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SUBMITTAL REVIEW

CLIENT NAME: Vails Gate Fire Department

PROJECT TITLE: Vails Gate FD - New Firehouse

SUBMITTAL No.: 238100-1.1 **H2M PROJECT No.:** VGFD2001

SUBMITTAL NAME: RTU PD SD

SUBMITTAL REVIEW

REVIEW IS FOR GENERAL COMPLIANCE WITH CONTRACT DOCUMENTS.
NO RESPONSIBILITY IS ASSUMED FOR CORRECTNESS
OF DIMENSIONS OR DETAILS

- [x] NO EXCEPTIONS TAKEN
- [ ] SUBMIT SPECIFIED ITEM
- [ ] MAKE CORRECTIONS NOTED (RESUBMISSION NOT REQUIRED)
- [ ] NO ACTION TAKEN (REVIEW IS THE RESPONSIBILITY OF ANOTHER PARTY)
- [ ] REVISE & RESUBMIT
- [ ] NO ACTION TAKEN (THIS SUBMITTAL IS NOT REQUIRED BY THE CONTRACT)
- [ ] REJECTED - SEE REMARKS
- [ ] RECEIVED FOR RECORD

Corrections or comments made on the shop drawings during this review do not relieve contractor from compliance with requirements of the drawings and specifications. This check is only for review of general conformance with the design concept of the project and general compliance with the information given in the contract documents. The contractor is responsible for: confirming and correlating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating their work with that of all other trades; and performing the work in a safe and satisfactory manner.

H2M architects + engineers

Date: 04/14/2023 By: MJV

Rev.: 2020-05-20

Comments:

Contractor responsible for all changes due to unit substitution

CONTRACTOR'S COMPANY NAME
ADDRESS

SUBMISSION TRANSMITTAL FORM
CLIENT NAME: Vails Gate Fire District
PROJECT TITLE: VGFD2001-New Firehouse

H2M PROJECT NO.: VGFD2001

Product, Item, or System Submitted:	RTU Product Data and Shop Drawings (Phase 2)		
Submission Date:	4/10/23	Submission Log No.:	238100-1.1
Specification Section:	238100	Paragraph Reference:	1.03/A-D
Contract Drawing Reference(s):			
Manufacturer's Name:	Joseph Lombardo Plumbing & Heating		
Manufacturer's Mailing Address:			
Manufacturer's Contact Information:	*Name*	( ) *Tel. no.*	*Email*
Supplier's Name:			
Supplier's Mailing Address:			
Supplier's Contact Information:	*Name*	( ) *Tel. no.*	*Email*
This item is a substitution for the specified item:		☑ No	☐ Yes

KEY CONSTRUCTION SERVICES, LLC

Project No: VGFD2001

Reviewed for General Acceptance Only. This review does not relieve the Subcontractors or Suppliers of responsibility for making the work conform to the requirements of the contract. The Subcontractor and Suppliers are responsible for all dimensions, correct fabrication and accurate fit with the work of other trades.

SUBJECT TO ARCHITECT AND OR ENGINEER APPROVAL

Signed *Joseph Manfredi*(PM) **Date: 4/10/23**

Contractor's Approval Stamp with Signature & Date

Contractor's Brief Comments or Remarks (attach separate letter as needed):

By making this submission, we represent that we have determined and verified all field measurements and dimensions, field construction criteria, site and building constraints in terms of limitations in moving the item into the enclosed space, materials, catalog and model numbers and similar data and that we have checked and coordinated this submission with other work at or adjacent to the installed location in accordance with the requirements contained in the Contract Documents.

END OF SECTION 013300

Joe Lombardo

Plumbing & Heating of Rockland, Inc.

321 Spook Rock Road
Suffern, NY 10901
Ph. 845-357-6537 Fx 845-357-8529
E: info@josephlombardo.com
Website: www.josephlombardo.com

Rockland Cty. Plumbing #1000 *Rockland Cty. Cooling # 1468*
Westchester Cty. Plumbing #460 *New Jersey State Plumbing #12702*

LETTER OF TRANSMITTAL

DATE:	JOB NO.
4-10-23	
ATTENTION: Joe Manfredi	
RE: Vails Gate Firehouse	

TO: **Key Construction**
4246 Albany Post Rd. Suite 1
Hyde Park, NY 12538

WE ARE SENDING YOU ☐ **Attached** ☐ **Under separate cover via** _____ **the following items:**

☐ **Shop Drawings** ☐ **Prints** ☐ **Plans** ☐ **Samples** ☐ **Specifications**
☐ **Copy of letter** ☐ **Change order** ☐ _____

COPIES	DATE	NO.	DESCRIPTION
1	4-10-23	238100	Packaged roof tops REVISION # 1

THESE ARE TRANSMITTED as checked below:

☐ **For approval** ☐ **No Exceptions Taken** ☐ **Resubmit** _____ **copies for review**
☐ **For your use** ☐ **Make Corrections Noted** ☐ **Submit** _____ **copies for distribution**
☐ **As requested** ☐ **Rejected** ☐ **Return** _____ **corrected prints**
☐ **For review and comment** ☐ _____
☐ **FOR BIDS DUE** _____ **20** ___ ☐ **PRINTS RETURNED AFTER LOAN TO US**

COPY TO: **CHRIS GERMANO** **SIGNED:** **Ronald J. Lombardo**

RTU-207 Submittal REV1

Prepared For:
H2M

Date: April 4, 2023

Job Name:
Vails Gate Fire District

Trane U.S. Inc. is pleased to provide the following submittal for your review and approval.

Product Summary

Qty	Product
1	3-10 Ton R-410A PKGD Unitary Cooling Rooftop (T4C) – **Primary Voltage 208/60/3**

Stav Shadmi
Trane U.S. Inc.
19 Chapin Road, Bldg B, Suite 200
Pine Brook, NJ 07058
Office Phone: (973) 244-7000

The attached information describes the equipment we propose to furnish for this project and is submitted for your approval.

Submittal acceptance and return is a critical step, so please ensure submittals are returned with approval to release to production within 14 days of submittal date.

Product performance and submittal data is valid for a period of 6 months from the date of submittal generation. If six months or more has elapsed between submittal generation and equipment release, the product performance and submittal data will need to be verified. It is the customer's responsibility to obtain such verification.

Coordination Notes:

1. Contractor to confirm electrical and voltage prior to release
2. Equipment will be released as submitted unless otherwise noted

Responses to engineer's comments of Rev-0 Submittal:

1. RTU-207 shows performance data updated to reflect 325 CFM of outside air.
2. RTU-207 has a standard curb. Seismic curb to be provided and submitted separately.

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3-10 Ton R-410A PKGD Unitary Cooling Rooftop (T4C) (Item A1) **3**

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3-10 Ton R-410A PKGD Unitary Cooling Rooftop 27

Tag Data - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop (T4C) (Qty: 1)

Item	Tag(s)	Qty	Description	Model Number
A1	RTU-207	1	3 Ton R-410A PKGD Unitary Cooling RTU	TZC036E3R0A**P6E1A2B600C1000001

Product Data - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop (T4C)
Item: A1 Qty: 1 Tag(s): RTU-207

DX cooling – 3 nominal tons
Ultra-high efficiency
Downflow discharge
208-230/60/3
Microprocessor controls 3ph
Low Leak Econ-comp enthalpy 0-100%/BR 3p
Single Zone VAV
Hinged panels/2" Pleated Filters MERV 13
Standard condenser coil with hail guard
Through the base 3 ph
Circuit breaker 3 ph
Powered convenience outlet
BACnet communications interface 3 ph
Return/supply air smoke detector 3 ph
Clogged filter switch 3 ph
Human Interface
Roof curb (Field Installed)
Programmable Zone Sensor - Title 24 (Field Installed)
Temperature sensor (Field Installed)
Humidity duct mounted sensor (Field Installed)
Compressor labor 2nd-5th year
1st Year Labor warranty

Additional Options:

Modulating Hot Gas Reheat
Hot Water Heating Coil /w Basic Piping Package
- 3-Way CCV Ball Valve
- Modulating Valve Control
- Freeze Protection Stat
- Freeze Avoidance Stat

UC400 Controller in External Control Panel
High Static Blower Supply Fan (1200 CFM @ 1.0" esp)
1 Hp Supply Motor
Supply Fan Variable Frequency Drive
Additional options are covered by TCS 1 year parts only warranty

Performance Data - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop (T4C)

Tags	RTU-207
Airflow Application	Downflow
Design Airflow (cfm)	1200
Outside Airflow (cfm)	325
Cooling Entering Dry Bulb (F)	79.05
Cooling Entering Wet Bulb (F)	66.56
Ent Air Rel Humidity (%)	52.24
Ambient Temp (F)	95.00
Cooling Leaving Unit DB (F)	59.43
Cooling Leaving Unit WB (F)	57.40
Gross Total Capacity (MBh)	36.34
Gross Sensible Capacity (MBh)	27.77
Gross Latent Capacity (MBh)	8.57
Net Total Capacity (MBh)	34.45
Net Sensible Capacity (MBh)	25.88
Net Sensible Heat Ratio (Number)	0.75
Reheat Temp Rise (F)	15.0
Reheat Capacity (MBH)	19.5
Hot water coil EWT (F)	150.0
Hot water coil LWT (F)	119.2
Hot water coil flow rate (gpm)	4.4
Hot water coil capacity (MBh)	66.4
Hot water coil EAT (F)	55.0
Hot water coil LAT (F)	105.8
Hot water coil temp rise (F)	50.8
Hot water connection size (in)	0.75
Hot water fluid type	Water
Hot water coil APD (in H2O)	0.34
Hot water coil fluid PR (ft H2O)	6.61
Design ESP (in H2O)	1.000
Electric Heat Static Press Add (in H2O)	0.000
Component SP Add (in H2O)	0.220
Indoor Mtr. Operating Power (bhp)	0.56
Indoor RPM (rpm)	2344
Indoor Motor Power (kW)	0.47
Outdoor Motor Power (kW)	0.10
Compressor Power (kW)	2.52
System Power (kW)	3.09
MCA (A)	15.00
MOP (A)	20.00
Compressor 1 RLA (A)	8.00
Compressor 2 RLA (A)	0.00
Condenser Fan FLA (A)	1.00
Evaprator Fan FLA (A)	3.30
Evaporator Face Area (sq ft)	7.71
Evaporator Face Velocity (ft/min)	156
Evaporator Fin Spacing (Per Foot)	192
Evaporator Rows ( )	3
Min. Unit Operating Weight (lb)	839.0
Max Unit Operating Weight (lb)	1021.0
Fan Motor Heat (MBh)	1.89
Evap Coil Leav Air Temp (DB) (F)	58.00
Evap Coil Leav Air Temp (WB) (F)	57.15
Dew Point Temp (F)	56.60

