

Submittal Cover Sheet

Project: 9000 Cypress Waters
Project Number: 21002354
Submittal #: 230000-002-0

CSI	ID #	Rev #	Description	Subcontractor	Type	Rcvd from Sub	Sent to A/E	Due from A/E
230000	002	0	DOAS Unit	VENTURE MECHANICAL	Product Data	4/7	4/7	4/21

Notes:

Please see the following PD for DOAS RTU unit. Please review electrical requirements.

Subcontractor to field verify all dimensions prior to fabrication.

Architect's Stamp

STRUCTURETONE
 Southwest

Review of these shop drawings or submittals does not relieve the Subcontractor of responsibility for full compliance with the plans, specifications, and contract documents. Dimensions, quantities, errors, omissions, and the furnishings of all items required, whether shown on this drawing or not, shall remain the responsibility of the Subcontractor.

Submittal No.: 230000-002-0
Project: 9000 Cypress Waters
Reviewed by: Diana Gonzalez
Date: 04/07/22

Consultant's Stamp



Submittal

Trane U.S. Inc.

Prepared For:
VMI

Date: 1/11/2022

Customer P.O. Number:
Customer Project Number:

Sold To: VMI

Job Number:
Job Name: 9000 Cypress Waters Billingsley

Trane is pleased to provide the enclosed submittal for your review and approval.

Product Summary

Qty	Model Description
2	Horizon™ (OAK/N Rev5) - Horizon™ - Outdoor Air Unit (K/N)

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

- APPROVED
- MAKE CORRECTIONS NOTED BELOW
- REVISE & RESUBMIT

COMMENTS:

DATE: 2/15/22
TH - VMI

Product Data - Horizon™ - Outdoor Air Unit (K/N)

Size	Qty	Description	Model Number
N648	2	Horizon™ - Outdoor Air Unit (K/N)	OAND648E4-D1C400LN-D3P00AC0002000B0B0A0

Tag(s): DOAS-1,2

Unit Voltage: 460-3-60

Airflow Configuration: Vertical Discharge/No Return

Installation: Outdoor

Evaporator Coil: DX 6 Row Interlaced

Hot Gas Reheat: Modulating

Compressor: Digital Scroll Both Circuits

Condenser: Air Cooled Variable Speed Head Pressure Low Ambient Control

Indoor Blower Motor: Direct Drive w/VFD

Heat Type: Electric - SCR Modulating

Fuel Type: Electric - Open Coil

460V Electric Heater: 139

Unit Controls: Trane UC600 - Discharge Air Control w/BACNET (No Display)

Damper Options: 2-Position Outdoor Air Damper

Filters: MERV-8

Electrical Options: Non-Fused Disconnect Switch w/115v Outlet

Accessories: Condenser Hailguard

Warranty: 1-Year Parts Only (manufacturer warranty)

Warranty: 5-Year Digital/Variable Speed Scroll Compressor

Supply Discharge Air Sensor (FLD)

2 inch Double Wall Construction

Stainless Steel Drip Pan

Blower HP - 5

Blower RPM - 1968

Supply Fan - CF180x2

Unit Amps - FLA: 188.1 Amps

Min Circuit Ampacity - MCA: 191.5 Amps

Maximum Fuse Size - MFS: 200 Amps

Tag: **DOAS-1,2**

Comments:

Unit Information

Model: Horizon™ (OAK/N Rev5)	Unit Length: 197 in	Weight Operating: 5582 lb*
Size: N648	Unit Width: 101 in	<i>Note: Weight does not include CURB weight. See CURB submittal for actual</i>
Quantity: 2	Unit Height: 93 in	Refrigerant Charge
Supply Airflow: 10,000 CFM	Elevation: 200 ft	Circuit 1: 58.3 lbs
Outside Airflow: 10,000 CFM	Ambient Air DB: 85 F	Circuit 2: 57.79 lbs
Minimum Airflow: 5,464 CFM		

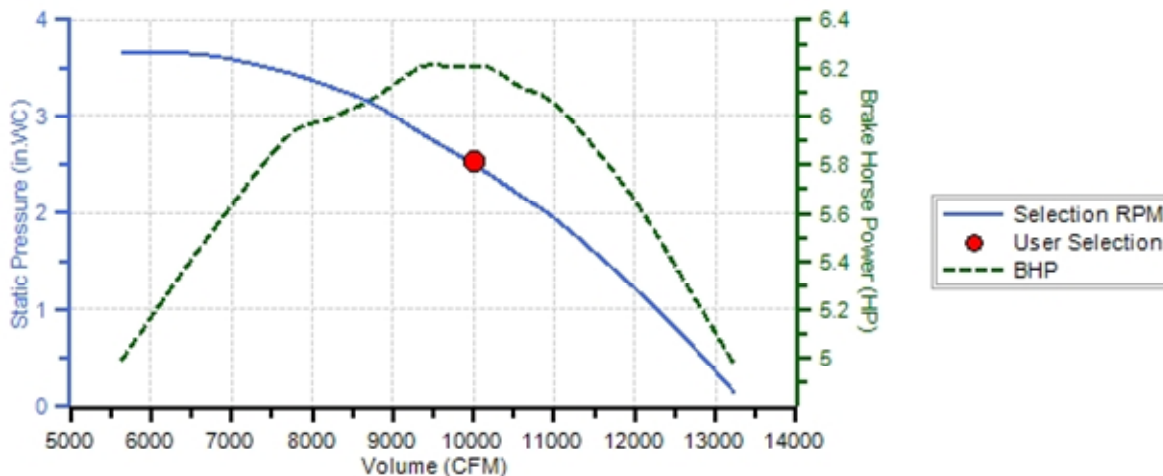
Cooling Performance

Gross Total Capacity: 703.5 MBh	Evaporator Face Area: 28.6 sq ft
Gross Sensible Capacity: 275.5 MBh	Evaporator Rows / FPI: 6 / 12
Net Total Capacity: 687.5 MBh	Condenser Face Area: 59.6 sq ft
Net Sensible Capacity: 259.5 MBh	Condenser Rows / FPI: 4 / 12
Entering Air DB / WB (Coil): 83.7 / 77.55 F	Air Velocity: 349 fpm
Leaving Air DB / WB (Coil): 58.7 / 58.4 F	Coil Air PD: 0.39 in H2O
Leaving Air DB / WB (Reheat): 76.2 / 64.62 F	EER: 13.3
Leaving Air DB / WB (Unit): 77.9 / 65.2 F	Watts: 51559
Leaving DP: 58 F	MRE: 7.48 lb/kWh
MRC: 385.86 lb/h	

