation,
- The curb is level and square. The top surface of the curb must be true to assure an adequate curb-to-unit seal.

⚠WARNING

Combustible Materials!

Maintain proper clearance between the unit heat exchanger, vent surfaces and combustible materials. Refer to unit nameplate and installation instructions for proper clearances. Improper clearances could result in combustible materials catching on fire. Failure to maintain proper clearances could result in death or serious injury or property damage.

Verify that appropriate materials were used in the construction of roof and ductwork. Combustible materials should not be used in the construction of ductwork or roof curb that is in close proximity to heater elements or any hot surface. Any combustible material on the inside of the unit base should be removed and replaced with appropriate material.

Step-by-step curb assembly and installation instructions ship with each accessory roof curb kit. Follow the instructions carefully to assure proper fit-up when the unit is set into place.

Note: *To assure proper condensate flow during operation, as well as proper operation of the condensate overflow switch (if equipped), the unit and curb must be level.*

If the unit is elevated, a field constructed catwalk around the unit is strongly recommended to provide easy access for unit maintenance and service.

Recommendations for installing the Supply Air and Return Air ductwork joining the roof curb are included in the curb instruction booklet. Curb ductwork must be fabricated and installed by the installing contractor before the unit is set into place.

Note: *For sound consideration, cut only the holes in the roof deck for the ductwork penetrations. Do not cut out the entire roof deck within the curb perimeter.*

If a Curb Accessory Kit is not used:

- The ductwork can be attached directly to the factory-provided flanges around the unit's supply and return air openings. Be sure to use flexible duct connections at the unit.
- For "built-up" curbs supplied by others, gaskets must be installed around the curb perimeter flange and the supply and return air opening flanges.

Rigging

⚠WARNING

Heavy Objects!

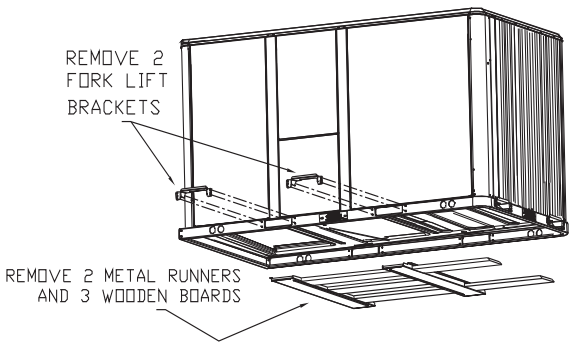
Ensure that all the lifting equipment used is properly rated for the weight of the unit being lifted. Each of the cables (chains or slings), hooks, and shackles used to lift the unit must be capable of supporting the entire weight of the unit. Lifting cables (chains or slings) may not be of the same length. Adjust as necessary for even unit lift. Other lifting arrangements could cause equipment or property damage. Failure to follow instructions above or properly lift unit could result in unit dropping and possibly crushing operator/ technician which could result in death or serious injury.

A Rigging illustration and Center-of-Gravity dimensional data table is shown in Figure 12, p. 17. Refer to the typical unit operating weights table before proceeding.

1. Remove all drill screws fastening wood protection to metal base rail. Remove all screws securing wooden protection to wooden top crate.

   On 7½-10 ton high efficiency units, remove wire ties from outdoor grill.
2. Remove wooden top crate.
3. Rig the unit as shown in Figure 12, p. 17. Attach adequate strength lifting slings to all four lifting brackets in the unit base rail. Do not use cables, chains, or slings except as shown.
4. Install a lifting bar, as shown in Figure 12, p. 17, to protect the unit and to facilitate a uniform lift. The minimum distance between the lifting hook and the top of the unit should be 7 feet.
5. Test-lift the unit to ensure it is properly rigged and balanced, make any necessary rigging adjustments.
6. Lift the unit enough to allow the removal of base fork pocket protection components as shown in the following figures.

Figure 17. Fork pockets



7. Downflow units; align the base rail of the unit with the curb rail while lowering the unit onto the curb. Make sure that the gasket on the curb is not damaged while positioning the unit.

General Unit Requirements

The checklist listed below is a summary of the steps required to successfully install a commercial unit. This checklist is intended to acquaint the installing personnel with what is required in the installation process. It does not replace the detailed instructions called out in the applicable sections of this manual.

- Check the unit for shipping damage and material shortage; file a freight claim and notify appropriate sales representative.
- Verify correct model, options and voltage from unit nameplate.
- Verify that the installation location of the unit will provide the required clearance for proper operation.
- Assemble and install the roof curb (if applicable). Refer to the latest edition of the curb installers guide that ships with each curb kit.
- Fabricate and install ductwork; secure ductwork to curb.
- Install pitch pocket for power supply through building roof. (If applicable)
- Rigging the unit.
- Set the unit onto the curb; check for levelness.
- Ensure unit-to-curb seal is tight and without buckles or cracks.
- Install and connect a condensate drain line to the evaporator drain connection.

Note: *Condensate Overflow Switch (if equipped) will not work if unit is not level properly.*

Factory Installed Economizer

- Ensure the economizer has been pulled out into the operating position. Refer to the economizer installers guide for proper position and setup.
- Install all access panels.

Temperature Limit Switch Usage for Gas Heat Units

Units are factory shipped in the down flow discharge configuration but can be field converted to a horizontal discharge configuration. Some, but not all units require a different TCO1 limit switch, which is attached to the combustion blower motor if horizontal discharge configuration is used.

Note: *The following units require a limit switch change out for horizontal discharge. The additional limit switch is shipped attached to the combustion blower housing: YSC060ED*H, YSC072ED*H, YSC090ED*H, YSC102ED*H, YSC120ED*H.*

If any of the aforementioned units are installed in the down flow discharge configuration, remove the additional TCO1 limit switch from the combustion blower motor and discard.

Table 3. TC01 tripping values

Unit Model (Standard Efficiency)	TCO1 Tripping Values Downflow / Horizontal
YSC060ED*L	170F
YSC060ED*H	170F/200F
YSC072ED*L	200F
YSC072E*H	180F/220F
YSC090ED*L	200F
YSC090ED*H	180F/220F
YSC102ED*L	200F
YSC102ED*H	190F/260F
YSC120ED*L	200F
YSC120ED*H	190F/260F

Horizontal Discharge Conversion (5 Ton Units)

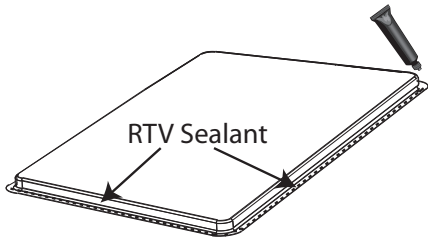
Supplies needed by installer for conversion: 3 oz. tube of high temperature RTV sealant. (500°F / 260°C: similar to Dow Corning 736)

Important: *Failure to use recommended sealant could result in unit performance loss.*

If a unit is to be converted to a horizontal discharge, the following conversion must be performed:

1. Remove RETURN and SUPPLY duct covers.
2. Locate supply cover. Apply ¼ in. (6mm.) continuous bead of 500°F RTV sealant to the flange as shown.

Figure 18. Duct cover



3. Position duct cover as shown, rotate 90 degrees to allow entrance into supply opening.
4. Slide duct covers into duct openings until inward edge of duct cover engages with the 2 retaining clips on the duct flanges. Secure the outward edge of each duct cover with 2 screws.
5. Slide RETURN DUCT COVER (insulation side up) into supply opening until inward edge of duct cover engages with the 2 retaining clips on the duct flange. Secure outward edge of the duct cover with two screws.
6. After completing installation of the duct covers for horizontal discharge, proceed to TCO-1 instructions.

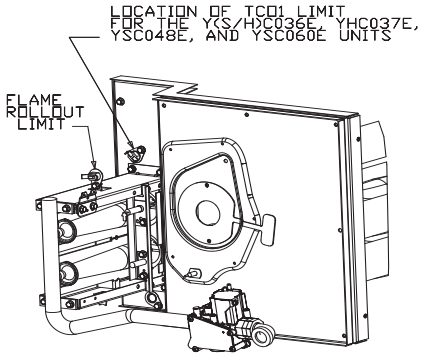
TCO-1 Instructions

If the unit being installed is listed in the following list, the limit control TCO1 must be replaced with the extra limit control shipped in the heater compartment. Replace TCO1 following the instructions in steps 1 through 3 below. If the unit being installed does not correspond to any in the following list, skip steps 1 through 3 and go on to next step in the installation process.

Unit Model Number

YSC060ED*H

Figure 19. TCO1 location (YSC060ED*H)



⚠WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/ tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

1. Remove the heat section access panel.
2. Remove TCO1 from shipping location, attached to the combustion blower.
3. Replace and discard the existing TCO1 originally installed at the factory for down flow operation with the TCO1 shipped attached to the combustion blower for horizontal operation.
4. Replace heat section access panel.

Horizontal Discharge Conversion (6 Through 10 Ton Units)

Note: *6 - 10 ton units the supply cover to return opening & return cover to supply opening.*

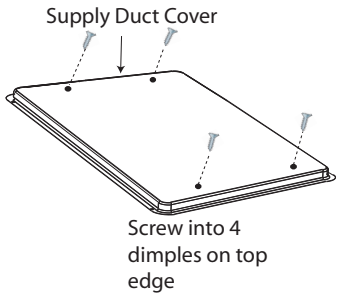
Supplies Needed by Installer for Conversion: 3 oz. tube of high Temperature RTV sealant (500°F / 260°C: Similar to Dow Corning 736).

Important: *Failure to use recommended sealant could result in unit performance loss.*

If a unit is to be converted to a Horizontal discharge, the following conversion must be performed:

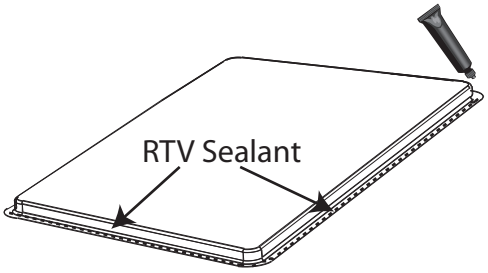
1. Remove RETURN and SUPPLY duct covers.
2. Place SUPPLY DUCT COVER over down-flow return opening. (insulation side down)
3. Using self-drilling screws, (or screws removed from duct cover), screw through dimples to attach DUCT COVER to base.