Tags	RTU-207
Rated capacity (AHRI) (MBh)	35.80
Refrig charge (HFC-410A) - ckt 1 (lb)	7.8
Saturated Suction Temp Circuit 1 (F)	53.56
Saturated Discharge Temp Circuit 1 (F)	115.68
Total Static Pressure (in H2O)	1.80
Height (ft)	3.02
Width (ft)	3.69
Length (ft)	5.82
T24_SZVZV	S
Indoor Fan Type	FC Centrifugal
Indoor Fan Drive Type	Variable Belt
Outdoor Fan Type	Propeller
Outdoor Fan Drive Type	Variable Direct
Outdoor Fan Quantity ( )	1
Heating Type	None

Mechanical Specifications - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop
Item: A1 Qty: 1 Tag(s): RTU-207

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 design shall comply with NRCA requirements. Curb shall be shipped knocked down for field assembly and shall include wood nailer strips.

Trane Single Zone Variable Air Volume Control Sequence of Operation (Precedent 17 Plus)
General Standby Mode
During normal occupied periods, when there is no space cooling or heating demands, the user will be able to choose Continuous or Cycling supply fan operation. During this period, if the supply fan is operating due to a Continuous Fan Mode selection or due to a ventilation request, the supply fan will operate at 50% of the user selected, application specific, maximum airflow. The unit controls will be compatible with BACnet and LonTalk Building Automation System communication interfaces.
Cooling Operation
Default Operation:
During Cooling operation, the control will monitor the Space Temperature and Space Cooling setpoint and with a PI contro
algorithm determine if active cooling capacity is required. As the Space Temperature deviates from the Space Cooling Setpoint,
the unit controller will calculate an active Discharge Air Cooling setpoint that the economizer (if installed) and compressor outputs
will be controlled to meet. This active Discharge Air Cooling setpoint will be calculated between the Space Cooling setpoint and a
user adjustable minimum (65F Default for Single Zone Variable Air Volume Control). Once the control determines that a discharge
air temperature equal to the user selected minimum (65F Default) is required to meet the space cooling demand, if the space
demand continues to increase, the supply fan speed will be allowed to increase above its minimum speed proportionally to meet
the additional demand.

Alternate Economizer Operation:
Under the Default Operation, as described above, the supply fan speed will remain at minimum speed, as determined by the active
cooling stages, until the space demand requires an increase in supply airflow. The customer will have the ability to choose to allow
the supply fan speed to increase when the economizer is enthalpy enabled in order to realize the maximum cooling capacity of the
economizer, prior to energizing compressor outputs, when the space requires active cooling capacity. All cooling capacity demand
decisions will function as described in the Default Operation section above with the exception of the supply fan speed when the
unit has an active cooling demand and the economizer is enthalpy enabled.
HeatingOperation
During Heating operation, the control will monitor the Space Temperature and Space Heating setpoint and with a PI control algorithm determine if active heating capacity is required. As the Space Temperature deviates from the Space Heating Setpoint, the unit controller will increase the supply airflow up to the user selected, application specific, maximum airflow and begin to stage heating outputs (gas or electric) to meet the space demand.
The customer will also have the ability to enable Supply Air Tempering control which will allow the unit to bring on one stage of heating when the discharge air temperature falls below the Space Heating Setpoint - 10°F and the unit is operating in a minimum ventilation state with the supply fan running (not actively heating or cooling). The supply fan output will increase to the user selected, application specific, maximum airflow during Supply Air Tempering operation.

General
The units shall be downflow supply air. The operating range shall be between 125°F and 0°F in cooling as standard from the factory for units with microprocessor controls. 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. Unit shall be ETL listed and labeled, classified in accordance with UL 1995/ANSI Z83.8, certified to CAN/CSA standard C22.2 No. 236 and CSA standard C22.2 No. 2.6. Unit shall be manufactured with UL listed components.

Casing
Unit casing shall be constructed of zinc coated, 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 withASTMB117. 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
The eFlex variable speed compressor shall be capable of speed modulation from 15Hz to a maximum of 75Hz.The minimum unit capacity shall be 25% of full load or less. The compressor motor shall be a permanent magnet type. Each variable speed compressor shall be matched with a specially designed, refrigerant-cooled, variable frequency drive which modulates the speed of the compressor motor and provides several compressor protection functions. Control of the variable speed compressor and inverter control, as well as tandem direct-drive, scroll type compressors, shall be integrated with the ReliaTel unit controller to ensure optimal equipment reliability and efficiency. Each compressor shall have a crankcase heater installed, properly sized to minimize the amount of liquid refrigerant present in the oil sump during off cycles. 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.

Evaporator and Condenser Coils
Internally finned, 5/16" copper tubes are mechanically bonded to a configured aluminum plate fin. The microchannel type condenser coil uses flat streamlined tubes with small ports, and metallurgical tube-to-fin bond.This allows the microchannel coil better heat transfer performance. Microchannel condenser coil can reduce system refrigerant charge by up to50%because of smaller internal volume, which leads to better compressor reliability. Compact all-aluminum microchannel coils also help to reduce the unit weight.These all aluminum coils are recyclable. Galvanic corrosion is also minimized due to all aluminum construction. Strong aluminum brazed structure provides better fin protection. In addition, flat streamlined tubes also make microchannel coils more dust resistant and easier to clean. 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 plate fin 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.

High Pressure Control
All units include High Pressure Cutout as standard.

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.

CO2 Sensor Wiring
The unit wiring for field installed C02 sensors. Factory-installed C02 sensor wiring saves time and ensures proper unit connections for the field installed C02 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.

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.

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 theThrough the Base Electrical with either the Disconnect Switch or Circuit Breaker option is ordered.

Single ZoneVariable AirVolume
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 SpaceTemperature.

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.

Through-the-Base Electrical Access
Anelectrical 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 awater 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 perNECand cULus guidelines, and be agency recognized by cULus.

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.

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.

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

Field Roof Curb
The roof curb shall be designed to mate with the unit¿s downflow supply and return and providesupport 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.

Control Specification (if *applied in a system with a system-level controller)*

A. CONTROL SYSTEM OVERVIEW:
Control System shall include a System Controller, all controllers for HVAC equipment and ancillary devices (such as lights and exhaust fans), wireless communication between the System Controller, equipment controllers, and space sensors, and all wiring and end devices required. Control System to be fully programmed and commissioned by the installing contractor.

B. TOUCH SCREEN DISPLAY:
Control System shall include a 10-inch color Touch Screen Display for use by building occupants to adjust zone temperature setpoints, override lighting and HVAC equipment for after-hours use, modify schedules, and view service notifications. This display shall have PIN access for users and provide setpoint adjustment limits.

C. MOBILE APP:
Control System manufacturer shall provide a Mobile App for iOS and Android devices to allow occupants to perform the same functions (listed above) as the Touch Screen Display.

D. WEB BROWSER INTERFACE:
System Controller shall have an embedded Web Browser Interface to allow the installer and service providers to make adjustments to system control parameters and view trend logs and other service information.

E. SYSTEM CONTROLLER:
System Controller shall provide scheduling and coordination of all HVAC equipment, exhaust fans, and controlled lighting devices. The System Controller shall include a software application that coordinates the operation of rooftop units and VAV terminals. The System Controller shall support multiple system types, including Single-Zone Constant Volume, Single-Zone VAV, Changeover Bypass, Changeover VAV, and Multiple-Zone VAV with Terminal Heat (electric or hot water). The System Controller shall provide energy optimization strategies including Night Setback, Optimal Start, Fan Pressure Optimization, Discharge Air Temperature Reset, and Demand-Controlled Ventilation.

F. REMOTE ACCESS/NETWORK SECURITY:
Installer shall provide secure remote access to the Control System to enable the owner or service provider to access the system remotely using the Mobile App or Web Browser Interface. The Control System must be secured behind a firewall and not allow any inbound ports to be open or exposed to the internet. Control System manufacturer shall provide a remote access portal accessible by the owner and/or a service provider (as authorized by the owner).

Sequence of Operation (if applied in a SINGLE-ZONE VAV SYSTEM)

A. SYSTEM OPERATING MODES:
The System Controller shall send the equipment controllers Occupied/Unoccupied, Morning Warm-up/Pre-cool, and Heat/Cool modes. If communication is lost, the equipment controllers shall operate using default modes and setpoints.

1. NIGHT SETBACK:
During unoccupied mode, the system shall shut off. If the zone temperature drifts to the unoccupied heating or cooling setpoint, the system shall start up to heat or cool the zone, while the OA damper remains closed (unless economizing).

2. OPTIMAL START:
The System Controller shall automatically determine the optimal start time, such that each zone reaches its occupied setpoint just in time for scheduled occupancy.

3. DEMAND-CONTROLLED VENTILATION:
For those zones equipped with an occupancy sensor or CO2 sensor, outdoor airflow shall be reset based on occupancy status and/or measured CO2 concentration.

C. SINGLE-ZONE VAV SYSTEM

1. OCCUPIED HEAT/COOL:
The RTU shall modulate the supply fan, modulate (or cycle) compressors, modulate (or stage) heat, and/or enable airside economizing to maintain zone temperature at setpoint. The OA damper shall modulate, in proportion to changing supply fan speed, to bring in the required amount of ventilation.

2. MORNING WARM-UP/PRE-COOL:
The RTU shall operate the supply fan and modulate (or cycle) compressors or modulate (or stage) heat to raise/lower zone temperature to its occupied setpoint. The OA damper shall remain closed, unless economizing.

