Amazon Data Services, Inc
P.O. Box 80683
Seattle, Washington 98108

Project: LCK062-Shell_Room Construction
2890-2970 Beech Road NW
New Albany, Ohio 43031

Submittal #237413-2.1 - Commercial Packaged Rooftop Unit
237413 - Commercial Packaged Rooftop Units

Revision	1	**Submittal Manager**	Michael Huntsman (Suffolk Construction Company, Inc.)
Status	Open	**Date Created**	Oct 1, 2024
		Spec Section	237413 - Commercial Packaged Rooftop Units
Responsible Contractor	Gutridge - Mechanical		
		Submit By	
Final Due Date	Oct 15, 2024	**Lead Time**	
		Type	Product Data
Approvers	Lauren Chapman (Swanson Rink), Keeley Randell (Swanson Rink)		
Ball in Court	Lauren Chapman (Swanson Rink), Keeley Randell (Swanson Rink)		
Distribution	Brandon Jones (Suffolk Construction Company, Inc.), Delaine Novak (Swanson Rink), James Leadingham (AWS Infrastructure), Kevin Bourgo (Suffolk Construction Company, Inc.), Leon Roberts (Suffolk Construction Company, Inc.), Lisa Kore (Swanson Rink), Michael Huntsman (Suffolk Construction Company, Inc.), Michael James (Suffolk Construction Company, Inc.), Michael Steinemann (DLB Associates), Rodney Brockelman (Swanson Rink), Thana Taliep (Gensler), Keeley Randell (Swanson Rink), Lauren Chapman (Swanson Rink)		
Description			
Variation from Drawings/Specifications		**Procurement Owner**	GC
Responsible Discipline(s)	Mechanical	**FBN Build ID(s)**	LCK062SHLP01.001
Design Type		**PAC FBN**	
PAC Region(s)		**Comments for Reviewers**	
PAC Category(s)		**PAC Submittals Only - Previous Status**	

Additional Reporting Requirements for Embodied Carbon

- **AMER** - For concrete, steel, deck, joists, rebar, roofing, drywall, refer to the Carbon Quantity & EPD Reporting (AMER) SOP
- **EMEA/APJC** - For concrete, refer to the Carbon Quantity & EPD Reporting (EMEA & APAC) SOP

Submittal Workflow

Name	Sent Date	Due Date	Returned Date	Response	Attachments
General Information Attachments					SHLP01-237413-02.1 Commercial Packaged Rooftop Unit.pdf
Lauren Chapman	Oct 1, 2024	Oct 15, 2024		Pending	
Keeley Randell	Oct 1, 2024	Oct 15, 2024		Pending	

Suffolk
65 Allerton St.
Boston, MA 02119
617-445-3500

THE REVIEW OF THIS SUBMITTAL BY SUFFOLK DOES NOT RELIEVE THE SUBCONTRACTOR OR SUPPLIER OF HIS RESPONSIBILITY FOR THE QUANTITY, OR ACCURACY OF THIS WORK HEREIN REPRESENTED, OR ANY DEVIATION FROM THE PLANS, SPECIFICATIONS, AND CONTRACT.

Proj # 224189 - LCK062

[X] REVIEWED	[ ] REVIEWED AS NOTED	[ ] REVISE & RESUBMIT	[ ] REJECTED

BY Michael Huntsman **DATE** 10/1/24

SUBM # SHLP01-237413-02.1 Commercial Packaged Rooftop

COMMENTS

S. A. MIRO, INC.
Consulting Engineers

THIS REVIEW IS ONLY FOR GENERAL CONFORMANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. CORRECTIONS OR COMMENTS MADE DURING THIS REVIEW DO NOT RELIEVE CONTRACTOR FROM COMPLIANCE WITH THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS. CONTRACTOR IS RESPONSIBLE FOR: DIMENSIONS TO BE CONFIRMED AND CORRELATED AT THE JOBSITE; INFORMATION PERTAINING TO FABRICATION PROCESSES OR TO MEANS/METHODS, SEQUENCES AND PROCEDURES OF CONSTRUCTION; COORDINATING THE WORK OF ALL TRADES; AND PERFORMING ALL WORK IN SAFE AND SATISFACTORY MEANS.

NO EXCEPTIONS TAKEN	X
EXCEPTIONS AS NOTED	
REVISE AND RETURN	
REJECTED	
By	DAC
Date	10/10/2024

REVIEWED FOR UNIT WEIGHT ONLY

Suffolk
65 Allerton St.
Boston, MA 02119
617-445-3500

SUFFOLK

THE REVIEW OF THIS SUBMITTAL BY SUFFOLK DOES NOT RELIEVE THE SUBCONTRACTOR OR SUPPLIER OF HIS RESPONSIBILITY FOR THE QUANTITY, OR ACCURACY OF THIS WORK HEREIN REPRESENTED, OR ANY DEVIATION FROM THE PLANS, SPECIFICATIONS, AND CONTRACT.