Figure 20. Duct cover



4. On original RETURN DUCT COVER, apply ¼"(6mm.) continuous bead of 500°F RTV sealant around flange (opposite insulation side), as shown.

Figure 21. Duct cover



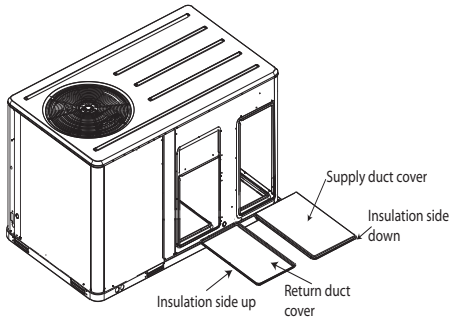
5. Slide RETURN DUCT COVER (insulation side up) into supply opening until inward edge of duct cover engages with the 2 retaining clips on the duct flange. Secure outward edge of the duct cover with two screws.

Note: *If unit is equipped with Return Air Smoke Detector, refer to field conversion instructions for horizontal discharge before installing return air duct.*

Note: *If unit is equipped with Discharge Air Sensing option refer to the following figure for proper tube positioning based on unit tonnage.*

6. After completing installation of the duct covers for horizontal discharge, proceed to TCO-1 instructions.

Figure 22. Supply and return covers



TCO1 Instructions

If the unit being installed is listed in the following list, the limit control TCO1 must be replaced with the extra limit control shipped in the heater compartment. Replace TCO1 following the instructions in steps 1 through 3 below. If the unit being installed does not correspond to any in the following list, skip steps 1 through 3 and go on to next step in the installation process.

Unit Model Number

YSC072ED*H, YSC090ED*H, YSC102ED*H, YSC120ED*H

⚠ WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

1. Remove the heat section access panel.
2. Remove TCO1 from shipping location, attached to the combustion blower.
3. Replace and discard the existing TCO1 originally installed at the factory for down flow operation with the TCO1 shipped attached to the combustion blower for horizontal operation.
4. Replace heat section access panel.

Requirements for Gas Heat

Note: *The unit gas train and Optional Through The Base Gas Shut-Off Valve are rated at 1/2 PSIG maximum. A pressure reducing regulator is recommended to prevent this maximum from being exceeded. These components must be isolated during field gas piping test that exceed 1/2 PSIG. It is recommended that the field piping be capped prior to the unit gas train or Optional Through The Base Gas Shut-Off Valve if present.*

- Gas supply line properly sized and connected to the unit gas train.
- All gas piping joints properly sealed.
- Gas piping leak checked with a soap solution. If piping connections to the unit are complete, do not pressurize piping in excess of 0.50 psig or 14" W.C. to prevent component failure.
- Drip leg Installed in the gas piping near the unit.
- Minimum gas supply pressure should be 4.5" W.C.
- Maximum gas supply pressure must not exceed 14.0" W.C.
- Manifold pressure for single stage heaters should be set to 3.3" W.C.
- Manifold pressure for two stage heaters should be set to 3.5" W.C. on HIGH FIRE and 1.8" W.C. on LOW FIRE.
- Flue Exhaust clear of any obstruction.

Condensate Drain Configuration

An evaporator condensate drain connection is provided on each unit. Refer to Figure 13, p. 18 and Figure 14, p. 18 for the appropriate drain location.

The condensate drain pan is factory installed to drain condensate to the back side of the unit. See Figure 13, p. 18 and Figure 14, p. 18. It can be converted to drain condensate out the front side of the unit or through the base.

Before drain pan removal, switch wire must be disconnected from wire tie on panel and any tape before drain pan can be removed.

Care must be taken wire does not catch on bottom of Indoor coil or any protrusions when drain pan is removed.

To Convert Drain Condensate Out the Front of Unit:

1. Remove evaporator access panel and supply air access panels.
2. Remove the support panel that the condensate drain pan exits through.
3. Slide the condensate drain pan out of the unit and rotate 180°.
4. Slide the condensate drain pan back into the unit, align the drain with the grommeted opening in the rear support panel and push until the coupling is seated in the grommet.
5. Replace the front support panel by aligning the panel with tabs in the raceway. Align the condensate drain pan support in the grommeted hole as the panel is put in place.
6. Replace evaporator access panel and supply air access panels.

To Convert Drain Condensate Through the Base of Unit:

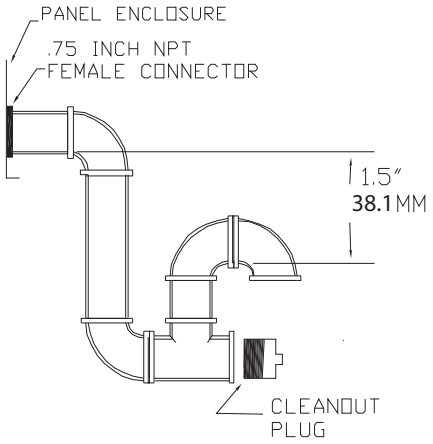
1. Remove evaporator access panel and supply air access panels.
2. Remove the support panel that the condensate drain pan exits through.
3. Slide the condensate drain pan out of the unit.
4. Place on a level surface in the position it was removed from the unit.
5. Remove the plug knockout in the bottom of the drain pan to convert it to through the base drainage.
6. Plug the original condensate drain opening with a field supplied 3/4″ NPT plug.
7. Slide the condensate drain pan back into the unit, align the drain support with the grommeted opening in the rear support panel and push until the support is seated in the grommet.

8. Replace the front support panel by aligning the panel with tabs in the raceway. Align the plugged condensate drain pan coupling in the grommeted hole as the panel is put in place.
9. Replace evaporator access panel and supply air access panels.

A condensate trap must be installed at the unit due to the drain connection being on the "negative pressure" side of the fan. Install the P-Trap using the guidelines in Figure 23, p. 23.

A condensate drain line must be connected to the P-Trap. Pitch the drain lines at least 1/2 inch for every 10 feet of horizontal run to assure proper condensate flow. Do not allow the horizontal run to sag causing a possible double-trap condition which could result in condensate backup due to "air lock".

Figure 23. Condensate trap installation



Drain Pan Removal (Units with Condensate Overflow Switch Option)

Before drain pan removal, the switch wire must be disconnected from wire tie on panel and/or any tape before drain pan can be removed.

Care must be taken so the wire does not catch on the bottom of indoor coil or any protrusion.

Note: *When reversing the drain pan, on some units, the condensate overflow switch will need to be moved to the second hole in its bracket to avoid contact with headers or indoor coil.*

Filter Installation

The quantity of filters is determined by unit size. Access to the filters is obtained by removing the filter access panel. Refer to the unit Service Facts (shipped with each unit) for filter requirements.

Note: *Do not operate the unit without filters.*

Field Installed Power Wiring

⚠WARNING

Proper Field Wiring and Grounding Required!

All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes. Failure to follow code could result in death or serious injury.

An overall dimensional layout for the field installed wiring entrance into the unit is illustrated in "Unit Dimensions," p. 10. To insure that the unit's supply power wiring is properly sized and installed, follow the following guidelines.

Verify that the power supply available is compatible with the unit's nameplate ratings. The available supply power must be within 10% of the rated voltage stamped on the nameplate. Use only copper conductors to connect the power supply to the unit.

NOTICE:

Use Copper Conductors Only!

Unit terminals are not designed to accept other types of conductors. Failure to use copper conductors could result in equipment damage.

Note: *If the unit is not equipped with an optional factory installed non-fused disconnect switch or circuit breaker, a field supplied disconnect switch must be installed at or near the unit in accordance with the National Electrical Code (NEC latest edition).*

Main Unit Power

⚠WARNING

Proper Field Wiring and Grounding Required!

All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes. Failure to follow code could result in death or serious injury.

⚠WARNING

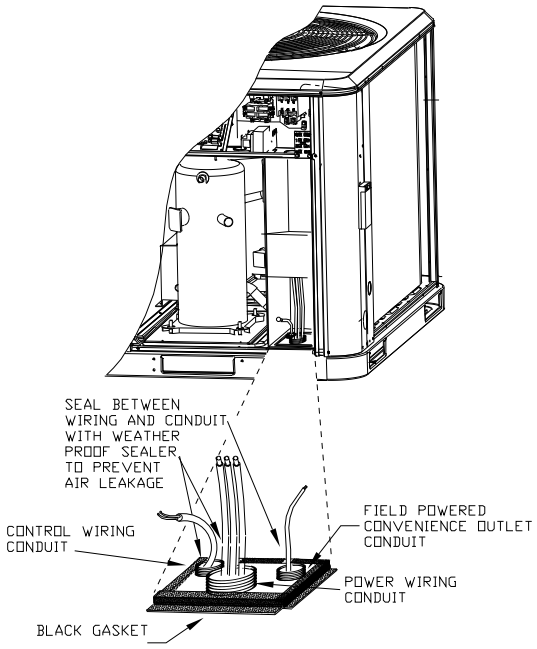
Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/ tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

Standard Wiring

1. Location of the applicable electrical service entrance is illustrated in "Unit Dimensions," p. 10. Complete the unit's power wiring connections at Compressor Contactor # 1 (CC1) inside the unit control panel. Refer to the customer connection diagram that is shipped with the unit for specific termination points
2. Provide proper grounding for the unit in accordance with local and national codes.

Figure 24. All units



Field Installed Control Wiring

Note: *All field wiring must conform to NEC guidelines as well as state and local codes.*

Control Power Transformer

The 24 volt control power transformers are to be used only with the accessories called out in this manual. Transformers rated greater than 50 VA are equipped with internal circuit breakers. If a circuit breaker trips, turn "Off" all power to the unit before attempting to reset it.

⚠WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/ tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

The transformer is located in the control panel.The circuit breaker is located on the left side of the transformer and can be reset by pressing in on the black reset button.

Controls Using 24 VAC

Before installing any connecting wiring, refer to "Unit Dimensions," p. 10 for the electrical access locations provided on the unit and Table 4, p. 24 for AC conductor sizing guidelines, and;

1. Use copper conductors unless otherwise specified.
2. Ensure that the AC control wiring between the controls and the unit's termination point does not exceed three (3) ohms/conductor for the length of the run.

Note: *Resistance in excess of 3 ohms per conductor may cause component failure due to insufficient AC voltage supply.*

Note: *Be sure to check all loads and conductors for grounds, shorts, and mis-wiring.*

3. Do not run the AC low voltage wiring in the same conduit with the high voltage power wiring.
4. Route low voltage wiring per illustrations per Figure 27, p. 25.