High Static BI Supply Fan
The unit shall include one backward inclined, centrifugal fan with a belt driven, fixed sheave, thermally protected motor. The unit has an adjustable motor mount assemble for quick adjustment of fan belts and motor sheaves. The high static blower shall be capable of producing 1200 CFM at 1.0" external static pressure. Oversized 1 Hp motor shall be included with the high static supply fan.

Supply Fan Variable Frequency Drive
General Description:
The AC Drive and all associated optional equipment are UL listed according to Power Conversation Equipment UL 508C and CSA certified. The AC Drive is designed, constructed and tested in accordance with NEMA ICS, NFPA, and IEC standards. The Drive is housed in a metal NEMA 1 enclosure. All standard and optional features are included within the Drive enclosure, unless otherwise specified. The Drive converts incoming fixed frequency three-phase AC power into a variable frequency and voltage for controlling the speed of three-phase AC motors. DC link reactors are provided on both the positive and negative rails of the DC bus equal to 3% impedance to minimize power line harmonics. Full load amp ratings meet or exceed NEC Table 430-150. The Drive provides full rated output current continuously, 110% of rated current for 60 seconds and 160% of rated current for up to 0.5 second while starting.

Isolation is provided between the Drive's power circuitry and control circuitry to ensure operator safety and to protect connected electronic control equipment from damage caused by voltage spikes, current surges, and ground loop currents. Audible motor noise is minimized through the use of an adjustable carrier frequency. Carrier frequency is automatically adjusted to optimize motor and AC Drive efficiencies while reducing motor noise. Operating range, ambient temperature, -10 to 50°C (14 to 104°F), 0 to 95% relative humidity, non-condensing, AC line voltage variation, -10 to +10% of nominal with full output.

Protective Features

Class 10 I2t electronic motor overload protection for single motor applications is provided. Protection against input transients, loss of AC line phase, output short circuit, output ground fault, over-voltage, under-voltage, AC Drive over-temperature and motor over-temperature. All faults are displayed in plain English. Protection from AC Drive sustained power or phase loss. Full rated output with an input voltage as low as 90% of nominal. Continuous operation with reduced output with an input voltage as low as 164 V AC for 208/230 volt units, 313 V AC for 460 volt units, and 394 volts for 600 volts units. Semi-conductor rated input fuses to protect power components. A 'signal loss detection' circuit senses the loss of an analog input signal such as 4 to 20 mA or 0 to 10 V DC, and is programmable to react as desired in such an instance.

Default: After 10-second time out the Drive will shut off. Will function normally when the keypad is removed while the AC Drive is running and continue to follow remote commands. AC Drive catches rotating motor operating forward or reverse up to full speed. The AC Drive is rated for 100,000 amperes interrupting capacity (AIC). Includes current sensors on three output phases to detect and report phase loss to the motor. Identifies which of the output phases is low or lost. Continues to operate without faulting until input voltage reaches 300 V AC on 208/230 volt units, 539 V AC on 460 volt units, and 690 volts on 600 volt units.

Interface Features

Off/Stop and Auto/Start selector switches provided to start and stop the AC Drive and determine the speed reference. The display is programmable to display in 9 languages including English, Spanish and French. The display has four lines, with 20 characters on three lines and eight large characters on one line. The following points are controlled and/or accessible: AC Drive Start/Stop. Speed reference, Fault diagnostics, Meter points to include - Motor power in HP, Motor power in kW, Motor kW-hr, Motor current, Motor voltage, Hours run, DC link voltage, Thermal load on motor, Thermal load on AC Drive and Heatsink temperature.

The AC Drive stores in memory the last 10 faults and related operational data. Four simultaneous displays are available, frequency or speed, run time, output amps and output power. The following displays are accessible from the keypad. Reference Signal Value, Output Frequency in Hz or percent, Output Amps, Motor HP, Motor kW, kW hour, Output Voltage, DC Bus Voltage, AC Drive Temperature in degrees, and Motor Speed in RPM.

A quick setup menu with factory-preset parameters is provided on the AC Drive eliminating the need for macros. A red FAULT light, a yellow WARNING light and a green POWER-ON light are provided. These indications are visible both on the keypad and on the AC Drive when the keypad is removed. The AC Drive includes a standard EIA-485 communication port and capability for future connection to a Modbus communication interface.

If the temperature of the AC Drive's heat sink rises to 80°C, the AC Drive automatically reduces its carrier frequency to reduce the heat sink temperature. If the temperature of the heat sink continues to rise the AC Drive automatically reduces its output frequency to the motor. As the AC Drive's heat sink temperature returns to normal, the AC Drive automatically increases the output frequency to the motor and returns the carrier frequency to its normal switching speed. The AC Drive has temperature controlled cooling fans for quiet operation and minimized losses.

Adjustments and Factory Default Settings

AC Drive carrier frequency is adjustable in steps of not less than 0.1 kHz to allow tuning the AC Drive to the motor. Four, acceleration and four deceleration ramps are provided. Acceleration and deceleration time is adjustable over the range from 0 to 3,600 seconds to base speed. The shape of these curves is automatically contoured to ensure no-trip acceleration and deceleration. Factory Default: The Drive is programmed for an acceleration and deceleration time of 30 seconds. Four current limit settings will be provided. Factory Default: The Drive is programmed for 1 X rated current. If the AC Drive trips on one of the following conditions, the AC Drive will be programmable for automatic or manual reset: under-voltage, over-voltage, current limit and inverter overload.

Factory Default: The Drive is programmed for automatic reset. The number of restart attempts is selectable from 0 through infinity and the time between attempts is adjustable from 0 through 600 seconds. Factory Default: 3 attempts, 10 seconds between attempts. After 3 failed restart attempts, the drive automatically reverts to the manual reset mode. An automatic 'on delay' may be selected from 0 to 120 seconds. Factory Default: The Drive is programmed for 0 seconds delay.

Hot Water Heating Coil with Basic Piping Package

Coil will be designed with aluminum or copper plate fins and copper/copper alloy tubes. Fins have collars drawn, belled and firmly bonded to the tubes by means of mechanical expansion of the tubes. Coil has airflow arrow and nameplate attached to coil casing. Capacities, pressure drops and selection procedure are certified in accordance with ARI standard 410. Coil casing is manufactured with G90 galvanized steel. The coil is shipped with control valve piped to the return water line. The control valve shall be a three-way control characterized valve.

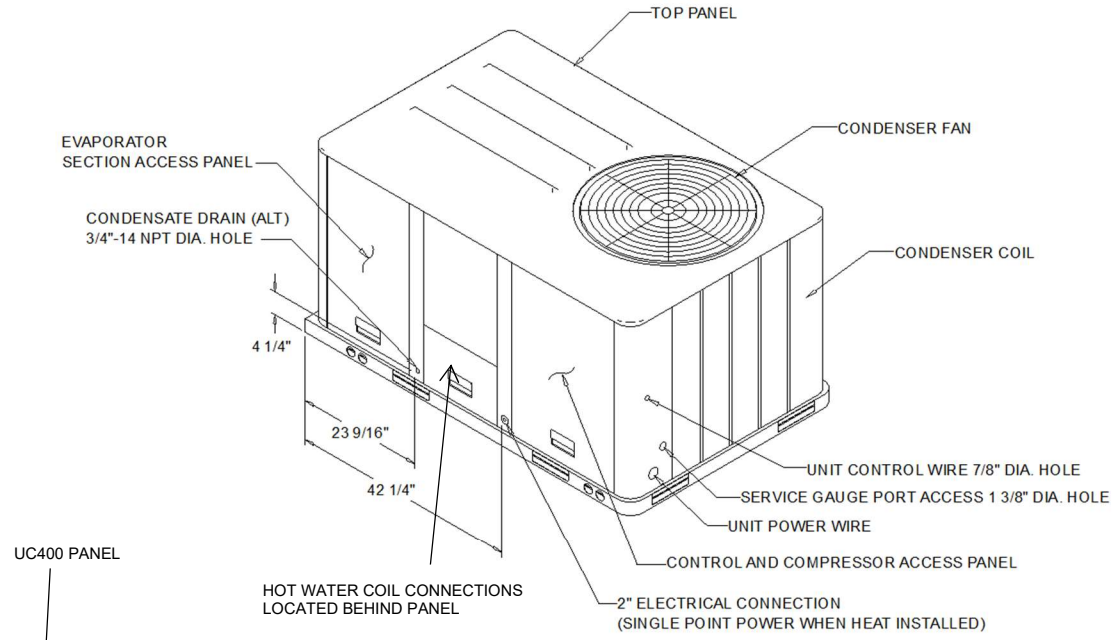
Upon a call for heat the unit shall modulate the hot water valve to maintain supply air temperature at 80ºF (adj). A low limit protection thermostat located on the down stream side of the hot water coil will open the hot water valve 100% and disable all unit functions if supply air temperature falls below 36ºF while the unit is operating. To help prevent nuisance trips, when the unit fan is not operating, the unit will open the hot water valve to maintain cabinet temperature at 42ºF.

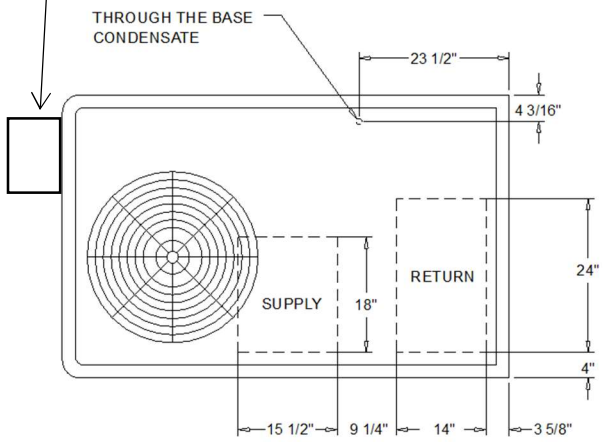
Modulating Hot Gas Reheat for Dehumidification
The unit is factory equipped with modulating hot gas reheat. By diverting hot discharge gas to a coil in the supply air stream, approximately room neutral air will be delivered to the space. Hot gas reheat mode shall be initiated by a humidity sensor in the space. Charge adjustment at startup may be required.