Heating Performance

Heat Type: Electric Heat	
Capacity: 139 kW	Voltage-Ph-Hz: 460-3-60
Entering Air DB: 23 F	Coil Air PD: 0.05 in H2O
Leaving Air DB: 66.9 F	

Supply Fan CF180x2



Supply Pressure Drop Summary

External Static Pressure:	1.75 in H2O
Cabinet:	0.01 in H2O
Cooling Coil:	0.39 in H2O

Supply Fan Conditions

Fan Motor BHP:	6.29 BHP
Operating RPM:	1968 RPM
Minimum RPM:	1178 RPM

Base Filter:	0.01 in H2O
Filter:	0.25 in H2O
Primary Heat:	0.05 in H2O
HGRH:	0.07 in H2O
Total Static Pressure:	2.53 in H2O

Standard Radiated Sound Power Level (dBA)

<u>63</u>	<u>125</u>	<u>250</u>	<u>500</u>	<u>1000</u>	<u>2000</u>	<u>4000</u>	<u>8000</u>	<u>Total dBA</u>
57.5	80	82.3	85.7	87.3	87.5	83.6	75.2	93

Sound power levels are listed for informational purposes only and are not guaranteed.

Unit Electrical Data

Unit Voltage-Ph-Hz:	460-3-60	Min Circuit Ampacity - MCA:	191.5 Amps
Unit Amps - FLA:	188.1 Amps	Maximum Fuse Size - MFS:	200.0 Amps

Electrical Summary

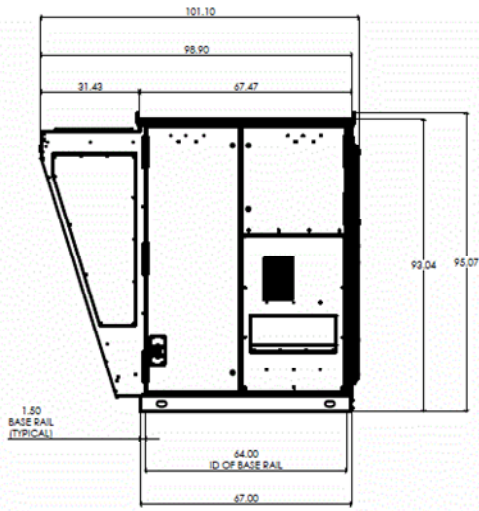
<u>Component</u>	<u>Fan Service</u>	<u>Qty</u>	<u>HP (ea.)</u>	<u>FLA (ea.)</u>	<u>RLA (ea.)</u>	<u>LRA (ea.)</u>
Digital Scroll		1			18.6	125
Scroll		1			18.6	125
Digital Scroll		1			23.1	150
Scroll		1			23.1	150
	Supply	2	5	6.3		
	Condenser	4	1	2.1		
Controls		1		1		
Electric Heat		1		174.5		

Notes

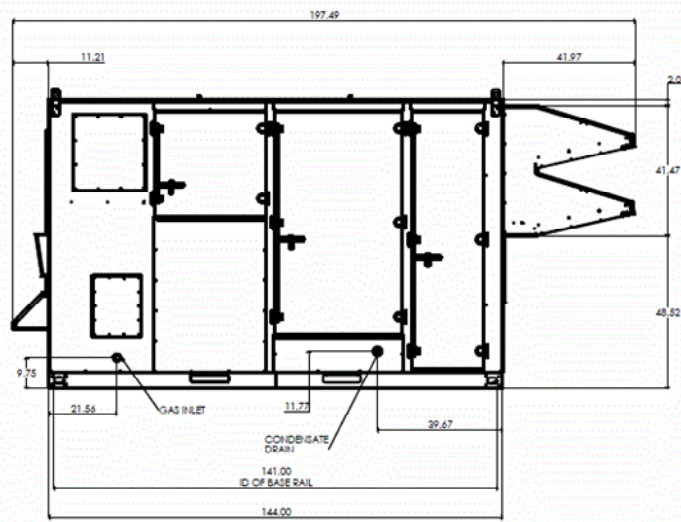
- Unit Electrical amps include the greater of compressor or electrical heat amps.
- Unit's electrical as shown above are for single point power.