Table 4. Electromechanical thermostat 24V AC conductors with ReliaTel

Distance from Unit to Control	Recommended Wire Size
000 - 460 feet	18 gauge
000 - 140 m	.75 mm2
461 - 732 feet	16 gauge
141 - 223 m	1.3 mm2
733 - 1000 feet	14 gauge
224 - 305 m	2.0 mm2

Controls using DC Analog Input/Outputs (Standard Low Voltage Multi conductor Wire)

Before installing any connecting wiring between the unit and components utilizing a DC analog input\output signal, refer to "Unit Dimensions," p. 10 for the electrical access locations provided on the unit.

- Table 5, p. 25 lists the conductor sizing guidelines that must be followed when interconnecting the DC binary output devices and the system components utilizing a DC analog input/output signal to the unit.

Note: *Resistance in excess of 2.5 ohms per conductor can cause deviations in the accuracy of the controls.*

Note: *Ensure that the wiring between controls and the unit's termination point does not exceed two and a half (2.5) ohms/conductor for the length of the run.*

- Do not run the electrical wires transporting DC signals in or around conduit housing high voltage wires.
- Route low voltage wiring per Figure 27, p. 25.

DC Conductors

Table 5. Zone sensor module wiring

Distance from Unit to Control	Recommended Wire Size
0 - 150 feet	22 gauge
0 - 45.7 m	.33 mm2
151 - 240 feet	20 gauge
46 - 73.1 m	.50 mm2
241 -385 feet	18 gauge
73.5 - 117.3 m	.75 mm2
386 - 610 feet	16 gauge
117.7 - 185.9 m	1.3 mm2
611 - 970 feet	14 gauge
186.2 - 295.7 m	2.0 mm2

Figure 25. ReliaTel conventional thermostat field wiring diagrams

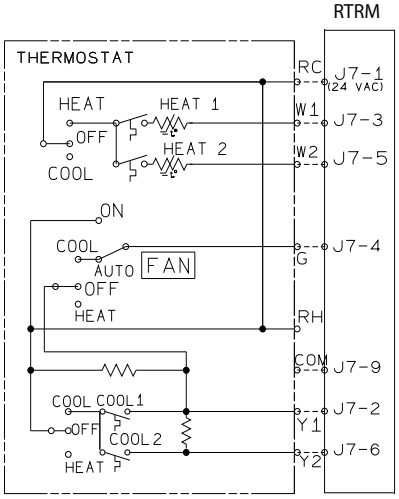


Figure 26. ReliaTel options module

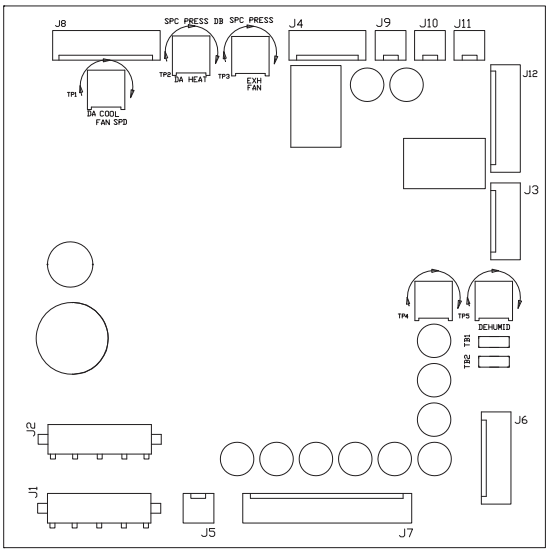
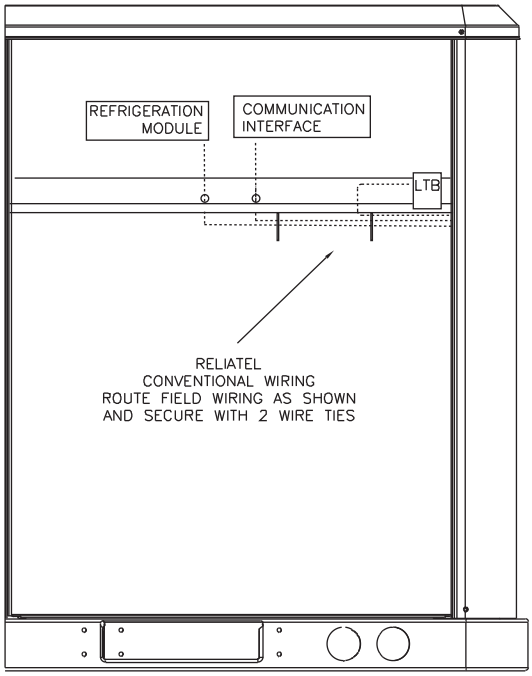


Figure 27. ReliaTel control customer low voltage routing



Space Temperature Averaging (ReliaTel™ Only)

Space temperature averaging is accomplished by wiring a number of remote sensors in a series/parallel circuit.

Using the BAYSENS016* or BAYSENS077*, at least four sensors are required to accomplish space temperature averaging. See diagram below.

Installation

- Example #1 illustrates two series circuits with two sensors in each circuit wired in parallel. The square of any number of remote sensors is required.
- Example #2 illustrates three sensors squared in a series/parallel circuit. Using BAYSENS077*, two sensors are required to accomplish space temperature averaging.
- Example #3 illustrates the circuit required for this sensor. Table 6, p. 28 lists the temperature versus resistance coefficient for all sensors.

Figure 28. Examples

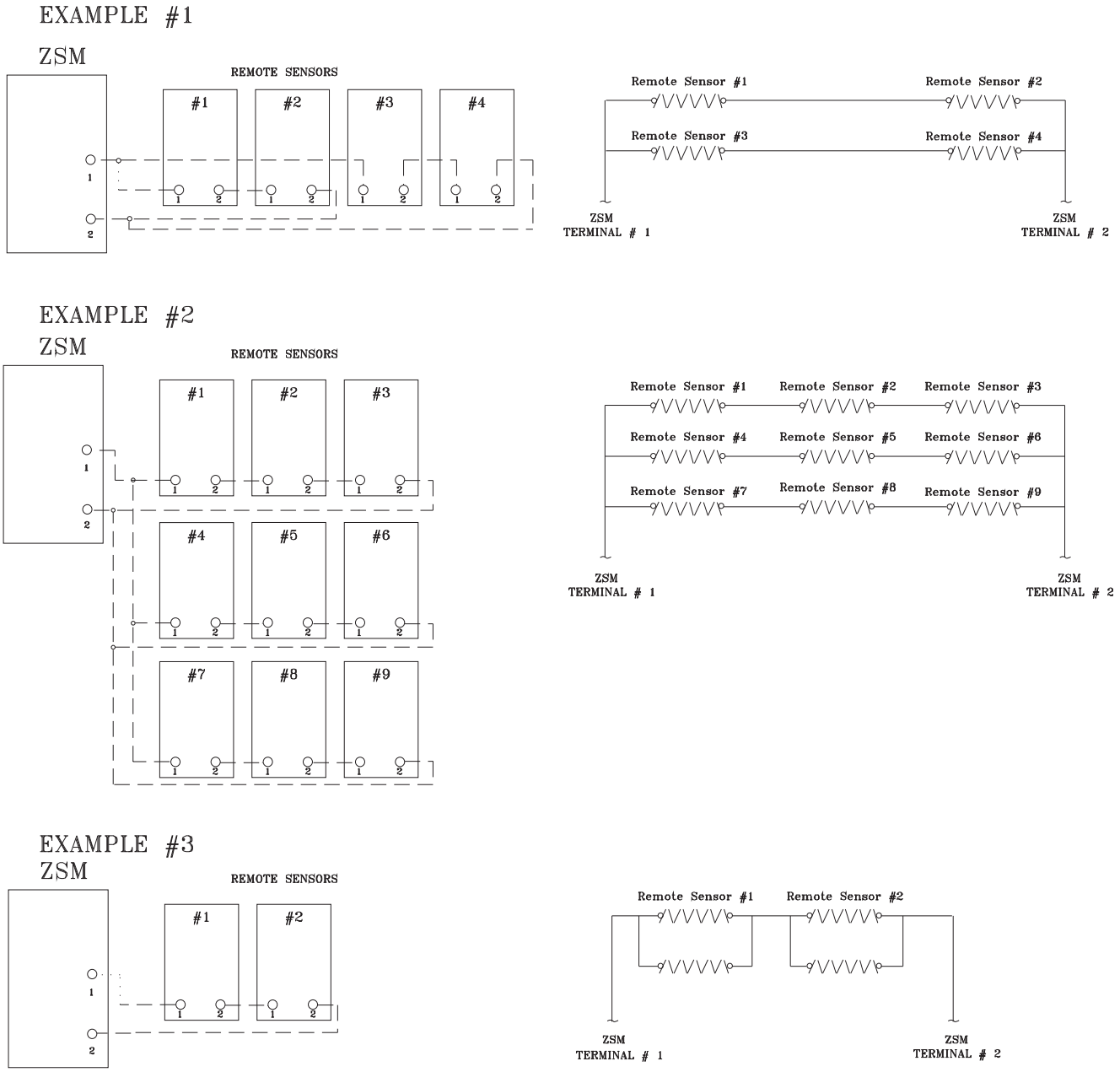
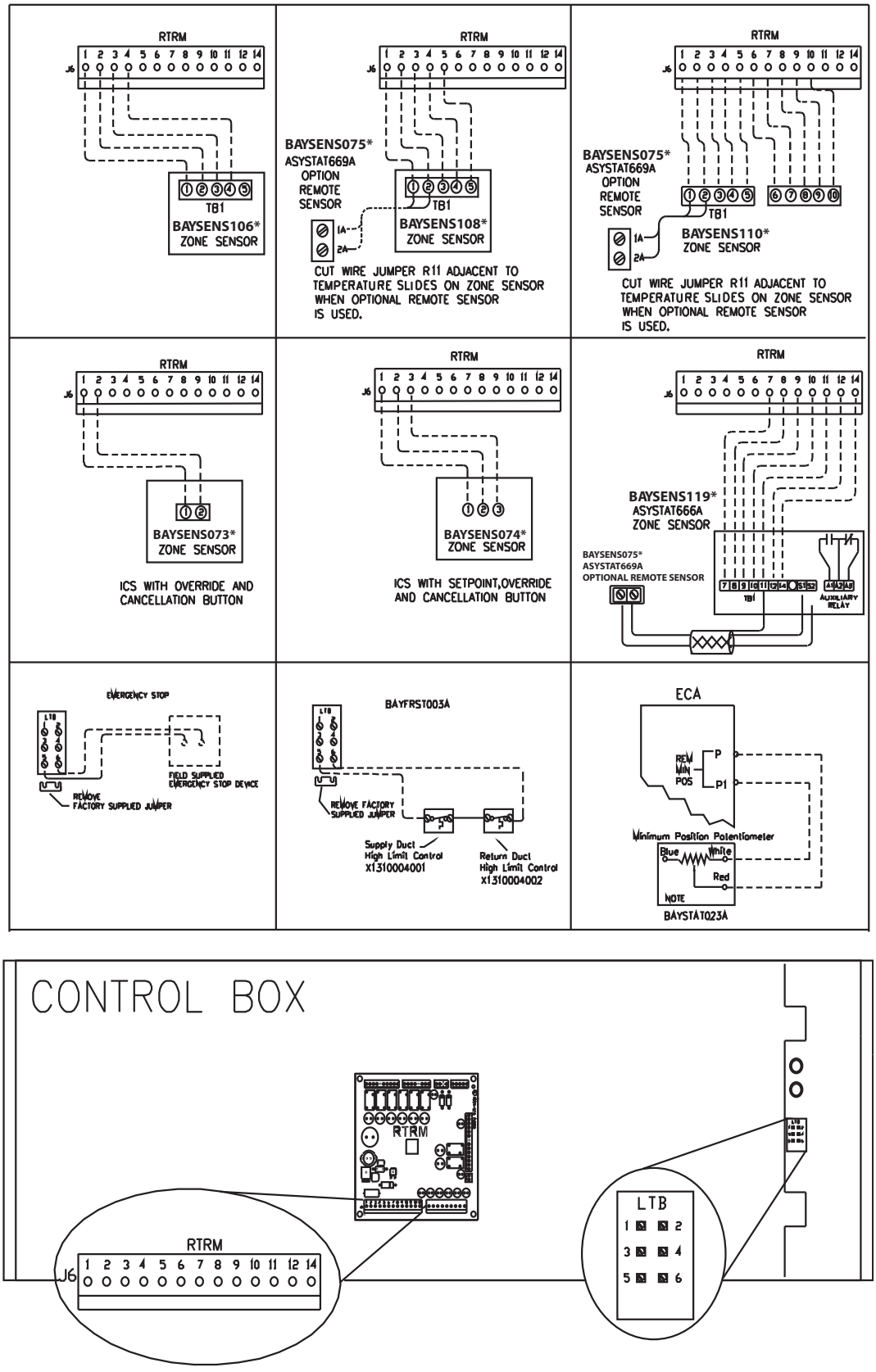