UC400 Controller
Cooling Mode: When Reliatel enables cooling, the UC400 will control the variable speed compressor to cooling discharge air temperature setpoint.
Dehumidification Mode: When Reliatel enables dehumidification mode, the UC400 will modulate reheat valve to discharge air temperature. The variable speed compressor will be set to full capacity in dehumidification mode.

UC400 Points	
Analog Inputs	**Binary Inputs**
Discharge Air Temperature	Compressor Call
Drive Alarm	Heat Call
Discharge Pressure	Reheat Call
Supply Cabinet Temperature	Freezestat Status
Analog Outputs	**Binary Outputs**
VS Compressor Speed	Compressor Run
Reheat Valves	Reheat Valve Close
Outdoor Fan Speed	
Hot Water Valve	
Analog Values	
Cooling Discharge Air Temperature Setpoint	
Heating Discharge Air Temperature Setpoint	
Reheat Discharge Air Temperature Setpoint	

Dimensional Drawings - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop
Item: A1 Qty: 1 Tag(s): RTU-207

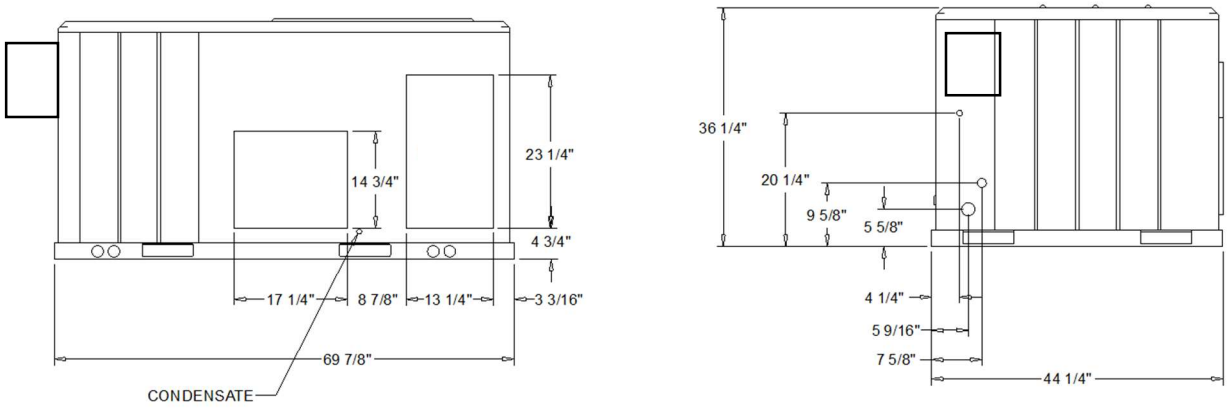




NOTES:
1. THRU -THE -BASE ELECTRICAL IS NOT STANDARD ON ALL UNITS.
2. VERIFY WEIGHT, CONNECTION, AND ALL DIMENSION WITH INSTALLER DOCUMENTS BEFORE INSTALLATION

PLAN VIEW UNIT

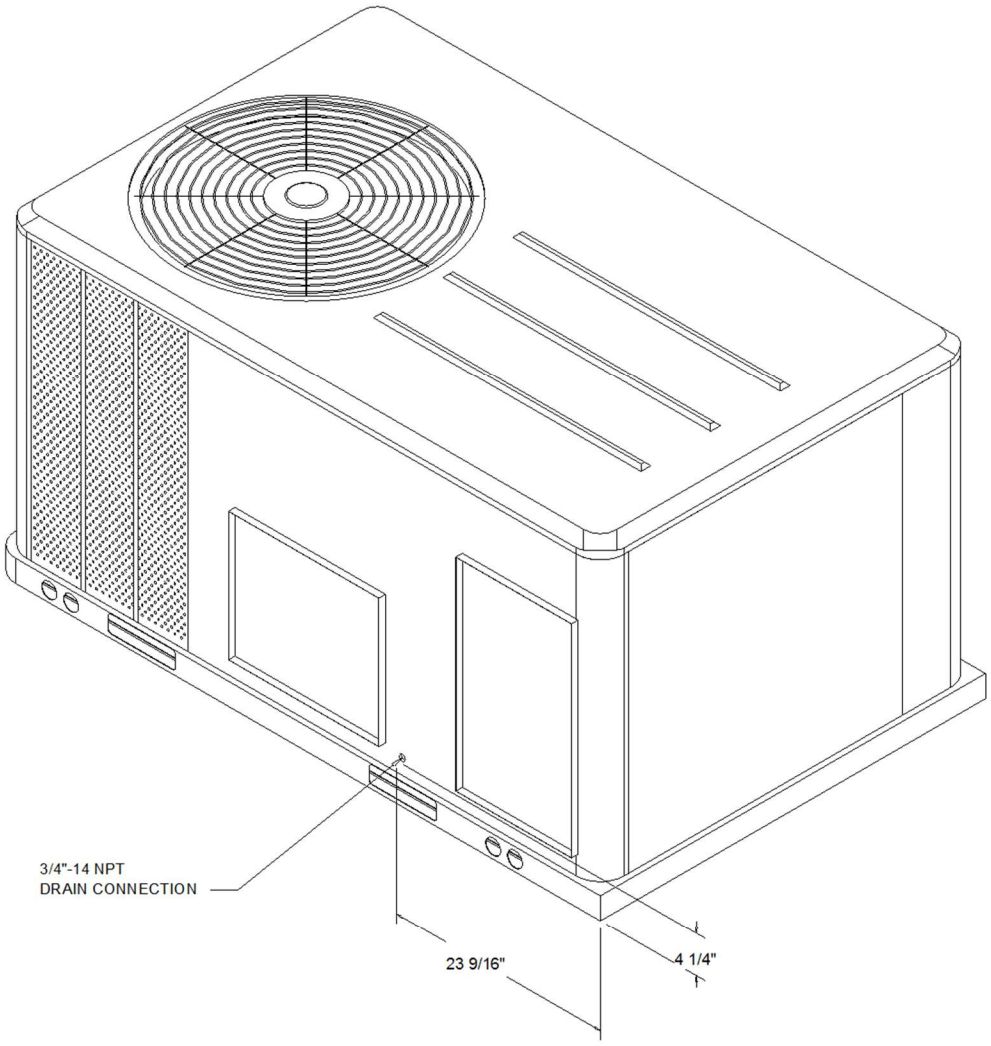
DIMENSION DRAWING



PACKAGED COOLING

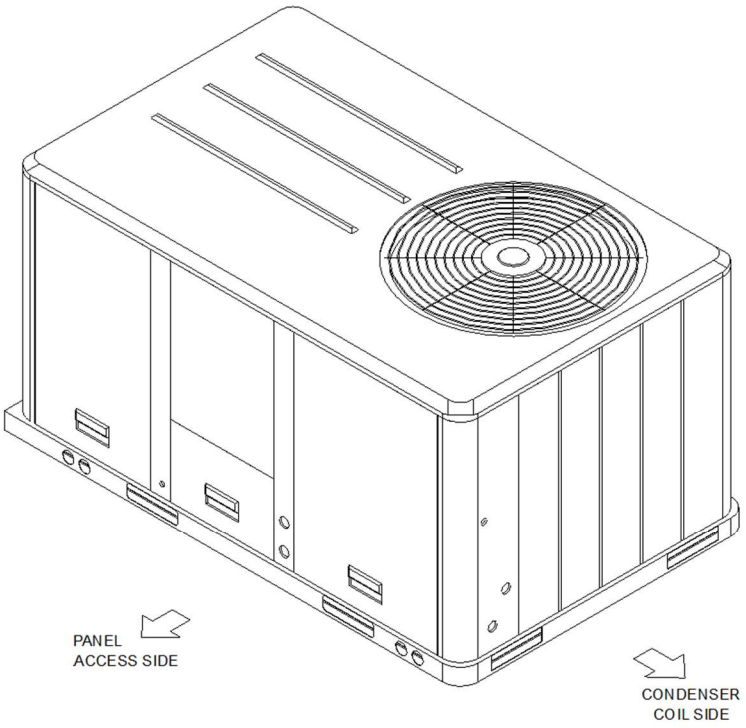
DIMENSION DRAWING

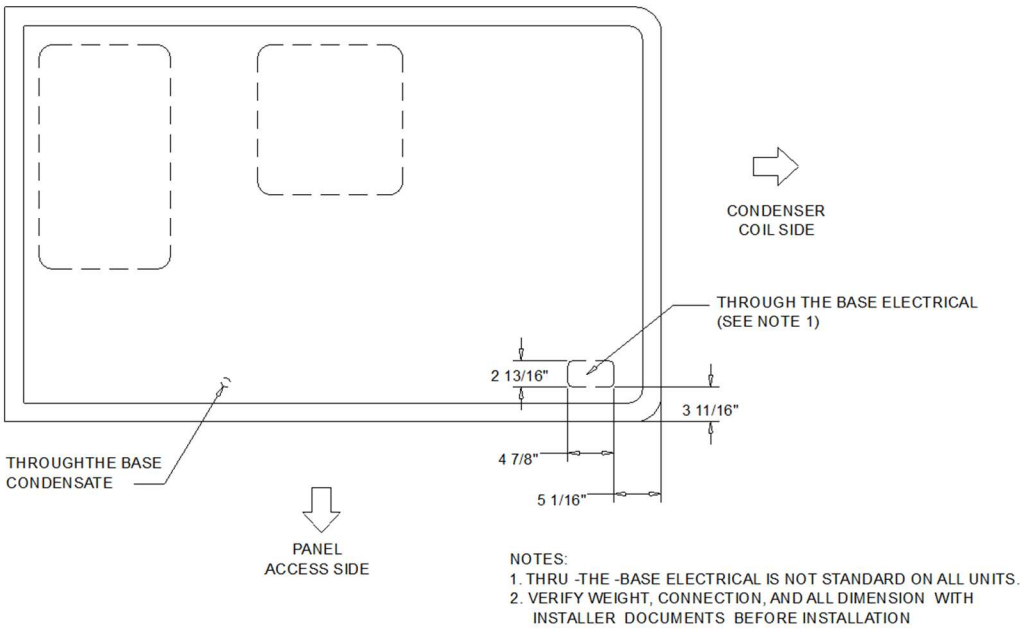
Dimensional Drawings - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop
Item: A1 Qty: 1 Tag(s): RTU-207