Proj # 224189 - LCK062

☒ REVIEWED	☐ REVIEWED AS NOTED	☐ REVISE & RESUBMIT	☐ REJECTED

BY Michael Huntsman **DATE** 10/1/24

SUBM # SHLP01-237413-02.1 Commercial Packaged Rooftop

COMMENTS

SWANSON RINK
SUBMITTAL/SHOP DRAWING REVIEW

- ☐ NO EXCEPTIONS TAKEN
- ☐ ADDRESS COMMENTS NOTED
- ☐ REJECTED
- ☐ REVISE AND RESUBMIT
- ☐ NOT REVIEWED
- ☑ SEE SEPARATE DISCIPLINE REVIEW MATRIX

Corrections or comments made on the shop drawings during this review do not relieve the 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 his work with that of all other trades; and performing his work in a safe and satisfactory manner. This submittal/shop drawing is in electronic format. As such, Swanson Rink is not liable for alterations to the content of this electronic document after it has been forwarded to other parties.

Reviewed By: Shawn Plunkert Date: 10/08/24

SWANSON RINK

SUBMITTAL/SHOP DRAWING DISCIPLINE REVIEW MATRIX

	NXT	MCN	R&R	REJ	NR
MECHANICAL		✓			
PLUMBING/FIRE PROT.		✓			
ELECTRICAL		X			
LIGHTING					✓
FIRE ALARM					✓
TELECOM					✓
SECURITY					✓
AUDIO/VIDEO					✓
AVIATION					✓
CONTROLS					✓

NXT = NO EXCEPTIONS TAKEN
MCN = MAKE CORRECTIONS NOTED
R&R = REVISE AND RESUBMIT
REJ = REJECTED
NR = NOT REVIEWED

R-454B refrigerant has been submitted in place of phased out R-410A units that were scheduled.

Update selections as noted to ensure new units can meet performance requirements listed in schedules.

Rooms served by RTUs have large enough volumes to meet ASHRAE 15 requirements for R-454B.

10/09/2024
Address comment on sheet 5 of this document.
Thank you.
Thomas A. O'Rourke, EIT
Swanson Rink

88 S. Second Street
Newark, OH 43055
Phone: (740) 349-9411
Fax: (740) 345-6020

Submittal Transmittal

PROJECT NAME: Suffolk - LCK062
PROJECT ADDRESS: 2890 Beech Rd NW
New Albany, OH 43031

DATE: 9/30/2024

CONTRACT ID: 24087

MECHANICAL CONTRACTOR:
KE Gutridge
88 South 2ND Street
Newark, Ohio 43055

ENGINEER:
Swanson Rink, Inc.
1120 Lincoln Street #1200
Denver, CO 80203

GENERAL CONTRACTOR:
Suffolk Construction Company
65 Allerton Street
Boston, MA 02119

SPECIFICATION NAME & NUMBER:
237413-1

PRODUCT DESCRIPTION:
Commercial Packaged Rooftop Unit (Rev 2) : Product Data

PRODUCT MANUFACTURER:
AAON

PRODUCT SUPPLIER:

MPSW

RETURN BY: 10/11/2024

I CERTIFY THAT GUTRIDGE HAS CHECKED THIS SUBMITTAL FOR CONFORMANCE WITH PLANS AND SPECIFICATIONS.

SIGNED: _____

*** PLEASE DO NOT MARK ABOVE THIS AREA. SPACE BELOW PROVIDED FOR NOTES AND STAMPS ***

Notes:

- No Curb Slope needed.

- Submitting Basis of Design units in lieu of the Previous Trane unit's to meet weight specification and lead times.

MPSW

EQUIPMENT SUBMITTAL

LCK062 - New Albany, OH

Date:	September 30th, 2024
Equipment:	Roof Top Units
Specification Section:	237413
Tags:	RTU 1-1thru 1-8
Quantity:	8
Manufacturer:	AAON
Submittal Status:	Submittal for Approval

Contractor:	Gutridge
Engineer:	Swanson Rink, Inc
Prepared By:	Aaron Beavers/ OE
Job Number:	PAMZ-2401278
Plans (Date/ REV)	May 30th, 2024 / REV. 2
Specs (Date / REV)	September 1st, 2023 / REV A

EQUIPMENT MATERIAL LIST

Qty (8) AAON RN Series Packaged Rooftop Unit as follows:

- Nominal sizing: (6) 10-ton, (1) 15-ton, (1) 60-ton
- Double-wall, 2" R-13 foam-injected panel construction
- Access doors with stainless steel piano hinges and quarter-turn lockable handles
- Vertical supply and return air openings
- High efficiency variable capacity compressor
- Crankcase heaters
- AMCA Class II low leak outside/return air economizer damper assembly with enthalpy limit
- Total enthalpy Heat Recovery Wheel (RTU-1-1 through 1-6, and 1-8 ONLY)
- Electric heat with modulating SCR control
- 6-Rows DX evaporator coil with double-sloped stainless-steel drain pan
- Condenser fan with VFD motor head pressure control with coil guard
- Direct-drive plenum supply fan with VFD and shaft grounding kit
- Power exhaust with VFD (RTU-1-1 through 1-6, and 1-8 ONLY)
- Filters: 2" –MERV 8 pleated (one set) (RTU-1-1 through 1-6, and 1-8)
- Filters: 2" – 30% MERV 8 pleated pre-filter; 4" – 85% MERV 13 pleated unit filter (one set) (RTU-1-7 only)
- Clogged filter switch
- SCCR Rating: 10 kAIC (as per Schedule)
- Phase and brownout protection
- 460/3/60, single point power connection with fuse disconnect.
- 115v/1ph Factory wired convenience outlet
- Remote safety shutdown terminals for field-provided smoke detector by others
- Unit level DDC controller with BACnet protocol
- Commlink 6 Communications Interface Kit
- 5-year parts-only warranty.
- 18" high seismic/wind rated, spring isolation, flat, insulated roof curb, non-adjustable (shimming & leveling by others). Acoustical curb treatment by others.
- Factory startup