Unit Dimensions - 30-60 Ton R-410A PKGD Unitary Cooling Rooftop

Qty: 2 Tags: DOAS-1,2



Front View



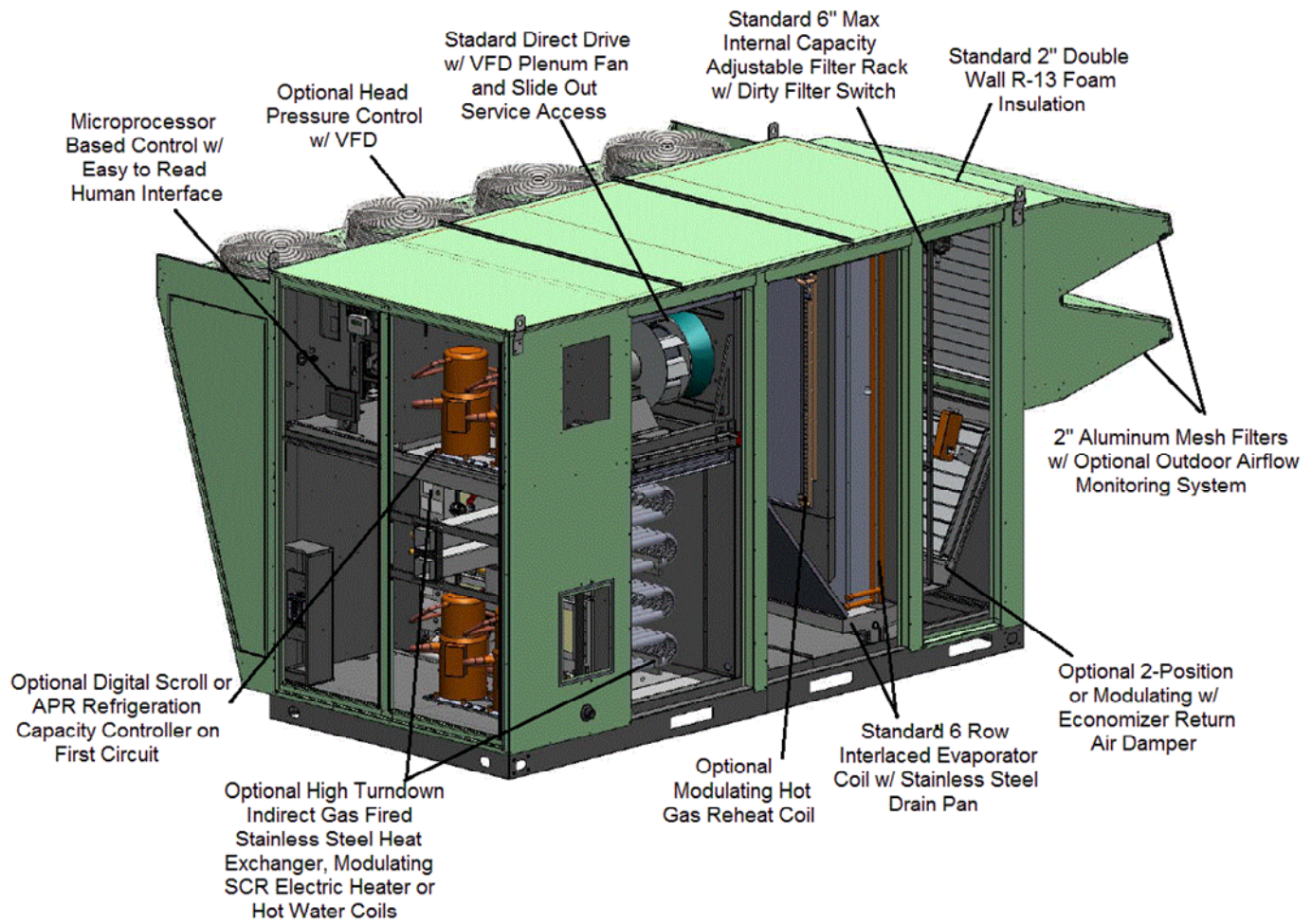
Side View



Bottom View

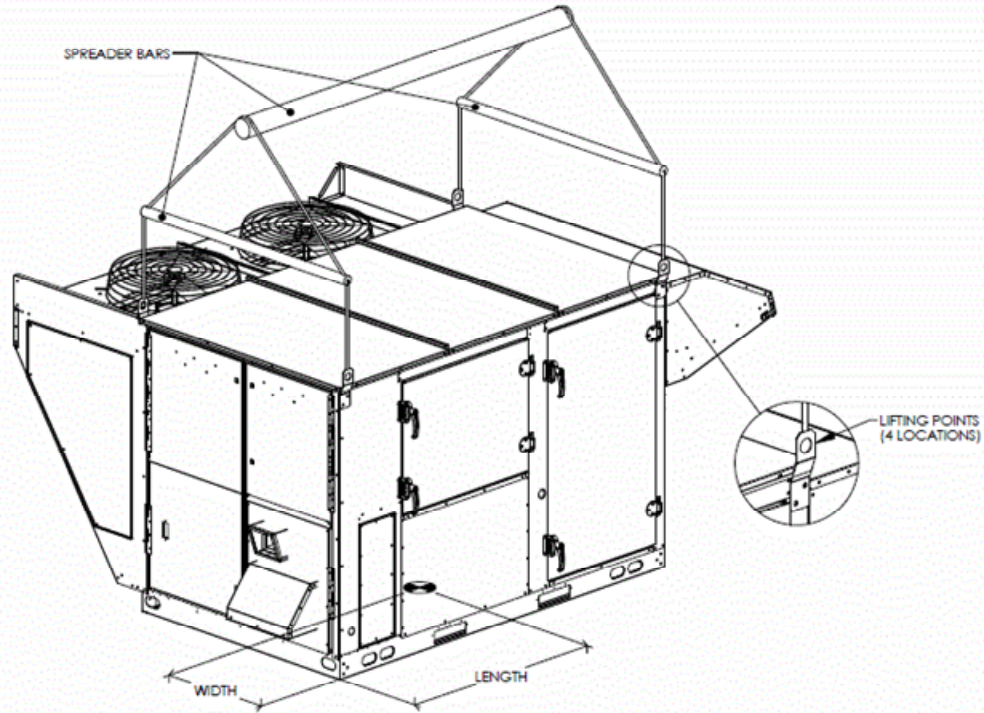
Component Layout - 30-60 Ton R-410A PKGD Unitary Cooling Rooftop