ISOMETRIC-PACKAGED COOLING

Dimensional Drawings - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop
Item: A1 Qty: 1 Tag(s): RTU-207





THRU THE BASE ELECTRICAL

PLAN / ISO VIEW DRAWING

Dimensional Drawings - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop
Item: A1 Qty: 1 Tag(s): RTU-207

ELECTRICAL / GENERAL DATA

GENERAL (2)(4)(6)

Model:	TZC036E	Oversized Motor	
Unit Operating Voltage:	187-253	MCA:	N/A
Unit Primary Voltage:	208	MFS:	N/A
Unit Secondary Voltage	230	MCB:	N/A
Unit Hertz:	60		
Unit Phase:	3		

Standard Motor		Field Installed Oversized Motor	
MCA:	15.0/15.0	MCA:	N/A
MFS:	20.0/20.0	MFS:	N/A
MCB:	20.0/20.0	MCB:	N/A

INDOOR MOTOR

Standard Motor		Outsized Motor		Field Installed Oversized Motor	
Number:	1	Number:	N/A	Number:	N/A
Horsepower:	1	Horsepower:	N/A	Horsepower:	N/A
Motor Speed (RPM):	-	Motor Speed (RPM):	N/A	Motor Speed (RPM):	N/A
Phase:	3	Phase:	N/A	Phase:	N/A
Full Load Amps:	3.3	Full Load Amps:	N/A	Full Load Amps:	N/A
		Locked Rotor Amps:	N/A	Locked Rotor Amps:	N/A

COMPRESSOR Circuit 1/2

Number:	1
Horsepower:	Variable Speed
Phase:	3
Rated Load Amps:	-
Locked Rotor Amps:	8.0
VFD Input Amps:	--

OUTDOOR MOTOR

Number:	1
Horsepower:	0.33
Motor Speed (RPM):	1100
Phase:	1
Full Load Amps:	1.0
Locked Rotor Amps:	-

POWER EXHAUST ACCESSORY (3,7)

(Field Installed Power Exhaust)

Phase:	
Horsepower:	
Motor Speed (RPM):	
Full Load Amps:	
Locked Rotor Amps:	

FILTERS

Type:	Throwaway
Furnished:	Yes
Number	2
Recommended	20"x30"x2"

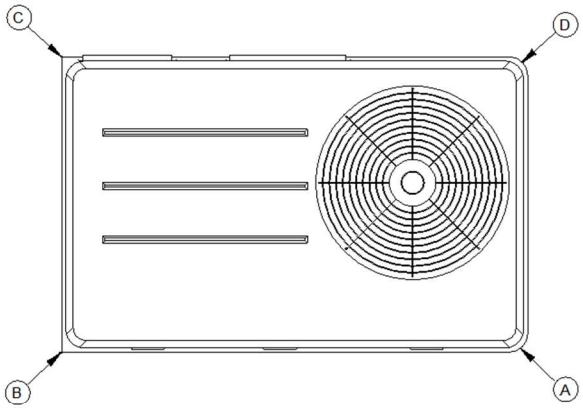
REFRIGERANT (2)

Type	R-410A
Factory Charge	
Circuit #1	7.8 lb
Circuit #2	

NOTES:

1. Maximum (HACR) Circuit Breaker sizing is for installations in the United States only.
2. Refrigerant charge is an approximate value. For a more precise value, see unit nameplate and service instructions.
3. Value does not include Power Exhaust Accessory.
4. Value includes oversized motor.
5. Value does not include Power Exhaust Accessory.
6. EER is rated at AHRI conditions and in accordance with DOE test procedures.
7. Installation of this power exhaust kit will affect unit level MCA and could affect MOP sizing having a direct impact on existing field wiring and unit protection devices. The change in MCA/MOP is the sole responsibility of the field installing party. Trane will not issue new nameplates as a result of this power exhaust accessory installation. FLA of the power exhaust kit option must be added to the MCA of the unit for building supply conductor sizing determination.

Weight, Clearance & Rigging - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop
Item: A1 Qty: 1 Tag(s): RTU-207



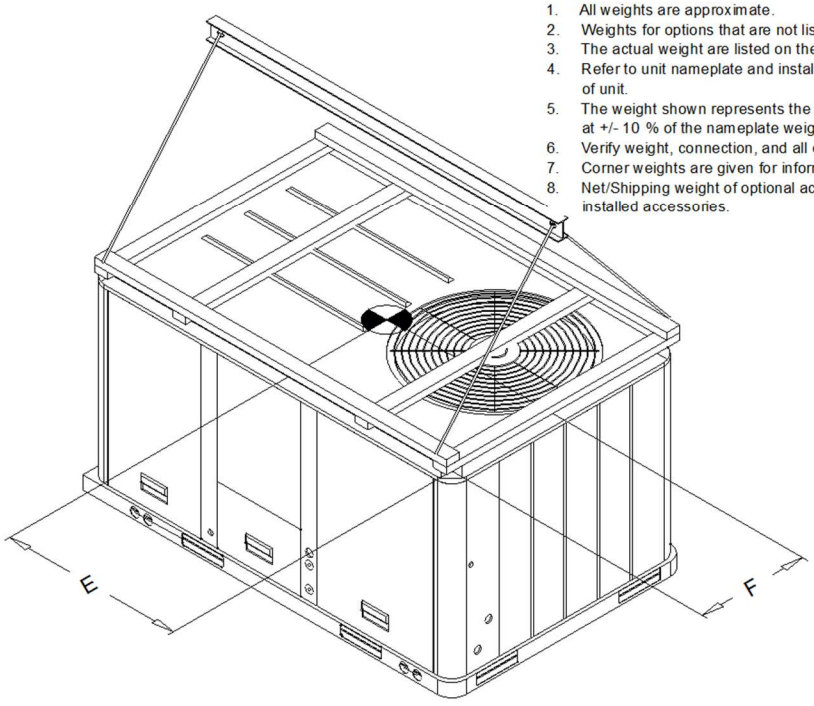
CORNER WEIGHT

INSTALLED ACCESSORIES NET WEIGHT DATA

ACCESSORY	WEIGHTS
ECONOMIZER	70.0 lb
MOTORIZED OUTSIDE AIR DAMPER	
MANUAL OUTSIDE AIR DAMPER	
BAROMETRIC RELIEF	
OVERSIZED MOTOR	
BELT DRIVE MOTOR	
POWER EXHAUST	
HEATER	
REHEAT	
THROUGHT THE BASE ELECTRICAL (FIOPS)	8.0 lb
UNIT MOUNTED CIRCUIT BREAKER (FIOPS)	5.0 lb
UNIT MOUNTED DISCONNECT (FIOPS)	
POWERED CONVENIENCE OUTLET (FIOPS)	38.0 lb
HINGED DOORS (FIOPS)	10.0 lb
HAIL GUARD	12.0 lb
SMOKE DETECTOR, SUPPLY / RETURN	7.0 lb
ADDITIONAL OPTIONS	140 lb
ROOF CURB	61.0 lb

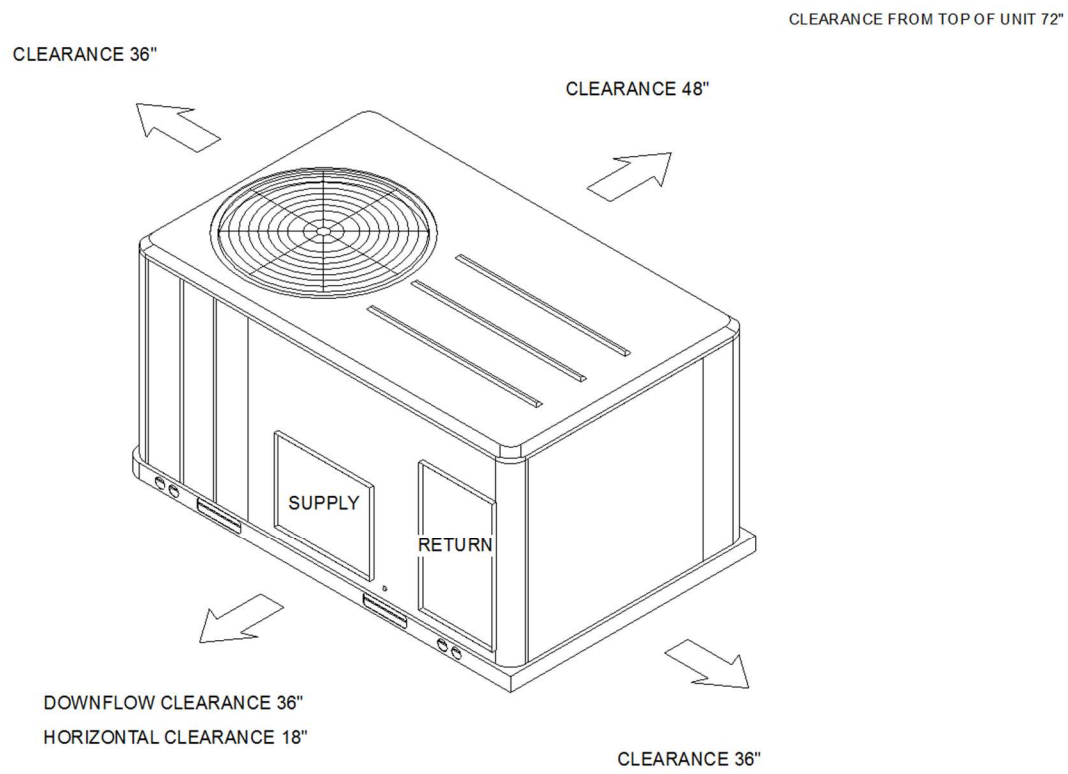
BASIC UNIT WEIGHTS		CORNER WEIGHTS				CENTER OF GRAVITIY	
SHIPPING	NET	A	133.0 lb	C	61.0 lb	(E) LENGHT	(F) WIDTH
	553.0 lb	B	183.0 lb	D	176.0 lb	32"	18"

NOTE:
1. All weights are approximate.
2. Weights for options that are not list refer to Installation guide.
3. The actual weight are listed on the unit nameplate.
4. Refer to unit nameplate and installation guide for weights before scheduling transportation and installation of unit.
5. The weight shown represents the typical unit operating weight for the configuration selected. Estimated at +/- 10 % of the nameplate weight. .
6. Verify weight, connection, and all dimension with installer documents before installation.
7. Corner weights are given for information only.
8. Net/Shipping weight of optional accessories should be added to unit weight when ordering factory or field installed accessories.