Figure 29. Typical field wiring diagrams for optional controls (ReliaTel only)



Installation

Table 6. Temperature vs. resistance

Temperature		
Degrees F°	**Degrees C°**	**Nominal Resistance**
-20°	-28.9°	170.1 K - Ohms
-15°	-26.1°	143.5 K - Ohms
-10°	-23.3°	121.4 K - Ohms
-5°	-20.6°	103.0 K - Ohms
0°	-17.8°	87.56 K - Ohms
5°	-15.0°	74.65 K - Ohms
10°	-12.2°	63.80 K - Ohms
15°	-9.4°	54.66 K - Ohms
20°	-6.7°	46.94 K - Ohms
25°	-3.8°	40.40 K - Ohms
30°	-1.1°	34.85 K - Ohms
35°	1.7°	30.18 K - Ohms
40°	4.4°	26.22 K - Ohms
45°	7.2°	22.85 K - Ohms
50°	10.0°	19.96 K - Ohms
55°	12.8°	17.47 K - Ohms
60°	15.6°	15.33 K - Ohms
65°	18.3°	13.49 K - Ohms
70°	21.1°	11.89 K - Ohms
75°	23.9°	10.50 K - Ohms
80°	26.7°	9.297 K - Ohms
85°	29.4°	8.247 K - Ohms
90°	32.2°	7.330 K - Ohms
95°	35.0°	6.528 K - Ohms

Table 7. Sizing natural gas pipe mains and branches

	Iron Pipe Size (IPS) Inches				
Length of Pipe (Ft.)	**½" Pipe**	**¾" Pipe**	**1" Pipe**	**1¼" Pipe**	**1½" Pipe**
15	76	176	345	750	1220
30	52	120	241	535	850
45	43	99	199	435	700
60	38	86	173	380	610
75		77	155	345	545

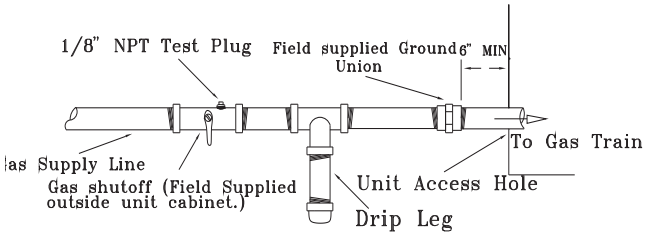
Note: Capacity of Pipe of Different Diameters and Lengths in Cu. Ft. Per Hr. with Pressure Drop of 0.3" and Specific Gravity of 0.60

Table 8. Iron pipe size (SI) millimeters

	Iron Pipe Size (SI) Millimeters				
Length of Pipe (Meters)	**15 mm Pipe**	**20 mm Pipe**	**25 mm Pipe**	**32 mm Pipe**	**40 mm Pipe**
4.6	2.15	4.98	9.76	21.23	34.54
9.1	1.47	3.39	6.82	15.14	24.06
13.7	1.21	2.80	5.63	12.31	19.82
18.3	1.07	2.43	4.89	10.76	17.27
22.9	—	2.18	4.38	9.76	15.40

Note: Capacity of Pipe of Different Diameters and Lengths in Cu. Meter Per Hr. with Pressure Drop of 74.6 Pa and Specific Gravity of 0.60.

Figure 30. Schematic diagram for field gas piping to unit



Pre-Start

Use the checklist provided below in conjunction with the "General Unit Requirements" checklist to ensure that the unit is properly installed and ready for operation.

⚠WARNING

Hazardous Voltage w/Capacitors!

Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/ tagout procedures to ensure the power cannot be inadvertently energized. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

For additional information regarding the safe discharge of capacitors, see PROD-SVB06A-EN

Verify that the condenser airflow will be unobstructed.

⚠WARNING

Rotating Components!

During installation, testing, servicing and troubleshooting of this product it may be necessary to work with live and exposed rotating components. Have a qualified or licensed service individual who has been properly trained in handling exposed rotating components, perform these tasks. Failure to follow all safety precautions could result in rotating components cutting and slashing technician which could result in death or serious injury.

- Verify that the condenser fan and indoor blower turn freely without rubbing and are properly tightened on the shafts.
- Check the supply fan belts for proper tension and the fan bearings for sufficient lubrication. If the belts require adjustment, or if the bearings need lubricating, refer to the maintenance section of this manual for instructions.
- Verify that a condensate trap is installed and the piping is properly sized and pitched.
- Verify that the correct size and number of filters are in place.
- Inspect the interior of the unit for tools and debris and install all panels in preparation for starting the unit.

Voltage Imbalance

Three phase electrical power to the unit must meet stringent requirements for the unit to operate properly.

Measure each leg (phase-to-phase) of the power supply. Each reading must fall within the utilization range stamped on the unit nameplate. If any of the readings do not fall within the proper tolerances, notify the power company to correct this situation before operating the unit.

Excessive three phase voltage imbalance between phases will cause motors to overheat and eventually fail. The maximum allowable voltage imbalance is 2%. Measure and record the voltage between phases 1, 2, and 3 and calculate the amount of imbalance as follows:

$$\% \text{ Voltage Imbalance} = \frac{100 \times AV - VD}{AV} \text{ where;}$$

$$AV \text{ (Average Voltage)} = \frac{\text{Volt 1} + \text{Volt 2} + \text{Volt 3}}{3}$$

V1, V2, V3 = Line Voltage Readings

VD = Line Voltage reading that deviates the farthest from the average voltage.

Example: If the voltage readings of the supply power measured 221, 230, and 227, the average volts would be:

$$\frac{221 + 230 + 227}{3} = 226 \text{ Avg.}$$

VD (reading farthest from average) = 221

The percentage of imbalance equals:

$$\frac{100 \times 226 - 227}{226} = 2.2\%$$

The 2.2% imbalance in this example exceeds the maximum allowable imbalance of 2.0%. This much imbalance between phases can equal as much as a 20% current imbalance with a resulting increase in motor winding temperatures that will decrease motor life. If the voltage imbalance is over 2%, notify the proper agencies to correct the voltage problem before operating this equipment.

Electrical Phasing (Three Phase Motors)

The compressor motor(s) and the supply fan motor are internally connected for the proper rotation when the incoming power supply is phased as A, B, C.

Proper electrical supply phasing can be quickly determined and corrected before starting the unit by using an instrument such as an Associated Research Model 45 Phase Sequence Indicator and following the steps below:

- Turn the field supplied disconnect switch that provides power to the main power terminal block or to the "Line" side of the optional factory mounted disconnect switch to the "Off" position.
- Connect the phase sequence indicator leads to the terminal block or to the "Line" side of the optional factory mounted disconnect switch as follows;

  Black (phase A) to L1

  Red (phase B) to L2

  Yellow (phase C) to L3

- Close the field supplied main power disconnect switch or circuit protector switch that provides the supply power to the unit.

Note: *Upon closing main power disconnect and the unit mounted disconnect switch or circuit breaker, the phase monitor will verify proper phasing. If LED on face of the monitor is red, correct supply power fault.*

⚠WARNING

Live Electrical Components!

During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

To prevent injury or death from electrocution, it is the responsibility of the technician to recognize this hazard and use extreme care when performing service procedures with the electrical power energized.

- Observe the ABC and CBA phase indicator lights on the face of the sequencer. The ABC indicator light will glow if the phase is ABC. If the CBA indicator light glows, open the disconnect switch or circuit protection switch and reverse any two power wires.
- Restore the main electrical power and recheck the phasing. If the phasing is correct, open the disconnect switch or circuit protection switch and remove the phase sequence indicator.