Qty: 2 Tags: DOAS-1,2



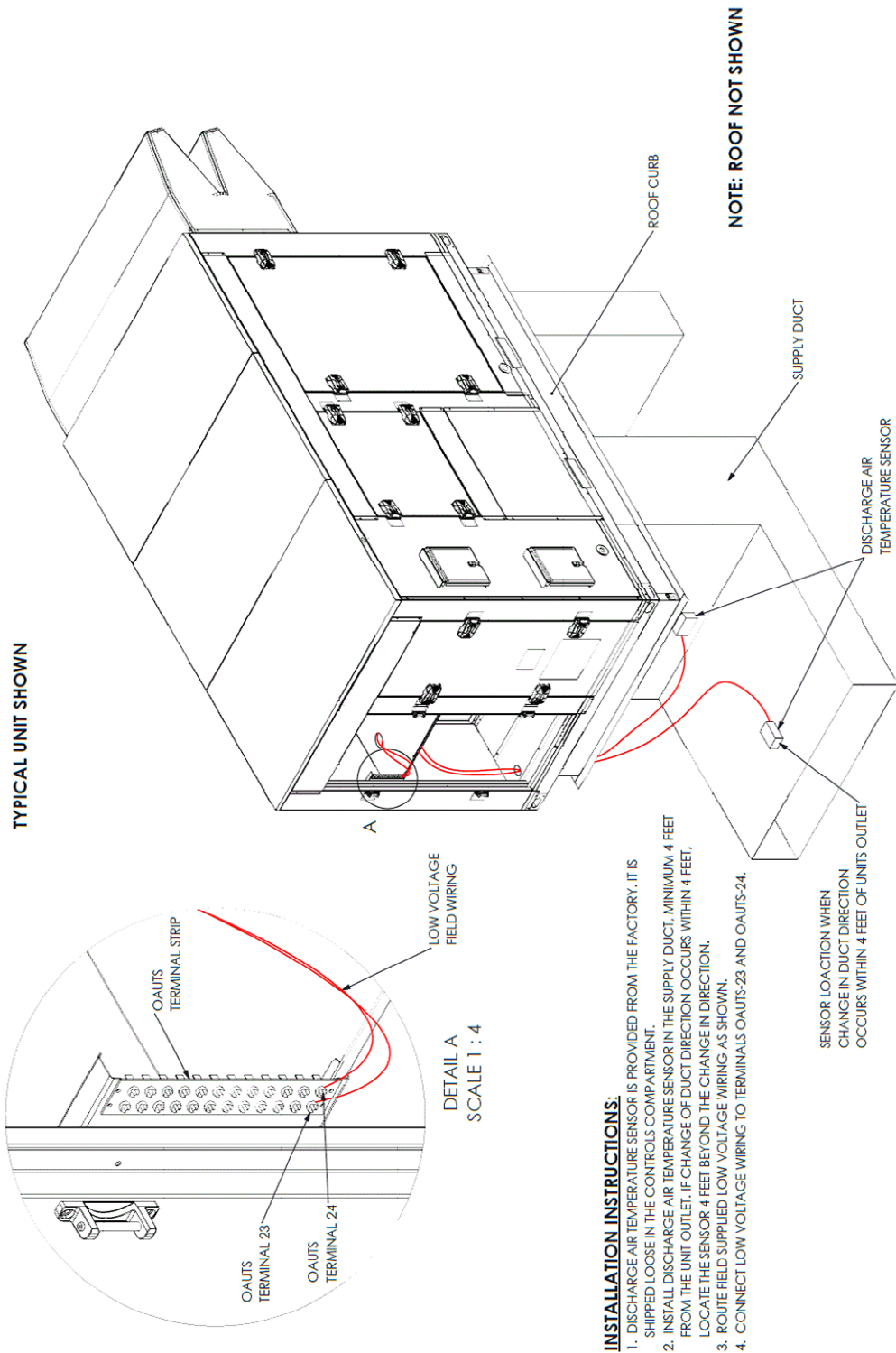
Rigging Diagram - 5-60 Ton R-410A PKGD Unitary Cooling Rooftop

Qty: 2 Tags: DOAS-1,2



Field Wiring - 3-54 Ton R-410A PKGD Unitary Cooling Rooftop

Qty: 2 Tags: DOAS-1,2



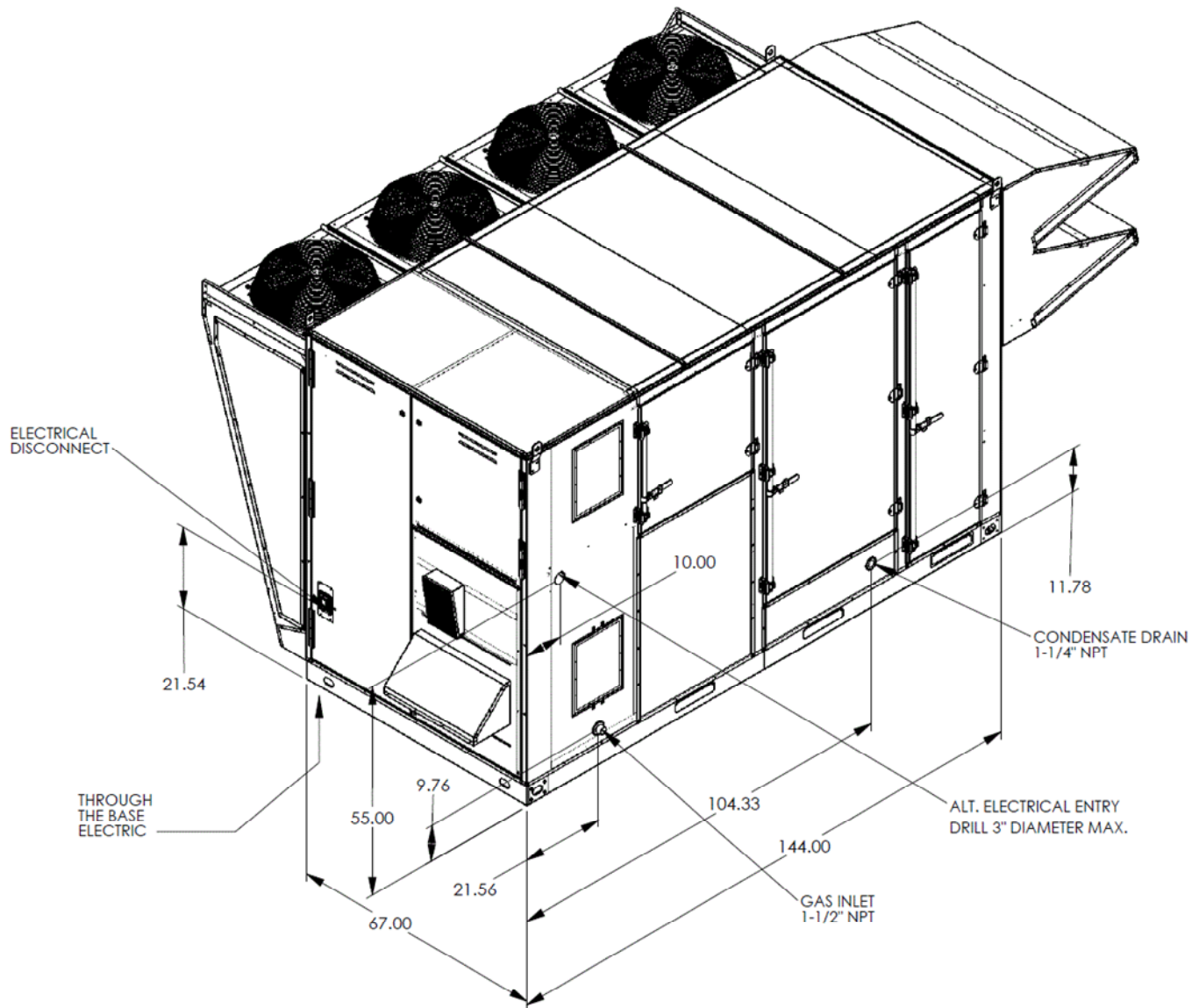
INSTALLATION INSTRUCTIONS:

1. DISCHARGE AIR TEMPERATURE SENSOR IS PROVIDED FROM THE FACTORY. IT IS SHIPPED LOOSE IN THE CONTROLS COMPARTMENT.
2. INSTALL DISCHARGE AIR TEMPERATURE SENSOR IN THE SUPPLY DUCT. MINIMUM 4 FEET FROM THE UNIT OUTLET. IF CHANGE OF DUCT DIRECTION OCCURS WITHIN 4 FEET, LOCATE THE SENSOR 4 FEET BEYOND THE CHANGE IN DIRECTION.
3. ROUTE FIELD SUPPLIED LOW VOLTAGE WIRING AS SHOWN.
4. CONNECT LOW VOLTAGE WIRING TO TERMINALS OAUTS-23 AND OAUTS-24.