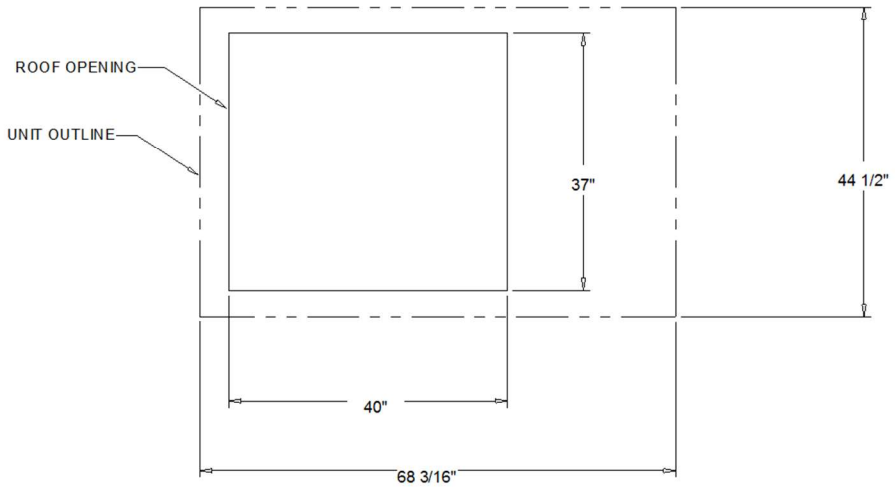


RIGGING AND CENTER OF GRAVITY

Weight, Clearance & Rigging - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop
Item: A1 Qty: 1 Tag(s): RTU-207



PACKAGED COOLING
CLEARANCE



PACKAGED COOLING
DOWNFLOW TYPICAL ROOF OPENING

Fan Curve - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop
Item: A1 Qty: 1 Tag(s): RTU-207

comefri fans of energy saving

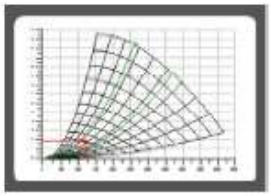
12/2/2022
Aeolus4 1.0.22255.0 Sep 2022

Customer	Stav Shadmi, North Jersey Trane CSO		
Project	Vails Gate Fire District	**Description**	RTU-207
Your Ref.	Nick Cavitt	**Our Ref.**	Trane Creative Solutions

Input data

Volume	1200 CFM	**Temperature**	68.0 °F	**Density**	0.075 lb/cu.ft
Static Pressure	1.80 In.W.G.	**Altitude**	0 ft	**Free Inlet - Free Outlet**	

	Catalogue data		
Selected Fan **THLZ 250 FF T**	n Max 1/min	Pw Max BHP	J lb ft²
	5800	6.71	0.47



Fan Information

c ft/min	p tot In.W.G.	p sta In.W.G.	p dyn In.W.G.	tip speed ft/min	RPM 1/min	eta Tot %	eta Sta %	P fan BHP	Min Mot. BHP	P mot BHP	Shaft diameter in
1076	1.87	1.80	0.07	6040	2344	76.04	73.11	0.46	0.56	0.75	0.79

fm[Hz]		63	125	250	500	1000	2000	4000	8000	Tot.
Lw7 Total Sound Power Level at the fan inlet, with ducted outlet - Lwmi Inlet and Casing Sound Power Level (free inlet) do not includes the effect of duct end correction										
Level Lw7	**dB/dB(A)**	73 / 47	72 / 56	72 / 64	74 / 71	72 / 72	70 / 72	63 / 64	56 / 55	**81 / 77**
Lw6 Total Sound Power Level at the free outlet - Lwmo Outlet Sound Power Level (free outlet) do not includes the effect of duct end correction										
Level Lw6	**dB/dB(A)**	73 / 47	73 / 57	74 / 66	75 / 72	72 / 72	70 / 72	63 / 64	56 / 55	**81 / 77**

Electronic Cometer

Piezo ring Q [m³/s] = dFac (Δp[Pa])$^{0.5}$

dFac	Q [m³/s]	Δp[Pa]
0.033	0.57	295

Δp: pressure differential between the suction chamber of the AHU and the sensor/ring

Fan Curve - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop
Item: A1 Qty: 1 Tag(s): RTU-207

Chart

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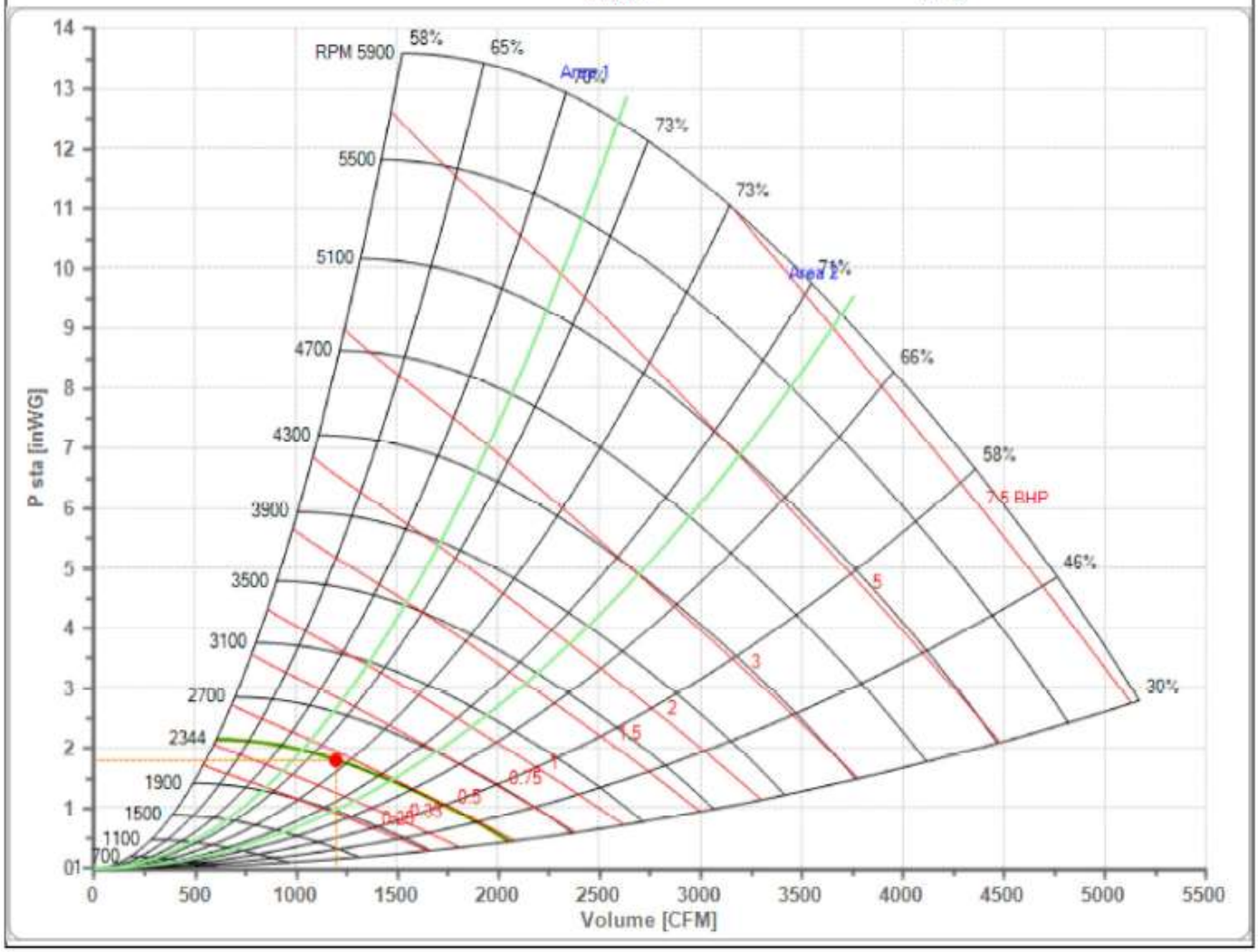
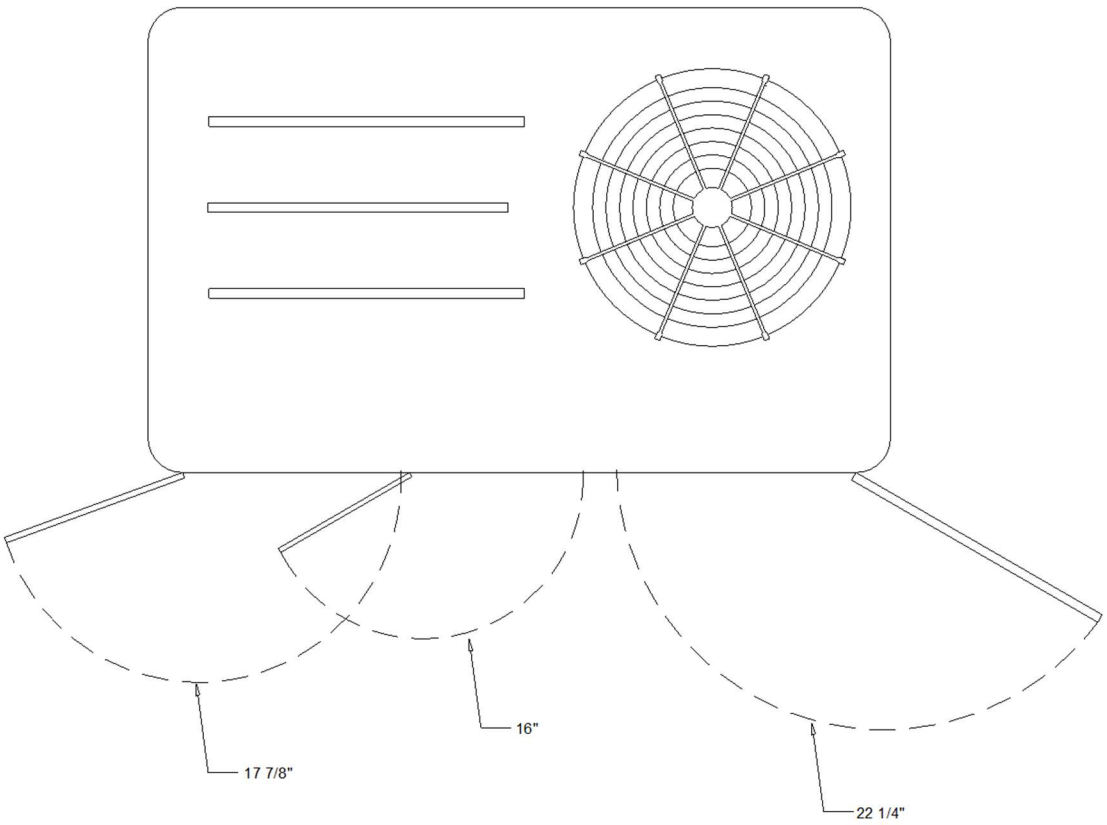
12/2/2022
Aeolus4 1.0.22255.0 Sep 2022