Notes:

- The following sensors will be provided with the AAON units. All other sensors not listed below are the responsibility of others:
    - Supply air temperature, space temp/humidity (except RTU-1-7), clogged filter switch, outside air temp/humidity
- Contractor is responsible for the installation of the following factory-provided sensors: supply temperature, space temperature/humidity (EBUS cable to be provided by MPSW), polytubing from integral building pressure sensor to sensing locations

Exclusions:

- Fused disconnect switches unless noted, smoke detectors, CO2 sensors, airflow monitoring stations
- Power & control wiring, BAS integration, wiring of factory provided sensors
- Space mounted on/off switches and HMI panels
- Acoustical treatment in curb Rigging and storage
- Any other item not listed above
- Installation, commissioning, or labor warranty

Per M903, verify all units shall be provided with manufacturer's unit mounted disconnect switch.

AAON Rooftop Unit Sequence of Operations

Constant Air Volume (CAV)
(RTU-1-1,2,3,4,5,6,7)

Overview
The AAON packaged rooftop system consists of a constant-speed supply fan (VFD included for balancing), direct-expansion cooling coil, variable capacity compressor(s), modulating hot gas reheat coil, total electric heat, and economizer dampers.

The AAON system shall include factory-provided DDC controls and accompanying sensors for complete unit-level standalone control. The controller will include a BACnet MS/TP connection for optional integration with the site BMS. The BMS will be able to adjust unit setpoints and scheduling.

Occupancy Scheduling
The AAON controls platform includes internal scheduling that will be programmed at startup and can be adjusted at any time via an AAON controller interface device. Scheduling can also be adjusted via BACnet through the building BMS.

Unoccupied Mode
When the AAON system is in Unoccupied Mode, the outside air damper will close, and the supply fan will turn off. All heating, cooling, and dehumidification functions shall be disabled.

Occupied Mode
Upon entering Occupied Mode, the outside air dampers shall open, and the supply fan shall turn on and follow the sequence below. The DDC controller will monitor the mode sensor as described below.

Supply Fan Control
The supply fan shall operate at a constant speed (adj. with the factory-mounted VFD) as determined at test and balance.

Exhaust Fan Control
The exhaust fan shall be energized when the unit is in Occupied mode. The exhaust fan will modulate to maintain the Space Static Pressure setpoint (adj.).

Economizer and Ventilation
The outside air damper will be opened to minimum position (as determined at test and balance) during normal Occupied mode. If the Outside Air Wet Bulb Temperature falls below the Economizer setpoint, the outside air damper will modulate open in order the maintain the Supply Air Temperature setpoint.

Mode of Operation
The AAON system will use the Space Temperature sensor to determine the unit mode of operation (Cooling or Heating).

Cooling Mode
If the Space Temperature rises above setpoint plus deadband (adj.), the AAON system will enter Cooling Mode. In Cooling Mode, compressors will be staged/modulated in order to maintain the Supply Air

Temperature setpoint. If the unit is in Economizer Mode, the outside air damper will modulate open as the first stage of cooling.

Heating Mode
If the Space Temperature falls below setpoint plus deadband (adj.), the unit will enter Heating Mode. The electric heaters will stage/modulate in order to maintain the active Supply Air Temperature setpoint.

Dehumidification Mode
If the Space Relative Humidity rises above setpoint plus deadband (adj.), the unit shall enter Dehumidification Mode. The compressors will be staged/modulated to maintain the active Dehumidification Coil Temperature setpoint, and the modulating hot gas reheat valve will be modulated to maintain the Supply Air Temperature setpoint. The active Supply Air Temperature setpoint will reset based on Space Temperature.

Remote Safety Shutdown Terminals
The AAON system shall have low voltage terminals to allow immediate shut down of the system functions from an external source.

BACnet MS/TP Connection
The "VCCX2 Controller" module includes a BACnet MS/TP connection for integration with the building's BMS.

AAON Rooftop Unit Sequence of Operations

Variable Air Volume (VAV)

(RTU-1-8)

Overview

The AAON packaged rooftop system consists of a variable-speed supply fan, direct-expansion cooling coil, variable speed compressor(s), modulating hot gas reheat coil, electric heat, and economizer dampers.

The AAON system shall include factory-provided DDC controls and accompanying sensors for complete unit-level standalone control. The controller will include a BACnet MS/TP connection for optional integration with the site BMS. The BMS will be able to adjust unit setpoints and scheduling.

Occupancy Scheduling

The AAON controls platform includes internal scheduling that will be programmed at startup and can be adjusted at any time via an AAON controller interface device. Scheduling can also be adjusted via BACnet through the building BMS.