Compressor Crankcase Heaters (Optional)

Each compressor can be equipped with a crankcase heater (on some units the crankcase heater comes standard). The proper operation of the crankcase heater is important to maintain an elevated compressor oil temperature during the "Off" cycle to reduce oil foaming during compressor starts. Oil foaming occurs when refrigerant condenses in the compressor and mixes with the oil. In lower ambient conditions, refrigerant migration to the compressor could increase.

When the compressor starts, the sudden reduction in crankcase pressure causes the liquid refrigerant to boil rapidly causing the oil to foam. This condition could damage compressor bearings due to reduced lubrication and could cause compressor mechanical failures.

Before starting the unit in the "Cooling" mode, set the system switch to the "Off" position and turn the main power disconnect to the "On" position and allow the crankcase heater to operate a minimum of 8 hours.

Before closing the main power disconnect switch, insure that the "System" selection switch is in the "Off" position and the "Fan" selection switch is in the "Auto" position.

Close the main power disconnect switch and the unit mounted disconnect switch, if applicable.

Note: *Upon closing main power disconnect and the unit mounted disconnect switch or circuit breaker, the phase monitor will verify proper phasing. If LED on face of the monitor is red, correct supply power fault.*

⚠WARNING

Live Electrical Components!

During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

To prevent injury or death from electrocution, it is the responsibility of the technician to recognize this hazard and use extreme care when performing service procedures with the electrical power energized.

ReliaTel™ Controls

Upon power initialization, the RTRM performs self-diagnostic checks to insure that all internal controls are functional. It also checks the configuration parameters against the components connected to the system. The Liteport LED located on the RTRM module is turned "On" within one second of power-up if internal operation is okay.

Use one of the following "Test" procedure to bypass some time delays and to start the unit at the control panel. Each step of unit operation can be activated individually by temporarily shorting across the "Test" terminals for two to three seconds. The Liteport LED located on the RTRM module will blink when the test mode has been initiated. The unit can be left in any "Test" step for up to one hour before it will automatically terminate, or it can be terminated by opening the main power disconnect switch. Once the test mode has been terminated, the Liteport LED will glow continuously and the unit will revert to the "System" control.

Table 9. Service test guide for component operation

Test Step	Mode	Fan	Econ [a]	Comp 1	Comp 2	Heat 1	Heat 2	Resistance	PWM Output[b]	Multi-Speed Fan Output
1	Fan	On	Minimum Position Setpoint 0%	Off	Off	Off	Off	2.2KΩ	50%	low
	Minimum Ventilation	On	Selectable	Off	Off	Off	Off			
2	Economizer Test Open	On	Open	Off	Off	Off	Off	3.3KΩ	50%[c]	low
3	Cool Stage 1	On	Minimum Position	On [d]	Off	Off	Off	4.7KΩ	82%	low
4[e]	Cool Stage 2	On	Minimum Position	On[d]	On[d]	Off	Off	6.8KΩ	100%	High (2-step cooling) Low (3-step cooling)
5[e]	Cool Stage 3	On	Minimum Position	On[d]	On[d]	Off	Off	8.2KΩ	100%	High
6[e]	Reheat	On	Minimum	On	On	Off	Off	33KΩ	100%[f]	High
7[e]	Heat Stage 1	On	Minimum	Off	Off	On	Off	10KΩ	100%	High
8[e]	Heat Stage 2	On	Minimum	Off	Off	On	On	15KΩ	100%	High

(a) The exhaust fan will turn on anytime the economizer damper position is equal to or greater than the exhaust fan setpoint.
(b) The PWM Output is in reference to the user selected maximum unit fan speed.
(c) Regardless of the Economizer Mode configuration, the unit will run the Supply Fan at the minimum speed during the Economizer step of the Service Test.
(d) The condenser fans will operate any time a compressor is 'On' providing the outdoor air temperatures are within the operating values.
(e) Steps for optional accessories and non-applicable modes in unit will be skipped.
(f) Units with Enhanced Dehumidification only will not perform this step during Service Test.

Test Modes

There are three methods in which the "Test" mode can be cycled at LTB-Test 1 and LTB-Test 2.

1. Step Test Mode - This method initiates the different components of the unit, one at a time, by temporarily shorting across the two test terminals for two to three seconds. For the initial start-up of the unit, this method allows the technician to cycle a component "On" and have up to one hour to complete the check.
2. Resistance Test Mode - This method can be used for start-up providing a decade box for variable resistance outputs is available. This method initiates the different components of the unit, one at a time, when a specific resistance value is placed across the two test terminals. The unit will remain in the specific test mode for approximately one hour even though the resistance is left on the test terminals.
3. Auto Test Mode - This method is not recommended for start-up due to the short timing between individual component steps. This method initiates the different components of the unit, one at a time, when a jumper is installed across the test terminals. The unit will start the first test step and change to the next step every 30 seconds.

   At the end of the test mode, control of the unit will automatically revert to the applied "System" control method.

For unit test steps, test modes, and step resistance values to cycle the various components, refer to Table 9, p. 31.

ReliaTel Controls

Upon power initialization, the Gas Ignition Module (IGN) performs self-diagnostic checks to insure that all internal controls are functional. It also checks the configuration parameters against the components connected to the system. The System LED located on the IGN module is turned "On" within one second of power-up if internal operation is okay.

Unit Start-Up

Verifying Proper Air Flow

⚠WARNING

Live Electrical Components!

During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

Units with Belt Drive Indoor Fan

Much of the systems performance and reliability is closely associated with, and dependent upon having the proper airflow supplied both to the space that is being conditioned and across the evaporator coil.

The indoor fan speed is changed by opening or closing the adjustable motor sheave.

Before starting the SERVICE TEST, set the minimum position setpoint for the economizer to 0 percent using the setpoint potentiometer located on the Economizer Control (ECA), if applicable.

ReliaTel Control: Using the Service Test Guide in Table 6, p. 30, momentarily jump across the Test 1 & Test 2 terminals on LTB1 one time to start the Minimum Ventilation Test.

With the fan operating properly, determine the total system airflow (CFM) by:

1. Measuring the actual RPM,
2. Measure the amperage at the supply fan contactor and compare it with the full load amp (FLA) rating stamped on the motor nameplate.
   a. Calculate the theoretical BHP using (Actual Motor Amps/ Motor Nameplate Amps) X Motor HP.
   b. Using the fan performance tables in the unit Service Facts, plot the actual RPM (step 1) and the BHP (step 2a) to obtain the operating CFM.
3. If the required CFM is too low, (external static pressure is high causing motor HP output to be below table value),
   a. Relieve supply and/or return duct static.
   b. Change indoor fan speed and repeat steps 1 and 2.

- To Increase Fan RPM; Loosen the pulley adjustment set screw and turn sheave clockwise.
- To Decrease Fan RPM; Loosen the pulley adjustment set screw and turn sheave counterclockwise.
- If the required CFM is too high, (external static pressure is low causing motor HP output to be above table value), change indoor fan speed and repeat steps 1 and 2.
- To stop the SERVICE TEST, turn the main power disconnect switch to the "Off" position or proceed to the next component start-up procedure.

Economizer Start-Up

ReliaTel Control: Using the Service Test Guide in Table 6, p. 30, momentarily jump across the Test 1 & Test 2 terminals on LTB1 one time to start the Minimum Ventilation Test.

1. Set the minimum position setpoint for the economizer to the required percentage of minimum ventilation using the setpoint potentiometer located on the Economizer Control (ECA).

   The economizer will drive to its minimum position setpoint, exhaust fans (if applicable) may start at random, and the supply fan will start when the SERVICE TEST is initiated.

⚠WARNING

Rotating Components!

During installation, testing, servicing and troubleshooting of this product it may be necessary to measure the speed of rotating components. Have a qualified or licensed service individual who has been properly trained in handling exposed rotating components, perform these tasks. Failure to follow all safety precautions when exposed to rotating components could result in death or serious injury.

   The Exhaust Fan will start anytime the economizer damper position is equal to or greater than the exhaust fan setpoint.

2. Verify that the dampers stroked to the minimum position.

   ReliaTel Control:

   Momentarily jump across the Test 1 & Test 2 terminals on LTB1 one additional time if continuing from previous component start-up or until the desired start-up component Test is started.

3. Verify that the dampers stroked to the full open position.
4. To stop the SERVICE TEST, turn the main power disconnect switch to the “Off” position or proceed to the next component start-up procedure. Remove electro mechanical test mode connections (if applicable).

Compressor Start-Up

1. Attach a set of service gauges onto the suction and discharge gauge ports for each circuit. Refer to the refrigerant circuit illustration in the Service Facts.

   ReliaTel Control:

   Momentarily jump across the Test 1 & Test 2 terminals on LTB1 one additional time if continuing from previous component start-up or until the desired start-up component Test is started.

   Scroll Compressors

   a. Once each compressor has started, verify that the rotation is correct. If a scroll compressor is rotating backwards, it will not pump and a loud rattling sound can be observed.

   b. If the electrical phasing is correct, before condemning a compressor, interchange any two leads (at the compressor Terminal block) to check the internal phasing. If the compressor runs backward for an extended period (15 to 30 minutes), the motor winding can overheat and cause the motor winding thermostat to open.

2. After the compressor and condenser fan have started and operated for approximately 30 minutes, observe the operating pressures. Compare the operating pressures to the operating pressure curve in the Service Facts.
3. Check system superheat. Follow the instruction listed on the superheat charging curve in the Service Facts.

   Superheat should be within ±5 F of the superheat chart value.
4. Repeat steps 1 through 4 for each refrigerant circuit.
5. To stop the SERVICE TEST, turn the main power disconnect switch to the "Off" position or proceed to the next component start-up procedure. Remove electro mechanical test mode connections (if applicable).

Gas Heat Units

Open the main disconnect switch to shut the unit off and to reset the RTRM.

ReliaTel Control: Follow the Test Guide in Table 9, p. 32 to start the unit in the heating mode. Momentarily jump across the Test 1 & Test 2 terminals on LTB1 one additional time if continuing from previous component start-up or until the desired start-up component Test is started.

When starting the unit for the first time or servicing the heaters, it is a good practice to start the heater with the main gas supply turned "Off".

Once the ignition system and components have been checked, open the main power disconnect switch to reset the unit.