SENSOR LOCATION WHEN CHANGE IN DUCT DIRECTION OCCURS WITHIN 4 FEET OF UNITS OUTLET

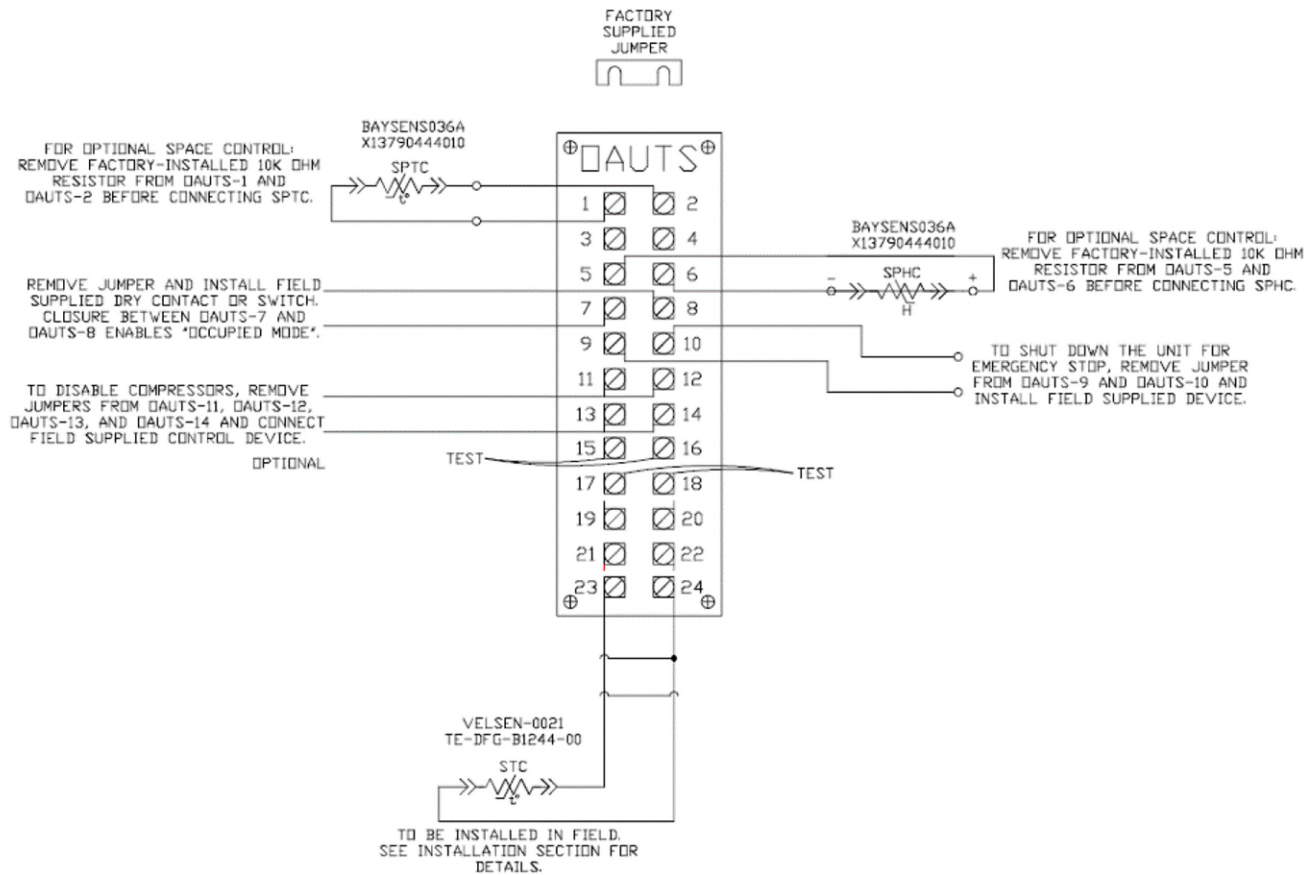
Utility Connections - 30-60 Ton R-410A PKGD Unitary Cooling Rooftop