Unoccupied Mode

When the AAON system is in Unoccupied Mode, the outside air damper will close, and the supply fan will turn off. All heating, cooling, and dehumidification functions shall be disabled.

Occupied Mode

Upon entering Occupied Mode, the outside air dampers shall open, and the supply fan shall turn on and follow the sequence below. The DDC controller will monitor the mode sensor as described below.

Morning Warmup

Upon switching from Unoccupied to Occupied mode, a warmup period can be initiated based on the Return Air Temperature sensor setpoint. The unit will modulate/stage heating to maintain the active Supply Air Temperature setpoint. The system shall remain in Morning Warmup until the Return Air Temperature rises above setpoint or until a pre-defined time period expires.

Morning Cooldown

Upon switching from Unoccupied to Occupied mode, a cooldown period can be initiated based on the Return Air Temperature sensor setpoint. The unit will modulate/stage cooling to maintain the active Supply Air Temperature setpoint. The system shall remain in Morning Cooldown until the Return Air Temperature falls below setpoint or until a pre-defined time period expires.

Night Setback

When in Unoccupied mode, a Night Setback mode can be initiated for space tempering based the Space Temperature sensor. Cooling and heating will be staged/modulated in order to maintain the Night Setback Space Temperature setpoints.

Supply Fan Control

The supply fan shall start at minimum speed and modulate up to maintain the active Supply Duct Static Pressure control setpoint.

Exhaust Fan Control
The exhaust fan shall be energized when the unit is in Occupied mode. The exhaust fan will modulate to maintain the Space Static Pressure setpoint (adj.).

Economizer and Ventilation
The outside air damper will be opened to minimum position (as determined at test and balance) during normal Occupied mode. An outside airflow measuring station will monitor the outside air flow rate and modulate the outside air dampers to maintain a constant ventilation flow rate in response to the supply fan changing speeds.

If the Outside Air Wet Bulb Temperature falls below the Economizer setpoint, the outside air damper will modulate open in order the maintain the Supply Air Temperature setpoint.

Mode of Operation
The AAON system will use the Supply Temperature sensor to determine the unit mode of operation (Cooling or Heating).

Cooling Mode
If the Supply Temperature rises above setpoint plus deadband (adj.), the AAON system will enter Cooling Mode. In Cooling Mode, compressors will be staged/modulated in order to maintain the Supply Air Temperature setpoint, and the supply fan will be modulated to maintain the cooling Space Temperature setpoint. If the unit is in Economizer Mode, the outside air damper will modulate open as the first stage of cooling.

Heating Mode
If the Supply Temperature falls below setpoint plus deadband (adj.), the unit will enter Heating Mode. The electric heaters will stage/modulate in order to maintain the active Supply Air Temperature setpoint.
The supply fan will be modulated to maintain the heating Space Temperature setpoint.

Dehumidification Mode
If the Space Relative Humidity rises above setpoint plus deadband (adj.), the unit shall enter Dehumidification Mode. The compressors will be staged/modulated to maintain the active Dehumidification Coil Temperature setpoint, and the modulating hot gas reheat valve will be modulated to maintain the Supply Air Temperature setpoint.

Remote Safety Shutdown Terminals
The AAON system shall have low voltage terminals to allow immediate shut down of the system functions from an external source.

BACnet MS/TP Connection
The “VCCX2 Controller” module includes a BACnet MS/TP connection for integration with the building’s BMS.

Unit Rating

2425 South Yukon Ave • Tulsa, OK 74107 • Ph: (918) 583-2266
Ecat Version: 352.0

RNA-010-A-A-3-GAB0A-A01N0:00-0ACAG-QAA-00000-ABHBG-DC-000
A-00-E0-B-AN0-EB-EA0A-00-000-A00A00-J000AB-0000B0B

Tag: RTU 1-1 to 1-6

R-454B is alternate to phased out R-410A. R-454B is A2L. Rooms served by RTU 1-1 to RTU 1-6 have large enough volume to meet ASHRAE 15 requirements for R-454B.

Job Information

Job Name:	*Amazon LCK062 New Albany County OH*
Job Number:	*OH62*
Site Altitude:	*940 ft*
Refrigerant:	*R-454B*
System Charges (oz):	*378*

Unit Information

Approx. Op./Ship Weights:	*1667 lbs / 1667 lbs (±5%)*
Ambient Temperature (DB/WB):	*99.3 °F / 82.1 °F*
Coil Filter FV / Qty:	*337.5 fpm / 4*
Min. Room Area/Height/Airflow**:	*355.0 ft² / 7.2 ft / 640 SCFM*
Exhaust Airflow/ESP/TSP:	*3000 SCFM / 1.00 in. w.g. / 1.51 in. w.g.*
Supply Airflow/ESP:	*3000 SCFM / 2.00 in. w.g.*
Outside Airflow:	*700 SCFM*
Return Temperature (DB/WB):	*75.0 °F / 62.0 °F*

This does not meet the scheduled value of 1345 lbs. Structural to confirm if acceptable.