Final System Setup

After completing all of the pre-start and start-up procedures outlined in the previous sections (i.e., operating the unit in each of its Modes through all available stages of cooling & heating), perform these final checks before leaving the unit:

- Program the Night Setback (NSB) panel (if applicable) for proper unoccupied operation. Refer to the programming instructions for the specific panel.
- Verify that the Remote panel "System" selection switch, "Fan" selection switch, and "Zone Temperature" settings for automatic operation are correct.
- Inspect the unit for misplaced tools, hardware, and debris.
- Verify that all exterior panels including the control panel doors and condenser grilles are secured in place.
- Close the main disconnect switch or circuit protector switch that provides the supply power to the unit's terminal block or the unit mounted disconnect switch.

⚠WARNING

Live Electrical Components!

During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

Make sure all personnel are standing clear of the unit before proceeding. The system components will start when the power is applied.

Maintenance

Fan Belt Adjustment - Belt Drive Units

⚠WARNING

Rotating Components!

During installation, testing, servicing and troubleshooting of this product it may be necessary to measure the speed of rotating components. Have a qualified or licensed service individual who has been properly trained in handling exposed rotating components, perform these tasks. Failure to follow all safety precautions when exposed to rotating components could result in death or serious injury.

The fan belts must be inspected periodically to assure proper unit operation.

Replacement is necessary if the belts appear frayed or worn. Units with dual belts require a matched set of belts to ensure equal belt length.

When removing or installing the new belts, do not stretch them over the sheaves. Loosen the belts using the belt tension adjustment bolts on the motor mounting base.

Once the new belts are installed, using a Browning or Gates tension gauge (or equivalent) illustrated in Figure 31; adjust the belt tension as follows;

1. To determine the appropriate belt deflection;
   a. Measure the center-to-center shaft distance (in inches) between the fan and motor sheaves.
   b. Divide the distance measured in Step 1a by 64; the resulting value represents the amount of belt deflection that corresponds to the proper belt tension.
2. Set the large O-ring on the belt tension gauge at the deflection value determined in Step 1b.
3. Set the small O-ring at zero on the force scale of the gauge plunger.
4. Place the large end of the gauge at the center of the belt span; then depress the gauge plunger until the large O-ring is even with the top of the next belt or even with a straightedge placed across the fan and motor sheaves. Refer to Figure 9.
5. Remove the belt tension gauge. The small O-ring now indicates a number other than zero on the plunger's force scale. This number represents the force (in pounds) required to give the needed deflection.
6. Compare the "force" scale reading (Step 5) with the appropriate "force" value listed in Table 10. If the "force" reading is outside the range, readjust the belt tension.

Note: *Actual belt deflection "force" must not exceed the maximum "force" value shown in Table 10*

7. Recheck the belt tension at least twice during the first 2 to 3 days of operation. Belt tension may decrease until the new belts are "run in".

Figure 31. Belt tension gauge

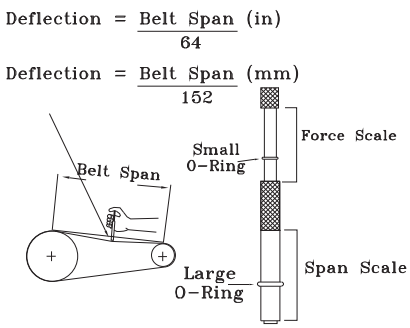


Table 10. Belt tension measurement and deflection

Belts Cross Section	Small P.D Range	Deflection Force (Lbs.) Super Gripbelts Min.	Super Gripbelts Max.	Gripnotch Min.	Gripnotch Max.	Steel Cable Gripbelts Min.	Steel Cable Gripbelts Max
	3.0 - 3.6	3	4 1/2	3 7/8	5 1/2	3 1/4	4
A	3.8 - 4.8	3 1/2	5	4 1/2	6 1/4	3 3/4	4 3/4
	5.0 - 7.0	4	5 1/2	5	6 7/8	4 1/4	5 1/4
	3.4 - 4.2	4	5 1/2	5 3/4	8	4 1/2	5 1/2
B	4.4 - 5.6	5 1/8	7 1/8	6 1/2	9 1/8	5 3/4	7 1/4
	5.8 - 8.8	6 3/8	8 3/4	7 3/8	10 1/8	7	8 3/4

Monthly Maintenance

⚠WARNING

Rotating Components!

During installation, testing, servicing and troubleshooting of this product it may be necessary to measure the speed of rotating components. Have a qualified or licensed service individual who has been properly trained in handling exposed rotating components, perform these tasks. Failure to follow all safety precautions when exposed to rotating components could result in death or serious injury.

Before completing the following checks, turn the unit OFF and lock the main power disconnect switch open.

Filters

Inspect the return air filters. Clean or replace them if necessary. Refer to the unit Service Facts for filter information.

Condensate Overflow Switch

During maintenance, the switch float (black ring) must be checked to ensure free movement up and down.

Cooling Season

- Check the unit's drain pans and condensate piping to ensure that there are no blockages.
- Inspect the evaporator and condenser coils for dirt, bent fins, etc. If the coils appear dirty, clean them according to the instructions described in "Coil Cleaning" later in this section.
- Manually rotate the condenser fan(s) to ensure free movement and check motor bearings for wear. Verify that all of the fan mounting hardware is tight.
- Inspect the F/A-R/A damper hinges and pins to ensure that all moving parts are securely mounted. Keep the blades clean as necessary.
- Verify that all damper linkages move freely; lubricate with white grease, if necessary.
- Check supply fan motor bearings; repair or replace the motor as necessary.
- Check the fan shaft bearings for wear. Replace the bearings as necessary.
- Check the supply fan belt. If the belt is frayed or worn, replace it. Refer to the "Fan Belt Adjustment" section for belt replacement and adjustments.
- Verify that all wire terminal connections are tight.
- Remove any corrosion present on the exterior surfaces of the unit and repaint these areas.
- Generally inspect the unit for unusual conditions (e.g., loose access panels, leaking piping connections, etc.)
- Make sure that all retaining screws are reinstalled in the unit access panels once these checks are complete.
- With the unit running, check and record the: ambient temperature; compressor suction and discharge pressures (each circuit); superheat (each circuit);
- Record this data on an "operator's maintenance log" like the one shown in Table 11, p. 37. If the operating pressures indicate a refrigerant shortage, measure the system superheat. For guidelines, refer to the "Compressor Start-Up" section.

Note: *Do not release refrigerant to the atmosphere! If adding or removing refrigerant is required, the service technician must comply with all federal, state and local laws.*

Heating Season

- Inspect the unit's air filters. If necessary, clean or replace them.
- Check supply fan motor bearings; repair or replace the motor as necessary.
- Inspect both the main unit control panel and heat section control box for loose electrical components and terminal connections, as well as damaged wire insulation. Make any necessary repairs.
- Clean burner area, verify gas heat system operates properly.

Coil Cleaning

Regular coil maintenance, including annual cleaning, enhances the unit's operating efficiency by minimizing: compressor head pressure and amperage draw; evaporator water carryover; fan brake horsepower, due to increase static pressure losses; airflow reduction.

At least once each year, or more often if the unit is located in a "dirty" environment, clean the evaporator and condenser coils using the instructions outlined below. Be sure to follow these instructions as closely as possible to avoid damaging the coils.

Note: *For units equipped with hail guards follow removal procedure listed below.*

Hail Guard Removal

- Unlatch hail guard.
- Pull the top of the hail guard outward until the fastener studs are free of the retaining nuts.
- Lift the hail guard from the lower retaining bracket and set aside.

To clean refrigerant coils, use a soft brush and a sprayer (either a garden pump-up type or a high-pressure sprayer). A high-quality detergent is also required; suggested brands include "SPREX A.C.", "OAKITE 161", "OAKITE 166" and "COILOX". If the detergent selected is strongly alkaline (ph value exceeds 8.5), add an inhibitor.

⚠WARNING

Hazardous Chemicals!

Coil cleaning agents can be either acidic or highly alkaline. Handle chemical carefully. Proper handling should include goggles or face shield, chemical resistant gloves, boots, apron or suit as required. For personal safety refer to the cleaning agent manufacturer's Materials Safety Data Sheet and follow all recommended safe handling practices. Failure to follow all safety instructions could result in death or serious injury.

1. Remove enough panels from the unit to gain access to the coil.
2. Protect all electrical devices such as motors and controllers from any over spray.
3. Straighten any bent coil fins with a fin comb.
4. Mix the detergent with water according to the manufacturer's instructions. If desired, heat the solution BUT DO NOT EXCEED 150 F maximum to improve its cleansing capability.

⚠WARNING

Hazardous Pressures!

Coils contain refrigerant under pressure. When cleaning coils, maintain coil cleaning solution temperature under 150°F to avoid excessive pressure in the coil. Failure to follow these safety precautions could result in coil bursting, which could result in death or serious injury.

5. Pour the cleaning solution into the sprayer. If a high-pressure sprayer is used:
   a. Do not allow sprayer pressure to exceed 600 psi.
   b. The minimum nozzle spray angle is 15 degrees.
   c. Maintain a minimum clearance of 6" between the sprayer nozzle and the coil.
   d. Spray the solution perpendicular (at 90 degrees) to the coil face.
6. Spray the leaving-airflow side of the coil first; then spray the opposite side of the coil. Allow the cleaning solution to stand on the coil for five minutes.
7. Rinse both sides of the coil with cool, clean water.
8. Inspect both sides of the coil; if it still appears to be dirty, repeat Steps 6 and 7.
9. Reinstall all of the components and panels removed in Step 1 and any protective covers installed in Step 2.

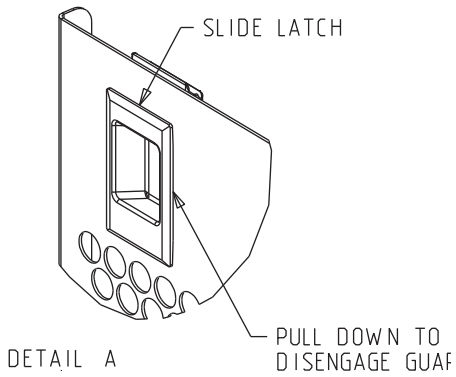
Note: *For units equipped with hail guards follow reinstallation procedure listed below.*

Hail Guard Reinstallation

10. To reinstall the hail guard, locate the bottom of the hail guard in the lower bracket and secure it to the upper unit bracket with the attached fasteners.

Note: *Secure hail guard latches.*

Figure 32. Slide latch



11. Restore the unit to it's operational status and check system operation.

Annual Maintenance

- Clean and repaint any corroded surface.