Qty: 2 Tags: DOAS-1,2



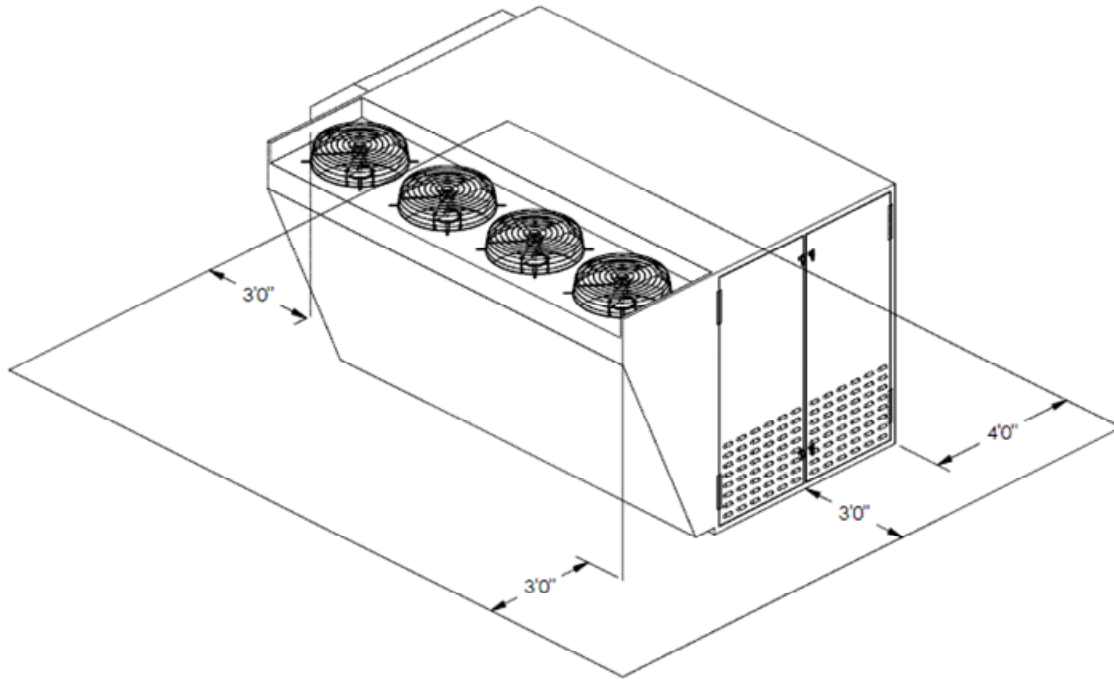
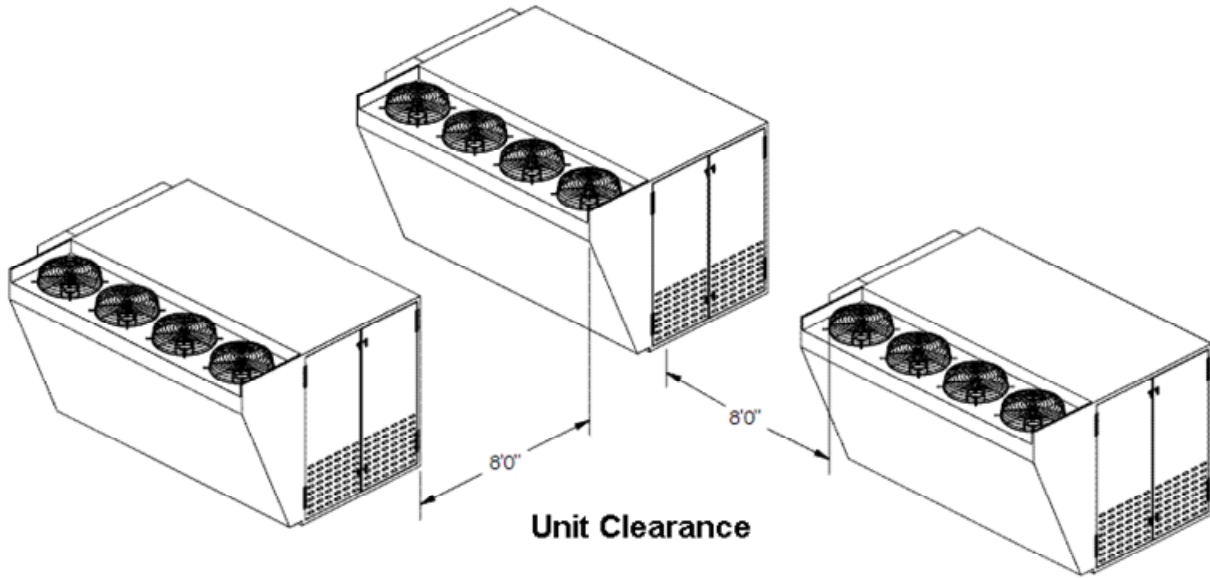
Field Wiring - 3-60 Ton T-410A PKGD Unitary Cooling Rooftop

Qty: 2 Tags: DOAS-1,2



Clearance Diagram - 30-60 Ton R-410A PKGD Unitary Cooling Rooftop

Qty: 2 Tags: DOAS-1,2

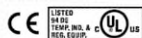


Options - 2 Position Damper Actuator

Qty: 2 Tags: DOAS-1,2

LF24(-S) US

On/Off, Spring Return, 24V



Torque min. 35 in-lb, for control of air dampers

Application

For On/Off, fail-safe control of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications. Control is On/Off from an auxiliary contact, digital output, or a manual switch.

The actuator is mounted directly to a damper shaft from 3/8" up to 1/2" in diameter by means of its universal clamp, 1/2" shaft centered at delivery. For shafts up to 3/4" use K6-1 accessory. A crank arm and several mounting brackets are available for applications where the actuator cannot be direct coupled to the damper shaft.

Operation

The LF series actuators provide true spring return operation for reliable fail-safe application and positive close off on air tight dampers. The spring return system provides consistent torque to the damper with, and without, power applied to the actuator.

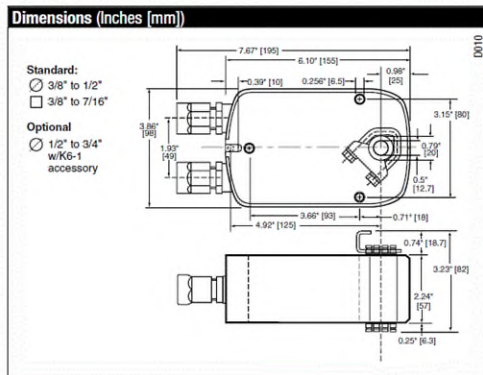
The LF series provides 95° of rotation and is provided with a graduated position indicator showing 0° to 95°.

The actuator may be stalled anywhere in its normal rotation without the need of mechanical end switches. Power consumption is reduced in holding mode.

The LF24-S US version is provided with one built in auxiliary switch. This SPDT switch is provided for safety interfacing or signaling, for example, for fan start-up. The switching function is adjustable between 0° and 95°. The auxiliary switch in the LF24-S is double insulated so an electrical ground connection is not necessary.

Technical Data		LF24(-S) US
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	5 W
	holding	2.5 W
Transformer sizing		7 VA (class 2 power source)
Electrical connection (LF24-S US has 2 cables)		3 ft, 18 GA appliance cable
		1/2" conduit connector
Overload protection		electronic throughout 0 to 95° rotation
Angle of rotation		max. 95°, adjust. with mechanical stop
Torque		35 in-lb [4 Nm]
Direction of rotation		reversible with cw/ccw mounting
Position indication		visual indicator, 0° to 95°
		(0° is spring return position)
Running time (nominal)	motor	< 40 to 75 sec
	spring	< 25 sec @ -4°F to 122°F [-20°C to 50°C] < 60 sec @ -22°F [-30°C]
Humidity		5 to 95% RH non-condensing
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing		NEMA type 2 / IP54
Housing material		zinc coated steel
Agency listings		cULus acc. to UL 873 and CAN/CSA C22.2 No. 24-93
Noise level (max)	running	< 50 db (A)
	spring return	62 db (A)
Servicing		maintenance free
Quality standard		ISO 9001
Weight	LF24	3.1 lbs (1.40 kg)
	LF24-S	3.2 lbs (1.45 kg)

LF24-S US	
Auxiliary switch	1 x SPDT 3A (0.5A) @ 250 VAC, UL Approved adjustable 0° to 95° (double insulated)



IM40024 - 05/10 - Subject to change. © Belimo Aircontrols (USA), Inc.