Static Pressure

External:	*2.00 in. w.g.*	Economizer:	*0.17 in. w.g.*
Cooling Coil:	*0.49 in. w.g.*	Heating:	*0.06 in. w.g.*
Filters Clean:	*0.13 in. w.g.*	Cabinet:	*0.16 in. w.g.*
Dirt Allowance:	*0.35 in. w.g.*	Energy Recovery:	*0.36 in. w.g.*
Reheat Coil:	*0.06 in. w.g.*	Total:	*3.43 in. w.g.*

Cooling Section

	Gross	Net
Equivalent Total Capacity:	*152.6 MBH*	*145.2 MBH*
Total Capacity:	*110.0 MBH*	*102.6 MBH* 105.5 MBH
Sensible Capacity:	*81.3 MBH*	*73.9 MBH* 82.7 MBH
Latent Capacity:	*28.7 MBH*	
HW Total Cooling Capacity:	*42.6 MBH*	
Mixed Air Temp (DB/WB):	*76.0 °F / 63.2 °F* 62 F WB	
Entering Air Temp (DB/WB):	*76.0 °F / 63.2 °F*	
Lv Air Temp (Coil) (DB/WB):	*49.9 °F / 49.8 °F* 49.3 F / 48.7 F	
Lv Air Temp (Unit) (DB/WB):	*52.2 °F / 50.8 °F*	

Supply Air Fan:	*1 x RNA185 @ 2.60 BHP Ea.* 1.5 BHP scheduled
SA Fan RPM / Width:	*1900 RPM / 4.140 in* 1604 RPM scheduled
SA Fan FEI:	*1.24*
Exhaust Air Fan:	*1 x RM150-RN @ 1.40 BHP Ea.*
EA Fan RPM / Width:	*1944 RPM / 5.160 in*
EA Fan FEI:	*1.08*
Evaporator Coil:	*8.5 ft² / 6 Rows / 14 FPI*
Evaporator Face Velocity:	*352.7 fpm*
Energy Recovery:	*1 x ERC-3019C*

Heating Section

Preheat Type:	*Std (No Preheat)*
Auxiliary Heating Type:	*Electric Heat*
Heating Airflow:	*3000 SCFM*
Total Capacity:	*34.1 MBH*
Entering Air Temp (DB/WB):	*70.9 °F / 59.7 °F* 60 F
Leaving Air Temp (DB/WB):	*81.6 °F / 63.4 °F* 70.9 F
Input:	*10.0 kW*
Electric Heat FLA:	*12.0*

Values in green are scheduled on M903 (typ). Confirm these scheduled values can be met by the R-454B unit. Update selection for correct temps as shown.

Re-heat Coil:

Capacity:	*78.2 MBH*
Leaving Air Temp (DB/WB):	*75.0 °F / 59.7 °F*
Relative Humidity:	*41.0%*

Rating Information

Listing Model	*RN-010-3-0-GABY-V0-21-000-A*
Cooling Capacity:	*117.0 MBH*
Cooling EER:	*11.86 BTU/h·W*
Cooling IEER:	*14.9 BTU/h·W*

**Rated in accordance with AHRI Standard 340/360 (I-P)*

Application EER @ Op. Conditions: ***12.0 BTU/h·W***

Electrical Data

2425 South Yukon Ave • Tulsa, OK 74107 • Ph: (918) 583-2266
Ecat Version: 352.0

SCCR of 5 KAIC scheduled. Electrical to confirm if acceptable.

SCCR rating is acceptable, thank you.

Circuit 1

Rating:	*460V/3Ø/60Hz*	*Minimum Circuit Amp:*	*27*
Unit FLA:	*24*	*Maximum Overcurrent:*	*40*
SCCR:	*10 KAIC*		

	Qty	HP	VAC	Phase	RPM	FLA	RLA
Compressor 1:	*1*		*460*	*3*			*13.5*
Condenser Fan:	*2*	*0.33*	*460*	*3*	*1080*	*1.1*	
Supply Fan:	*1*	*3.00*	*460*	*3*	*1760*	*4.8*	
Exhaust Fan:	*1*	*2.00*	*460*	*3*	*1760*	*3.4*	
Energy Recovery:	*1*	*0.05*	*230*	*1*	*1050*	*0.3*	

Cabinet Sound Power Levels*

Octave Bands:	63	125	250	500	1000	2000	4000	8000
Discharge LW (dB):	*87*	*86*	*89*	*85*	*77*	*75*	*72*	*66*
Return LW (dB):	*84*	*84*	*81*	*77*	*75*	*72*	*69*	*65*

**Sound power levels are given for informational purposes only. The sound levels are not guaranteed.*

*****The minimum floor area for the Lower Flammability Limit (LFL) is calculated in accordance with UL60335-2-40 4th ed. (operating or storage).***