ATTACHMENT 7

Final Process

For future reference, you may find it helpful to record the unit data requested in the blanks provided.

Complete Model Number

_____

Unit Serial Number

_____

Wiring Diagram Numbers (from unit control panel)

_____

Schematics

_____

Connections

_____

Table 11. Sample maintenance log

		Refrigerant Circuit #1						Refrigerant Circuit #2					
Date	Current Ambient Temp. F/C	Compr. Oil Level	Suct. Press. Psig/ kPa	Disch. Press. Psig/ kPa	Liquid Press. Psig/ kPa	Super -heat F/C	Sub- cool. F/C	Compr. Oil Level	Suct. Press. Psig/kPa	Disch. Press. Psig/ kPa	Liquid Press. Psig/ kPa	Super- heat F/C	Sub- cool. F/C
		- ok - low						- ok - low					
		- ok - low						- ok - low					
		- ok - low						- ok - low					
		- ok - low						- ok - low					
		- ok - low						- ok - low					
		- ok - low						- ok - low					
		- ok - low						- ok - low					
		- ok - low						- ok - low					
		- ok - low						- ok - low					
		- ok - low						- ok - low					
		- ok - low						- ok - low					

Note: Check and record the data requested above each month during the cooling season with the unit running

Trouble Shooting

ReliaTel™ Control

The RTRM has the ability to provide the service personnel with some unit diagnostics and system status information.

Before turning the main power disconnect switch "Off", follow the steps below to check the ReliaTel Refrigeration Module (RTRM). All diagnostics & system status information stored in the RTRM will be lost when the main power is turned "Off".

⚠WARNING

Live Electrical Components!

During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

To prevent injury or death from electrocution, it is the responsibility of the technician to recognize this hazard and use extreme care when performing service procedures with the electrical power energized.

1. Verify that the Liteport LED on the RTRM is burning continuously. If the LED is lit, go to Step 3.
2. If the LED is not lit, verify that 24 VAC is presence between J1-1 and J1-2. If 24 VAC is present, proceed to Step 3. If 24 VAC is not present, check the unit main power supply, check transformer (TNS1). Proceed to Step 3 if necessary.
3. Utilizing "Method 1" or "Method 2" in the "System Status Diagnostic" section, check the following:

   System status

   Heating status

   Cooling status

   If a System failure is indicated, proceed to Step 4. If no failures are indicated, proceed to Step 5.
4. If a System failure is indicated, recheck Steps 1 and 2. If the LED is not lit in Step 1, and 24 VAC is present in Step 2, the RTRM has failed. Replace the RTRM.
5. If no failures are indicated, use one of the TEST mode procedures described in the "Unit Start-Up" section to start the unit. This procedure will allow you to check all of the RTRM outputs, and all of the external controls (relays, contactors, etc.) that the RTRM outputs energize, for each respective mode. Proceed to Step 6.
6. Step the system through all of the available modes, and verify operation of all outputs, controls, and modes. If a problem in operation is noted in any mode, you may leave the system in that mode for up to one hour while troubleshooting. Refer to the sequence of operations for each mode, to assist in verifying proper operation. Make the necessary repairs and proceed to Steps 7 and 8.
7. If no abnormal operating conditions appear in the test mode, exit the test mode by turning the power "Off" at the main power disconnect switch.
8. Refer to the individual component test procedures if other microelectronic components are suspect.

System Status Checkout Procedure

"System Status" is checked by using one of the following two methods:

Method 1

If the Zone Sensor Module (ZSM) is equipped with a remote panel with LED status indication, you can check the unit within the space. If the ZSM does not have LED's, use Method 2. BAYSENS110*, BAYSENS109*, BAYSENS119*, BAYSENS023A all have the remote panel indication feature. The LED descriptions are listed below.

LED 1 (System)

"On" during normal operation.

"Off" if a system failure occurs or the LED fails.

"Flashing" indicates test mode.

LED 2 (Heat)

"On" when the heat cycle is operating.

"Off" when the heat cycle terminates or the LED fails.

"Flashing" indicates a heating failure.

LED 3 (Cool)

"On" when the cooling cycle is operating.

"Off" when the cooling cycle terminates or the LED fails.

"Flashing" indicates a cooling failure.

LED 4 (Service)

"On" indicates a clogged filter.

"Off" during normal operation.

"Flashing" indicates an evaporator fan failure or condensate overflow switch failure.

Below is the complete listing of failure indication causes.

System failure

Check the voltage between terminals 6 and 9 on J6, it should read approximately 32 VDC. If no voltage is present, a System failure has occurred. Refer to Step 4 in the previous section for the recommended troubleshooting procedure.

Heating Failure

Verify Heat Failure by Ignition Module (IGN) LED indicator:

OFF: No Power or Failure

ON: Normal

Slow Flash: Normal, Heat Call

Fast Flash: Error Code:

1 Flash: Communication Failure

2 Flashes: System Lockout

3 Flashes: Pressure Switch Fail

4 Flashes: TC01 or TC02 Open

5 Flashes: Flame w/o Gas Valve

6 Flashes: Flame Rollout Open

Cooling Failure

- Cooling and heating set point (slide pot) on the zone sensor has failed. Refer to the "Zone Sensor Test Procedure" section.
- Zone temperature thermistor ZTEMP on ZTS failed. Refer to the "Zone Sensor Test Procedure" section.
- CC1 or CC2 24 VAC control circuit has opened, check CC1 & CC2 coils, and any of the controls below that apply to the unit (HPC1, HPC2).
- LPC1 has opened during the 3 minute minimum "on time" during 4 consecutive compressor starts, check LPC1 or LPC2 by testing voltage between the J1-1 & J3-2 terminals on the RTRM and ground. If 24 VAC is present, the LPC's has not tripped. If no voltage is present, LPC's has tripped.

Service Failure

- If the supply fan proving switch has closed, the unit will not operate (when connected to RTOM), check the fan motor, belts, and proving switch.
- Clogged filter switch has closed, check the filters.
- If the condensate overflow switch is closed, the unit will not operate, check the float position is not in a tripped condition and verify an "open" between wires connecting to RTOM J6-1, J6-2 (ReliaTel controls).

Simultaneous Heat and Cool Failure

- Emergency Stop is activated

Method 2

The second method for determining system status is done by checking voltage readings at the RTRM (J6). The system indication descriptions and the approximate voltages are listed below.

System Failure

- Measure the voltage between terminals J6-9 & J6-6.
- Normal Operation = approximately 32 VDC
- System Failure = less than 1 VDC, approximately 0.75 VDC
- Test Mode = voltage alternates between 32 VDC & 0.75 VDC

Heat Failure

- Measure the voltage between terminals J6-7 & J6-6.
- Heat Operating = approximately 32 VDC
- Heat Off = less than 1 VDC, approximately 0.75 VDC
- Heating Failure = voltage alternates between 32 VDC & 0.75 VDC

Cool Failure

- Measure the voltage between terminals J6-8 & J6-6.
- Cool Operating = approximately 32 VDC
- Cool Off = less than 1 VDC, approximately 0.75 VDC
- Cooling Failure = voltage alternates between 32 VDC & 0.75 VDC

Service Failure

- Measure the voltage between terminals J6-10 & J6-6.
- Clogged Filter = Approximately 32 VDC.
- Normal = Less than 1 VDC, approximately 0.75 VDC
  Fan Failure = voltage alternates between 32 VDC & 0.75 VDC.

To use LED's for quick status information at the unit, purchase a BAYSENS110* ZSM and connect wires with alligator clamps to terminals 6 through 10. Connected each respective terminal wire (6 through 10) from the Zone Sensor to the unit J6 terminals 6 through 10.

Note: *If the system is equipped with a programmable zone sensor, (BAYSENS119*, or BAYSENS023A), the LED indicators will not function while the BAYSENS110* is connected.*

Resetting Cooling and Ignition Lockouts

Cooling Failures and Heating Lockouts are reset in an identical manner. Method 1 explains resetting the system from the space; Method 2 explains resetting the system at the unit.

Note: *Before resetting Cooling Failures and Ignition Lockouts check the Failure Status Diagnostics by the methods previously explained. Diagnostics will be lost when the power to the unit is disconnected.*

Method 1

To reset the system from the space, turn the "Mode" selection switch at the zone sensor to the "Off" position. After approximately 30 seconds, turn the "Mode" selection switch to the desired mode, i.e. Heat, Cool or Auto.

Method 2

To reset the system at the unit, cycle the unit power by turning the disconnect switch "Off" and then "On".

Lockouts can be cleared through the building management system. Refer to the building management system instructions for more information.

Zone Temperature Sensor (ZTS) Service Indicator

The ZSM SERVICE LED is a generic indicator, that will signal the closing of a Normally Open switch at any time, providing the Indoor Motor (IDM) is operating. This indicator is usually used to indicate a clogged filter, or an air side fan failure.

The RTRM will ignore the closing of this Normally Open switch for 2 (±1) minutes. This helps prevent nuisance SERVICE LED indications. The exception is the LED will flash 40 seconds after the fan is turned "On" if the Fan Proving Switch is not made.

Clogged Filter Switch

This LED will remain lit the entire time that the Normally Open switch is closed. The LED will be turned off immediately after resetting the switch (to the Normally Open position), or any time that the IDM is turned "Off".

If the switch remains closed, and the IDM is turned "On", the SERVICE LED will be turned "On" again after the 2 (±1) minute ignore delay.

This LED being turned "On", will have no other affect on unit operation. It is an indicator only.

Fan Failure Switch

When the "Fan Failure" switch is wired to the RTOM, the LED will remain flashing the entire time the fan proving switch is closed, indicating a fan failure, and it will shut the unit operations down.

Condensate Overflow Switch

When the "Condensate Overflow Switch" is closed, a drain pan overflow condition is indicated and it will shut unit operations down.

Zone Temperature Sensor (ZTS) Test

Note: *These procedures are not for programmable or digital models and are conducted with the Zone Sensor Module electrically removed from the system.*

Test 1 - Zone Temperature Thermistor (ZTEMP)

This component is tested by measuring the resistance between terminals 1 and 2 on the Zone Temperature Sensor. Below are some typical indoor temperatures, and corresponding resistive values.