800-543-9038 USA 866-805-7089 CANADA 203-791-8396 LATIN AMERICA

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Mechanical Specifications - Tag(s): DOAS-1,2**General**

The units shall be down discharge airflow. Cooling performance shall be rated in accordance with ARI 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 ETL listed and labeled, classified in accordance to UL 1995/CAN/CSA No. 236-M40 for Central Cooling Air Conditioners. Canadian units shall be CSA Certified.

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. Unit shall have 2 inch thick Antimicrobial polyisocyanurate foam insulation, metal encapsulated with no exposed edges. Initial R value of 6.6 per inch of thickness. The unit's base pan shall have no penetrations within the perimeter of the curb other than the raised downflow supply/return openings to provide an added water integrity precaution, if the condensate drain backs up.

Unit Top

The top cover shall be one piece construction or, where seams exist, it shall be double-hemmed and gasket-sealed. The ribbed top adds extra strength and enhances water removal from unit top

Sensors

A factory installed combination outdoor air sensor located in the outdoor air hood is designed to sense both outdoor air temperature and relative humidity for use by the microprocessor controller to make required ventilation, cooling, dehumidification and heating decisions. Refer to the Sequence of Operations section of the Installation, Operation and Maintenance manual for detailed unit control and operational modes. A factory installed sensing tube is designed to sense the supply air temperature downstream of the indoor fan section.

Indoor Fans

Supply Fan motor shall be direct drive type with factory installed Variable Frequency Drive. All motors shall be thermally protected. All indoor fan motors meet the U.S. Energy Policy Act of 2005 (EPACT).

Evaporator Coil: DX 6 Row Interlaced

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 shall be leak tested to 500 psig and pressure tested to 500 psig. A Stainless Steel double-sloped condensate drain pan with provision for through the unit wall condensate drain is standard. Evaporator coil will have 6 interlaced rows for superior sensible and latent cooling.

Hot Gas Reheat: Modulating

This option shall consist of a modulating hot-gas reheat coil located on the leaving air side of the evaporator coil pre-piped and circuited with a low pressure switch. Refer to the Sequence of Operations section of the Installation, Operation and Maintenance manual for detailed unit control and operational modes.

Compressor: Digital Scroll Both Circuits

All units shall have direct-drive, hermetic, digital 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. Compressor shall be able to fully modulate from 20%-100%.

Condenser: Air Cooled Variable Speed Head Pressure Low Ambient Control

(Fin and Tube Coil) - 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 condenser coil shall be leak tested to 500 psig and pressure tested to 500 psig. The condenser coil shall have a fin design with slight gaps for ease of cleaning.

Outdoor Fans: Shall be direct drive vertical discharge design with low-noise corrosion resistant glass reinforced polypropylene props, powder coated wire discharge guards and electro-plated motor mounting brackets. Fans shall be statically and dynamically balanced.

Condenser fans to be controlled via VFD to maintain adjustable pressure to increase reheat capacity where applicable and low ambient control.

Indoor Blower Motor: Direct Drive w/VFD

Supply Fan motor shall be direct drive type with factory installed Variable Frequency Drive (unless no controls option is selected, VFD can be provided by others). All motors shall be thermally protected. All indoor fan motors meet the U.S. Energy Policy Act of 2005 (EPACT). All Fans shall be mounted on rubber vibration isolators, to reduce the transmission of noise.

460V Electric Heater: 139

Primary heat is supplied using Electric Resistance heaters. Heaters shall meet the requirements of the National Electrical Code and shall be listed by Underwriters Laboratories for zero clearance to combustible surfaces and for use with heat pumps and air conditioning equipment. Heating elements shall be open coil, 80% nickel, 20% chromium, Type A resistance wire, Type C alloys containing iron or other alloys are not acceptable. Coils shall be machine crimped into stainless steel terminals extending at least 1" into the air stream and all terminal hardware shall be stainless steel. Coils shall be supported by ceramic bushings staked into supporting brackets. Brackets are not to be spaced more than 4-1/2" apart. Heater frames and terminal boxes shall be corrosion resistant steel. Unless otherwise indicated, the terminal box shall be NEMA 1 construction and shall be provided with a hinged, latching cover. Open coil heaters shall be furnished with an airflow switch, disconnecting contactors, fuses (if over 48 amps), control circuit transformer (with primary fusing on Class I circuits as required), built-in, snap acting, door interlock disconnect switch, and a disk type, automatic reset thermal cutout for primary overtemperature protection. Heaters shall also be furnished with disk type, load-carrying manual reset thermal cutouts, factory wired in series with heater stages for secondary protection. Heat limiters or other fusible overtemperature devices are not acceptable. For modulating heaters, control will be SCR type. For staged heaters, 5kW capacity will be 2 stage and all heaters above 5kW will be 4 stage. Unit shall be suitable for use with Electric Resistance Heat.

Unit Controls: Trane UC600 - Discharge Air Control w/BACNET (No Display)

Unit is completely factory wired with necessary controls and contactor pressure lugs for power wiring. Units will provide an external location for mounting fused disconnect device. PLC controls are provided for all 24 volt control functions. The resident control algorithms will make all heating, cooling and/or ventilating decisions in response to electronic signals from sensors measuring outdoor temperature and humidity. The control algorithm maintains accurate temperature control, minimizes drift from set point and provides better building comfort. A centralized PLC (UC600) will provide anti-short cycle timing for a higher level of machine protection. Terminals are provided for a field installed dry contact or switch closure to put the unit in the Occupied or Unoccupied modes.

Damper Options: 2-Position Outdoor Air Damper

The unit shall have a factory installed and integrated 100% outdoor air hood with damper controlled a by direct coupled actuator and 2 inch permanent and washable aluminum mesh filters accessible through a hinged access panel. The return air damper tray is blocked off to allow 100% outdoor airflow.