Unit Rating

2425 South Yukon Ave • Tulsa, OK 74107 • Ph: (918) 583-2266
Ecat Version: 352.0

A1 A2 A3 A4 A5 B1 B2 B3 B4 B5 1 2 3A 3B 3C 3D 3E 4A 4B 4C 5A 5B 5C 5D 5E 6A 6B 6C 6D 6E 7 8 9A 9B 9C

RNA-010-A-A-3-GAB0A-A01N0:00-0ACAG-QAA-00000-ABHBG-DC-000
A-00-E0-B-AN0-EB-EA0A-00-000-A00A00-J000AB-0000B0B

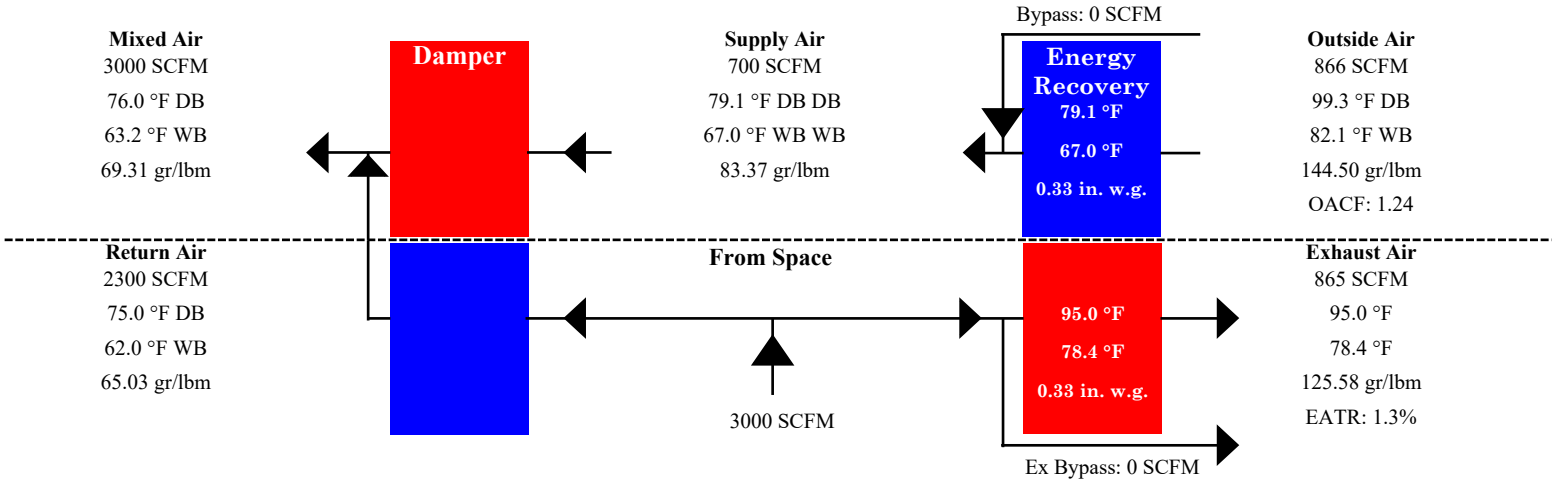
9D 10A 10B 11A 11B 12 13A 13B 13C 14 15 16A 16B 16C 16D 17A 17B 18A 18B 18C 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Tag: RTU 1-1 to 1-6

Job Name:	**Amazon LCK062 New Albany County OH**	Energy Recovery Type:	**Total**
Job Number:	**OH62**	Energy Recovery Model:	**ERC-3019C**
Site Altitude:	**940 ft**	Energy Recovery Qty:	**1**
Net Supply Airflow Sum/Win:	**691 SCFM / 691 SCFM**	Energy Recovery Software Ver:	**1.1.0.0**
Purge Angle:	**0.0°**		

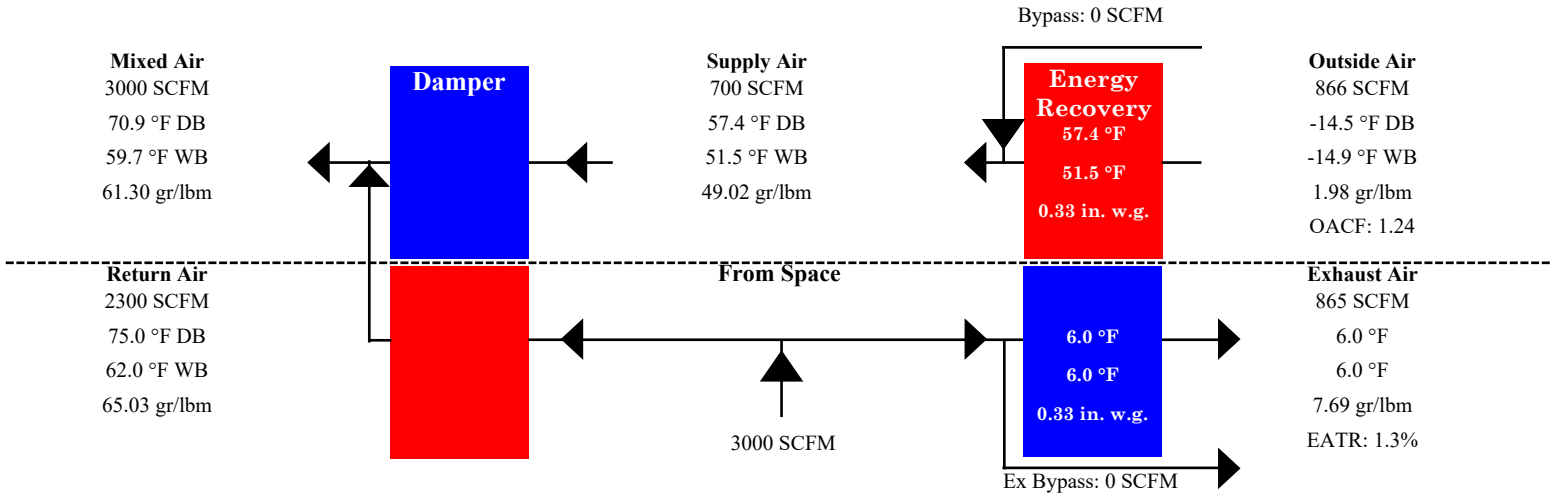
Application Rating is outside the scope of the AHRI ERV Certification Program but is rated in accordance with AHRI Standard 1060.