Selected Fan	THLZ 250 FF T	Fan working conditions	Free Inlet - Free Outlet
n Max	5800 1/min	Volume	1200 CFM
Pw Max	6.71 BHP	Total Pressure	1.87 In.W.G.
J	0.47 lb ft²	Static Pressure	1.80 In.W.G.
		P fan	0.46 BHP
Required working point	•	eta Tot	76.04 %
Effective working point	•	eta Sta	73.11 %
		RPM	2344 1/min
		Temperature	68.0 °F
		Altitude	0 ft

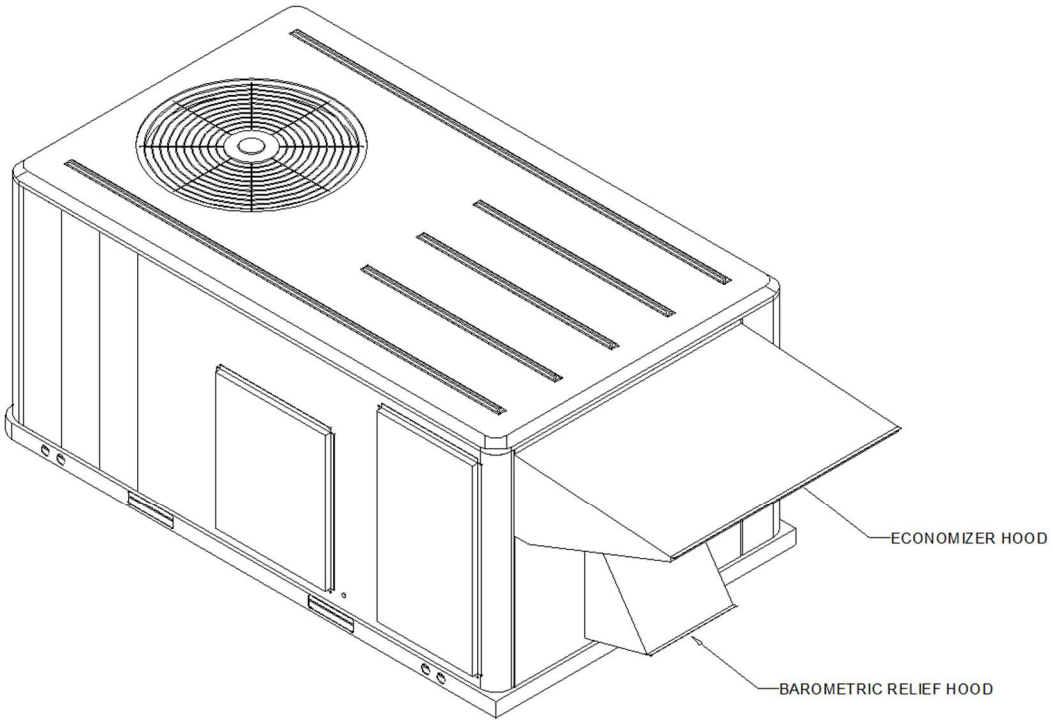


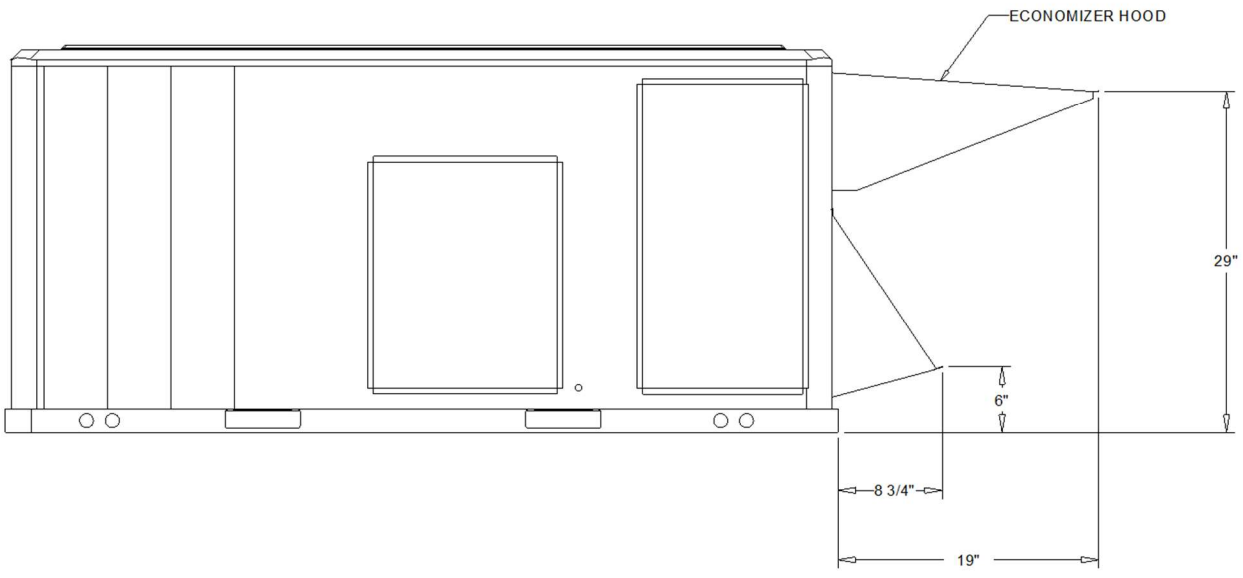
Accessory - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop
Item: A1 Qty: 1 Tag(s): RTU-207



SWING DIAMETER - HINGED DOOR(S) OPTION

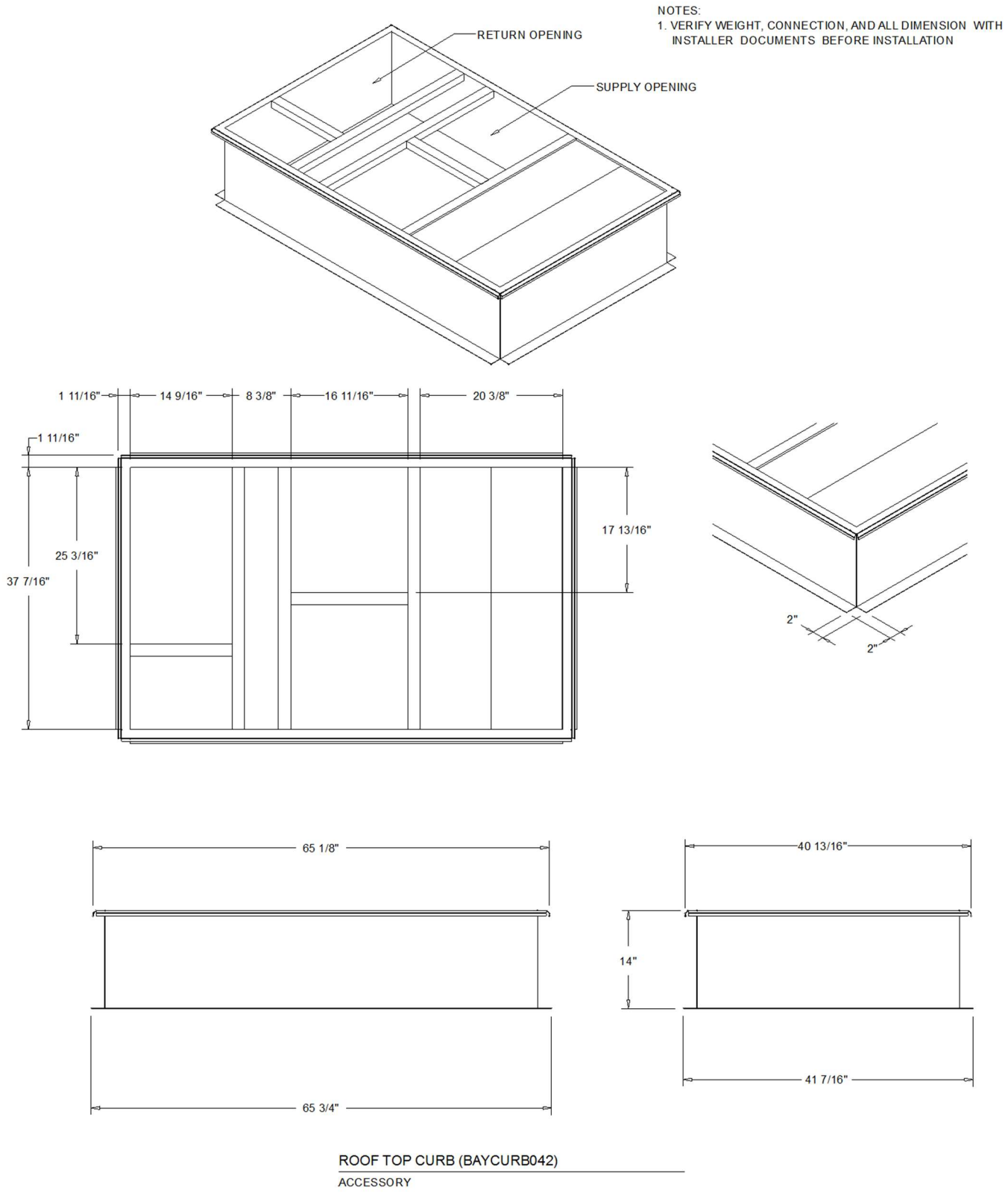
Accessory - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop
Item: A1 Qty: 1 Tag(s): RTU-207