Filters: MERV-8

Aluminum Mesh Filters (D, K and N Cabinets) and Galvanized Mesh Bird Screen (B and G Cabinets) shall be installed on the intake of the unit. In addition, one row of 2 inch MERV-8 rated filters (30 percent) shall be installed prior to the evaporator coil. Unit shall be equipped with a 6" filter rack upstream of the evaporator. Frame shall be field-adjustable to match any filter combination specified in the attached selection.

Electrical Options: Non-Fused Disconnect Switch w/115v Outlet

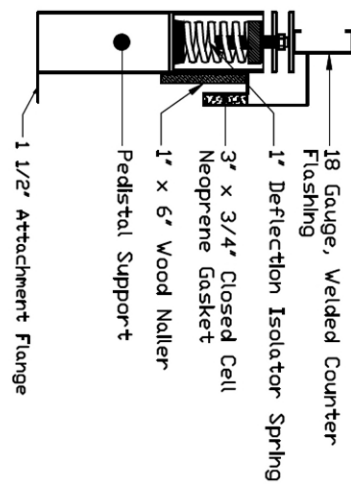
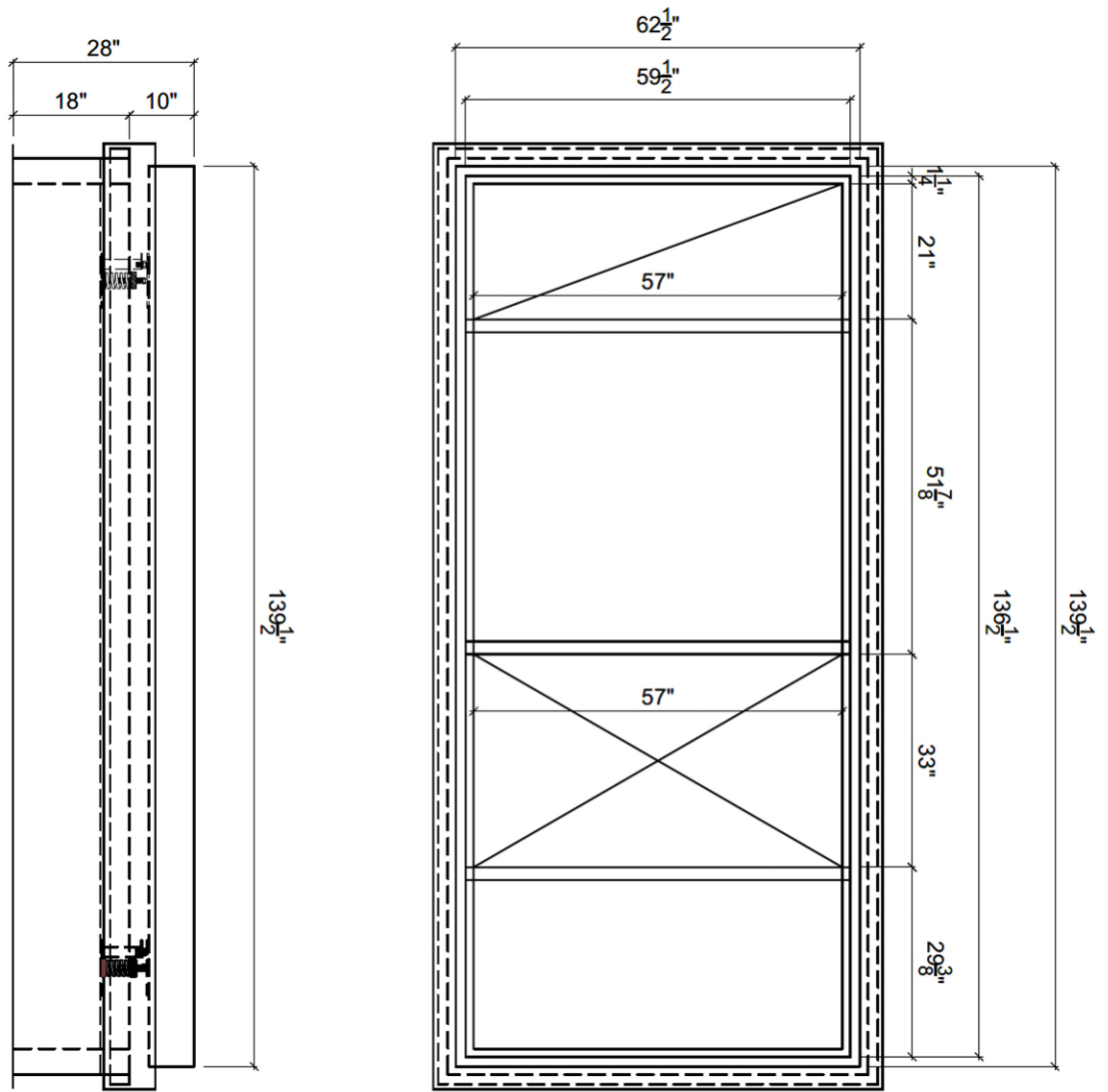
A 3-pole, molded case, HACR circuit breaker with provisions for through the base electrical connections shall be factory installed. Wiring will be provided from the circuit breaker to the unit high voltage terminal block. The switch will be UL/CSA agency recognized. The circuit breaker will be sized per NEC and UL guidelines. A powered 120 volt, 10 amp, 2 plug convenience outlet shall be factory installed. A service receptacle disconnect shall be installed. 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.

Factory wired Voltage/Phase monitor shall be included as standard. In the event of any of the following, the units will be shut down and upon correction of the fault condition the unit will reset and restart automatically.

1. Phase Unbalance Protection: Factory set 2%
2. Over/Under/Brown Out Voltage Protection: +/-10% of nameplate voltage
3. Phase Loss/Reversal

Accessories: Condenser Hailguard

Hail guards shall be installed on the outside of the condenser coil. The guards shall consist of perforated metal, of the same gauge and color as the unit itself. Airflow through the hail guards shall not be restricted due to location or size of the perforations. Guards shall be removable to accommodate coil cleaning.



Units: 9000 Cypress	
DWG#: OAND64	
Qty: 2	Welded By: Finish Time:
Job#:	
Ship Date:	
Drawn by: TWL	
Shop Use Only:	
Date:	
Start Time:	