Test 2 - Cooling Set Point (CSP) and Heating Set Point (HSP)

Table 12. Cooling setpoint and heating setpoint

Zone	Temperature	Nominal ZTEMP Resistance
50 F°	10.0 C°	19.9 K-Ohms
55 F°	12.8 C°	17.47 K-Ohms
60 F°	15.6 C°	15.3 K-Ohms
65 F°	18.3 C°	13.49 K-Ohms
70 F°	21.1 C°	11.9 K-Ohms
75 F°	23.9 C°	10.50 K-Ohms
80 F°	26.7 C°	9.3 K-Ohms
85 F°	29.4 C°	8.25 K-Ohms
90 F°	32.2 C°	7.3 K-Ohms

The resistance of these potentiometers are measured between the following ZSM terminals. Refer to the chart above for approximate resistances at the given setpoints.

Cool SP = Terminals 2 and 3

Range = 100 to 900 Ohms approximate

Heat SP = Terminals 2 and 5

Range = 100 to 900 Ohms approximate

Test 3 - System Mode and Fan Selection

The combined resistance of the Mode selection switch and the Fan selection switch can be measured between terminals 2 and 4 on the Zone Sensor. The possible switch combinations are listed below with their corresponding resistance values.

Test 4 - LED Indicator Test, (SYS ON, HEAT, COOL & SERVICE)

Method 1

Testing the LED using a meter with diode test function. Test both forward and reverse bias. Forward bias should measure a voltage drop of 1.5 to 2.5 volts, depending on your meter. Reverse bias will show an Over Load, or open circuit indication if LED is functional.

Method 2

Testing the LED with an analog Ohmmeter. Connect Ohmmeter across LED in one direction, then reverse the leads for the opposite direction. The LED should have at least 100 times more resistance in reverse direction, as compared with the forward direction. If high resistance in both directions, LED is open. If low in both directions, LED is shorted.

Method 3

To test LED's with ZSM connected to unit, test voltages at LED terminals on ZSM. A measurement of 32 VDC, across an unlit LED, means the LED has failed.

Programmable & Digital Zone Sensor Test

Testing serial communication voltage

1. Verify 24 VAC is present between terminals J6-14 & J6-11.
2. Disconnect wires from J6-11 and J6-12. Measure the voltage between J6-11 and J6-12, should be about 32 VDC.
3. Reconnect wires to terminals J6-11 and J6-12. Measure voltage again between J6-11 and J6-12, voltage should flash high and low every 0.5 seconds. The voltage on the low end will measure about 19 VDC, while the voltage on the high end will measure from approximately 24 to 38 VDC.
4. Verify all modes of operation, by running the unit through all of the steps in the "Test Modes" section discussed in "Unit Start-Up".
5. After verifying proper unit operation, exit the test mode. Turn the fan on continuously at the ZSM, by pressing the button with the fan symbol. If the fan comes on and runs continuously, the ZSM is good. If you are not able to turn the fan on, the ZSM is defective.

ReliaTel Refrigeration Module (RTRM) Default Chart

If the RTCI loses input from the building management system, the RTRM will control in the default mode after approximately 15 minutes. If the RTRM loses the Heating and Cooling setpoint input, the RTRM will control in the default mode instantaneously. The temperature sensing thermistor in the Zone Sensor Module is the only component required for the "Default Mode" to operate.

Unit Operation without a Zone Sensor

This procedure is for temporary operation only. The economizer and condenser fan cycling functions are disabled.

⚠ WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

1. Open and Lock the unit disconnect switch.
2. Remove the Outside Air Sensor (OAS) from the condenser section of unit.
3. Use two (2) wire nuts, to individually cap the wires.
4. Locate the RTRM (J6). Connect two (2) wires to terminals J6-1 and 2.
5. Connect the sensor (OAS) using two wire nuts to the two (2) field supplied wires that were connected to terminals 1 and 2 on J6.

Unit Economizer Control (ECA) Troubleshooting

ReliaTel Control

Verify Economizer Status by Economizer Actuator (ECA) LED indicator:

OFF: No Power or Failure

ON: Normal, OK to Economize

Slow Flash: Normal, Not OK to Economize

Fast Flash - 1/2 Second On / 2 Seconds Off:

Error Code:

Communications Failure

Pulse Flash:2 Seconds On / 1/2 Second Off:

Error Code:

1 Flash: Actuator Fault

2 Flashes: CO_2 Sensor

3 Flashes: RA Humidity Sensor

4 Flashes: RA Temp Sensor

5 Flashes: OA Quality Sensor

6 Flashes: OA Humidity Sensor

7 Flashes: OA Temp Sensor

8 Flashes: MA Temp Sensor

9 Flashes:RAM Fault

10 Flashes:ROM Fault

11 Flashes:EEPROM Fault

Heating Failure

Verify Heat Failure by Ignition Module (IGN) LED indicator:

OFF: No Power or Failure

ON:Normal

Slow Flash: Normal, Heat Call

Fast Flash:Error Code:

1 Flash:No Communication

2 Flashes:System Lockout

3 Flashes:Pressure Switch Fail

4 FlashesTC01 orTC02 Open

5 Flashes:Flame w/o Gas Valve

6 Flashes:Flame Rollout Open

Cooling Failure

- Cooling and heating set point (slide pot) on the thermostat has failed.
- CC1 or CC2 24 VAC control circuit has opened, check CC1 & CC2 coils, and any of the controls below that apply to the unit (HPC1, HPC2, LPC1, LPC2, Frostat™).

Resetting Cooling and Ignition Lockouts

Cooling Failures and Ignition Lockouts are reset in an identical manner. Method 1 explains resetting the system from the space; Method 2 explains resetting the system at the unit.

Method 1

To reset the system from the space, turn the “Mode” selection switch at the thermostat to the “Off” position. After approximately 30 seconds, turn the “Mode” selection switch to the desired mode, i.e. Heat, Cool or Auto.

Method 2

To reset the system at the unit, cycle the unit power by turning the disconnect switch “Off” and then “On”.

ATTACHMENT 7

Unit Wiring Diagrams Numbers

Note: *Wiring diagrams can be accessed using e-Library by entering the diagram number in the literature order number search field or by contacting technical support.*

Table 13. Unit wiring diagram numbers

Schematic Type		Schematic Type		Schematic Type		Description
Control	4366-1012-0110	Power	4366-1005-0104	Connection Diagram	4366-1543-0110	060E
	4366-1015-0104		4366-1005-0104		4366-1540-0110	072E
	4366-1015-0104		4366-1005-0104		4366-1540-0110	090E
	4366-1042-0110		4366-1034-0110		4366-1532-0110	102E
	4366-1042-0110		4366-1034-0110		4366-1532-0110	120E

Limited Warranty

Combination Gas Electric Air Conditioner

YCC, YCD, YCH, YCP, YSC and YHC (Parts Only)

Models Less Than 20 Tons for Residential Use*

This limited warranty is extended by Trane to the original purchaser and to any succeeding owner of the real property to which the Combination Gas Electric Air Conditioner is originally affixed, and applies to products purchased and retained for use within the U.S.A. and Canada.

If any part of your Combination Gas Electric Air Conditioner fails because of a manufacturing defect within five years from the date of the original purchase, Warrantor will furnish without charge the required replacement part. Any local transportation, related service labor, diagnosis calls, air filters, refrigerant and related items are not included.

If the sealed motor-compressor fails because of a manufacturing defect within five years from the date of original purchase, Warrantor will furnish without charge the required replacement compressor. Any local transportation, related service labor, diagnosis calls, refrigerant and related items are not included.

In addition, if the optional, factory installed, stainless steel heat exchanger fails because of a manufacturing defect within ten years from the date of start-up, Warrantor will furnish without charge a replacement heat exchanger. Any local transportation, related service labor and diagnosis calls are not included.

This limited warranty does not cover failure of your combination gas electric air conditioner if it is damaged while in your possession, failure attributable or caused by unreasonable use of the combination gas electric air conditioner and/or failure to properly maintain the combination gas electric air conditioner as set forth in the Use and Care manual.

This limited warranty applies to product installed on or after 10/1/2001 where product is manufactured after 1/1/2000. This limited warranty is not retroactive to any installations prior to 10/1/2001 or on product produced prior to 2000.

THE LIMITED WARRANTY AND LIABILITY SET FORTH HEREIN ARE IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, WHETHER IN CONTRACT OR IN NEGLIGENCE, EXPRESS OR IMPLIED, IN LAW OR IN FACT, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR USE, AND IN NO EVENT SHALL WARRANTOR BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.

Some states do not allow limitations on how long an implied limited warranty lasts or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This limited warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Parts will be provided by our factory organization through an authorized service organization in your area listed in the yellow pages. If you wish further help or information concerning this limited warranty, contact:

Trane

2701 Wilma Rudolph Blvd.

Clarksville, TN 37040-1008

Attention: Manager, Product Service

GW-618-4001

*This limited warranty is for residential usage of this equipment and not applicable when this equipment is used for a commercial application. A commercial use is any application where the end purchaser uses the product for other than personal, family or household purposes.

Combination Gas Electric Air Conditioner

YCZ, YCY, YCX, YCC, YCD, YCH, YCP, YHC and YSC (Parts Only)

Models Less Than 20 Tons for Commercial Use*

This warranty is extended by Trane to the original purchaser and to any succeeding owner of the real property to which the Combination Gas Electric Air Conditioner is originally affixed, and applies to products purchased and retained for use within the U.S.A. and Canada. There is no warranty against corrosion, erosion or deterioration.

If any part of your Combination Gas Electric Air Conditioner fails because of a manufacturing defect within one year from the date of the original purchase, Warrantor will furnish without charge the required replacement part.

In addition, if the sealed motor-compressor fails because of a manufacturing defect within the second through fifth year from the date of original purchase, Warrantor will furnish without charge the required replacement compressor.

In addition, if the optional, factory installed, stainless steel heat exchanger fails because of a manufacturing defect within ten years from the date of start-up, Warrantor will furnish without charge a replacement heat exchanger. Any local transportation, related service labor and diagnosis calls are not included.

ATTACHMENT 7

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The manufacturer optimizes the performance of homes and buildings around the world. A business of Ingersoll Rand, the leader in creating and sustaining safe, comfortable and energy efficient environments,the manufacturer offers a broad portfolio of advanced controls and HVAC systems, comprehensive building services, and parts. For more information, visit www.IRCO.com.

RT-SVX38B-EN 10 Sep 2012
Supersedes RT-SVX38A-EN (01 Nov 2009)

Ingersoll Rand