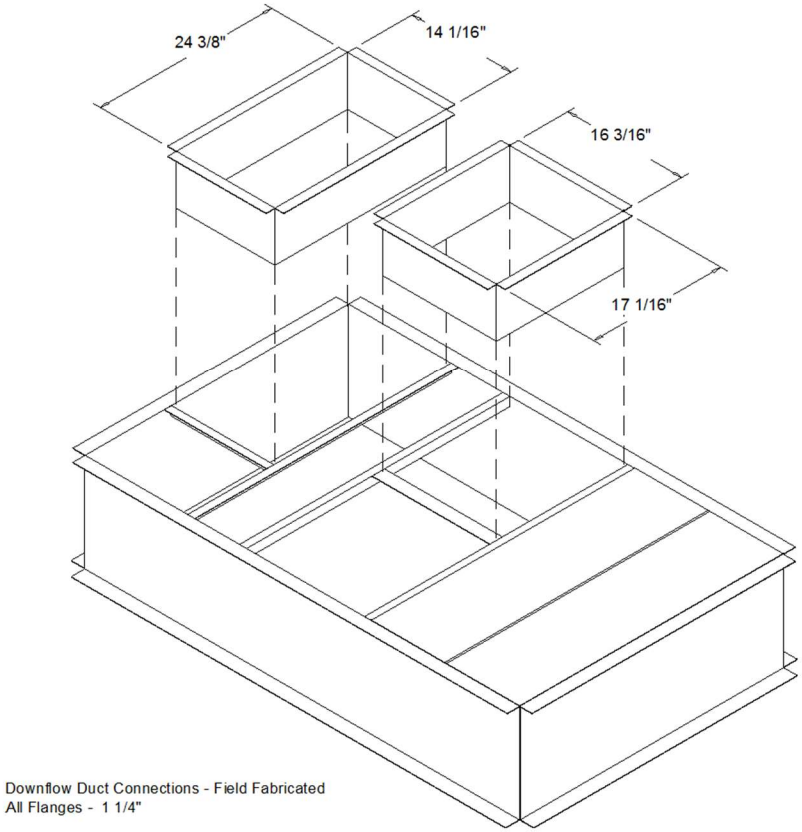
LOW LEAK ECONOMIZER HOOD
ACCESSORY

Accessory - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop
Item: A1 Qty: 1 Tag(s): RTU-207



ROOF TOP CURB (BAYCURB042)
ACCESSORY

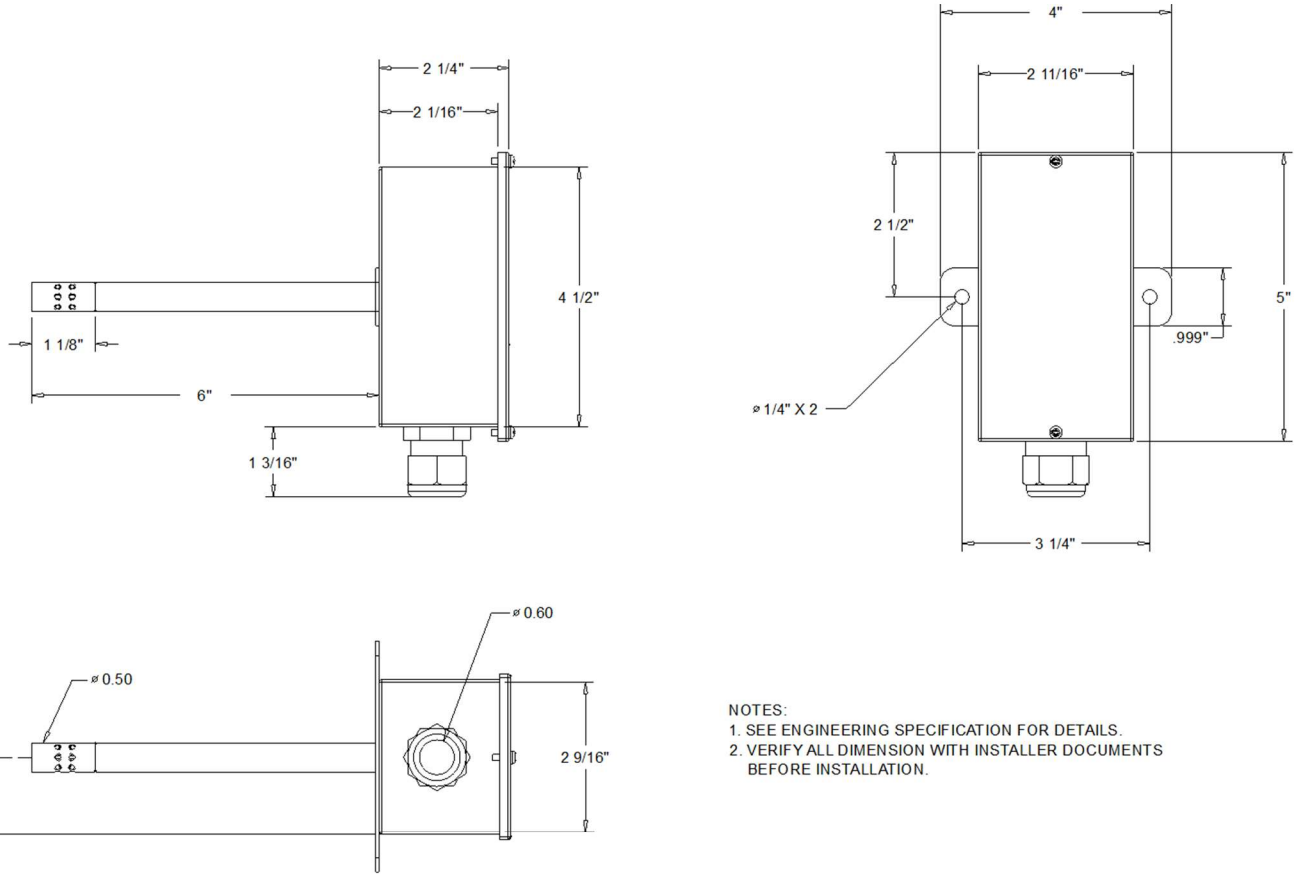
Accessory - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop
Item: A1 Qty: 1 Tag(s): RTU-207



Downflow Duct Connections - Field Fabricated
All Flanges - 1 1/4"

ACCESSORY - DUCT CONNECTIONS

Accessory - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop
Item: A1 Qty: 1 Tag(s): RTU-207

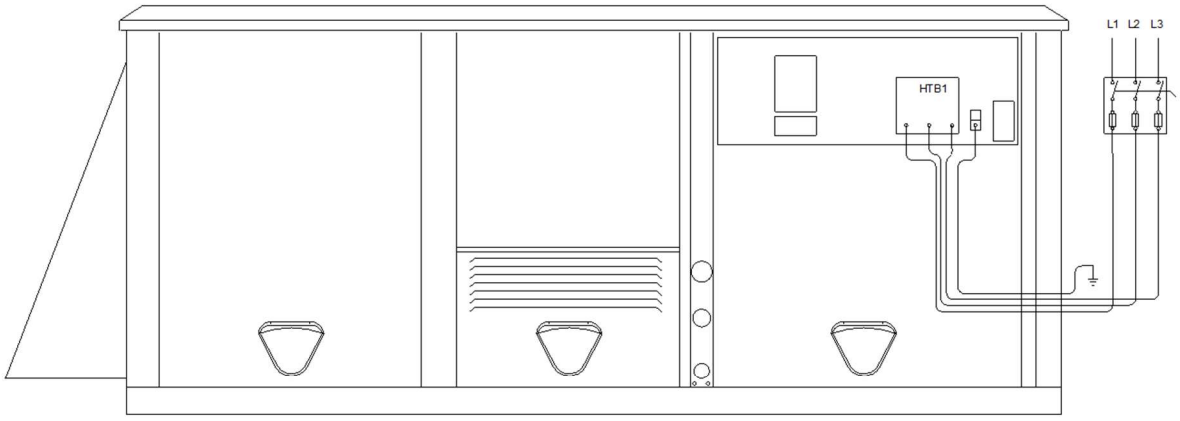


NOTES:
1. SEE ENGINEERING SPECIFICATION FOR DETAILS.
2. VERIFY ALL DIMENSION WITH INSTALLER DOCUMENTS BEFORE INSTALLATION.

BAYSENS037A - DUCT MOUNT HUMIDITY SENSOR

ACCESSORY

Field Wiring - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop
Item: A1 Qty: 1 Tag(s): RTU-207



ZONE SENSOR WIRE TABLE

WIRE SIZE	MAXIMUM WIRE LENGTH
22 GAUGE	1800"
20 GAUGE	3000"
18 GAUGE	4500"
16 GAUGE	7200"
14 GAUGE	11700"

NOTE:

1. All wiring and devices shown dashed to be supplied and installed by the customer in accordance with national and local electrical codes.
2. Low voltage control wiring must not be run in conduit with power wiring.

Field Installed Options - Part/Order Number Summary
This is a report to help you locate field installed options that arrive at the jobsite. This report provides part or order numbers for each field installed option, and references it to a specific product tag. It is NOT intended as a bill of material for the job.

Product Family - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop

Item	Tag(s)	Qty	Description	Model Number
A1	RTU-207	1	3-10 Ton R-410A PKGD Unitary Cooling Roo	TZC036E3R0A**P6E1A2B600C1000001000000000

Field Installed Option Description	Part/Ordering Number
Roof curb	BAYCURB042A
Programmable Zone Sensor - Title 24	BAYSENS924B
Temperature sensor	BAYSENS016A
Humidity duct mounted sensor	BAYSENS037A