Summer Conditions



	Cooling/Dehumidification	Heating/Dehumidification	Effectiveness
Total Capacity:	**42.6 MBH**	**0.0 MBH**	**78.7%**
Sensible Capacity:	**14.2 MBH**	**0.0 MBH**	**82.9%**
Latent Capacity:	**28.5 MBH**	**0.0 MBH**	**76.6%**

Winter Conditions



Frost Warning - Conditions for frost forming on the energy recovery exists. Outside air preheat is required to prevent frost formation. Optionally, the return air humidity ratio could be lowered to prevent frost formation. See AAON literature titled 'AAONAIRE ENERGY RECOVERY' for details.

	Cooling/Dehumidification	Heating/Dehumidification	Effectiveness
Total Capacity:	**0.0 MBH**	**75.0 MBH**	**80.8%**
Sensible Capacity:	**0.0 MBH**	**52.7 MBH**	**82.9%**
Latent Capacity:	**0.0 MBH**	**22.3 MBH**	**77.0%**

Unit Submittal

2425 South Yukon Ave • Tulsa, OK 74107 • Ph: (918) 583-2266
Ecat Version: 352.0

RNA-010-A-A-3-GAB0A-A01N0:00-0ACAG-QAA-00000-ABHBG-DC-000
A-00-E0-B-AN0-EB-EA0A-00-000-A00A00-J000AB-0000B0B

Tag: *RTU 1-1 to 1-6*

Job Name: *Amazon LCK062 New Albany County OH*

Job Number: *OH62*

Unit Worksheet For:

Unit Worksheet Date: *9/30/2024*

	Base Option	Description
RN	Generation	RN Series
A	Major Revision	Major Revision A
010	Unit Size	Ten
A	Series	A Series
A	Minor Revision	Minor Revision A
3	Voltage	460V/3φ/60Hz
G	Compressor Style	R-454B Variable Capacity Scroll Compressor
A	Condenser Style	Microchannel Air-Cooled Condenser
B	Indoor Coil Configuration	6 Row Evaporator
0	Cooling Heat Exchanger Construction	Standard
A	Cooling Staging	1 Variable Capacity Comp
A	Heat Type	Electric Heat (Vertical Unit Configuration)
0	Heat Construction	Standard
1	Heat Designation	10 kW
N	Heat Staging	Modulating SCR Electric - Temperature Control
0	Heat Pump Auxiliary Heating	No Auxiliary Heat

	Feature Option		Decription
0	**F1.**	Unit Orientation	Standard Access - Hinged Access Doors with Lockable Handles
0	**F2.**	Supply & Return Locations	Bottom Supply--Bottom Return
0	**F3A.**	Supply Fan Quantity	1 Fan
A	**F3B.**	Supply Fan Configuration	1 Fan per VFD + Full Width Fan
C	**F3C.**	Supply Fan Size	18.5" Direct Drive Backward Curved Aluminum
A	**F3D.**	Supply Fan Motor Type	High Efficiency Open Motor (1,800 nominal rpm)
G	**F3E.**	Supply Fan Motor Size	3 hp
Q	**F4A.**	Outside Air Section	Economizer + Energy Recovery + Bypass Damper
A	**F4B.**	Energy Recovery Type	Polymer Energy Recovery Wheel
A	**F4C.**	Energy Recovery Size	Low CFM Enthalpy
0	**F5A.**	Return Fan Quantity	0 Return Fans
0	**F5B.**	Return Fan Configuration	No Return Fan
0	**F5C.**	Return Fan Size	No Return Fan
0	**F5D.**	Return Fan Motor Type	No Return Fan
0	**F5E.**	Return Fan Motor Size	No Return Fan
A	**F6A.**	Exhaust Fan Quantity	1 Fan
B	**F6B.**	Exhaust Fan Configuration	1 Fan per VFD + Full Width Fan
H	**F6C.**	Exhaust Fan Size	15" Backward Curved Aluminum
B	**F6D.**	Exhaust Fan Motor Type	High Efficiency Open Motor (1,800 nominal rpm)
G	**F6E.**	Exhaust Fan Motor Size	2 hp
D	**F7.**	Outside Air Control	Fully Modulating Actuator - Enthalpy Limit
C	**F8.**	Return and Exhaust Air Options	Standard Barometric Relief EA Dampers
0	**F9A.**	Unit Filter Type	2" Pleated - MERV 8
0	**F9B.**	Unit Filter Size & Location	Standard Filters in Standard Position
0	**F9C.**	Final Filter Type	No Final Filters
A	**F9D.**	Filter Options	Clogged Filter Switch - Unit Filters
0	**F10A.**	Refrigeration Control A	Standard - Adj Comp. Cooling Lock Out Through Unit Controls

	Feature Option		Decription
0	F10B.	Refrigeration Control B	Standard
E	F11A.	Refrigeration Options A	Modulating Hot Gas Reheat Microchannel Coil [MHGR-MC]
0	F11B.	Refrigeration Options B	Standard Packaged Unit
B	F12.	Refrigeration Accessories	Compressor Isolation Valves
A	F13A.	Unit Disconnect Type	Single Point Power - Non-fused Disconnect Power Switch
N	F13B.	Disconnect 1 Size	100 Amps ✓
0	F13C.	Disconnect 2 Size	Standard - None
E	F14.	Safety Options	Remote Safety Shutdown Terminals
B	F15.	Electrical Accessories	Phase & Brown Out Protection
E	F16A.	Control Sequence	Constant Air Volume Unit Controller - CAV Cool + CAV Heat
A	F16B.	Control Supplier	AAON Controls
0	F16C.	Control Supplier Options	None
A	F16D.	BMS Connection & Diagnostics	BACnet IP or MSTP
0	F17A.	Preheat Configuration	Standard - None
0	F17B.	Preheat Sizing	Standard - None
0	F18A.	Option Box Location	None
0	F18B.	Option Box Size	None
0	F18C.	Option Box Accessories	None
A	F19.	Outside Air Accessories	Outside Air Hood
0	F20.	Cabinet Options	Standard - None
0	F21.	Accessories	Standard
A	F22.	Maintenance Accessories	Factory Wired 115V Convenience Outlet
0	F23.	Code Options	Standard - ETL U.S.A. Listing
0	F24.	Shipping Splits	Standard
J	F25.	Air-Cooled Condenser Accessories	Cond Coil Guards + VFD Cond Fan Head Pressure Control
0	F26.	Evap-Cooled Condenser Accessories	Standard
0	F27.	Water-Cooled Condenser Accessories	None
0	F28.	Energy Recovery Accessories	None
A	F29.	VFD Options	Shaft grounding kit on all SA, RA, EA motors
B	F30.	Miscellaneous Options	SCCR (10kA) ✓
0	F31.	Blank	Standard
0	F32.	Blank	Standard
0	F33.	Blank	Standard
0	F34.	Blank	Standard
B	F35.	Warranty	5 Year Parts Warranty
0	F36.	Cabinet Material	Galvanized Cabinet - Double Wall + R-13 Foam Insulation
B	F37.	Specials & Paint	Premium AAON Gray Paint Exterior Paint

Controller Components
2425 South Yukon Ave • Tulsa, OK 74107 • Ph: (918) 583-2266
Ecat Version: 352.0

RNA-010-A-A-3-GAB0A-A01N0:00-0ACAG-QAA-00000-ABHBG-DC-000
A-00-E0-B-AN0-EB-EA0A-00-000-A00A00-J000AB-0000B0B

Tag: RTU 1-1 to 1-6

Job Name:	Amazon LCK062 New Albany County OH	VCCX For:	
Job Number:	OH62	VCCX Date:	September 30, 2024

Part#	Included Parts	Assigned Channel	BACnet Point
ASM07503	VCCX-454 CONTROLLER		
ASM01692	OSA Temp/Hum Sensor	EBUS2 Communicating Sensor	AI:16,AI:17,AI:18,AI:19
R82890	Supply Temp Sensor - Field Installed	VCCX Control Point AI3	AI:9
ASM01820	Space Digital Temp/Hum Sensor	EBUS3 Communicating Sensor	AI:12,AI:13
ASM01832	Building Pressure Sensor	VCCX Control Point AI5	AI:23
	Supply Fan Control Signal 0-10VDC	VCCX Control Point AO1	AI:22
	Economizer	VCCX Control Point AO2	AI:30
	Modulated Heating (0-10VDC)	VCCX Control Point AO3	AI:35
	Building Pressure Control Signal	VCCX Control Point AO4	AI:24
R62330	Proof of Air Flow	VCCX Control Point BI1	BI:6, BI:24
G150620	Clogged Filter Switch (Standard Filters)	VCCX Control Point BI2	BI:25
	A2L Airstream Leak Detect Status	VCCX Control Point BI5	BI:9
	Safety Shut Down	VCCX Control Point BI8	BI:26
	Supply Fan	Configured Relay Point	BI:0
	Exhaust Fan	Configured Relay Point	BI:1
	Energy Recovery Wheel	Configured Relay Point	BI:2
	Heat 1	Configured Relay Point	BI:3
ASM07563	A2L MITIGATION BOARD 1		
G137750	Gas Sensor 1	A2L MB1 AI1	
	Supply Fan Proof of Flow	A2L MB1 BI1	
	Alarm Output	A2L MB1 Fixed RO3	
ASM07716	REFRIGERATION MODULE		
V38391	Suction Pressure Sensor A	RM454-D SP-1	AI:48
V38410	Discharge Pressure Sensor A	RM454-D HP-1	AI:50
	Comp Discharge Temp A	RM454-D TEMP1	AI:66
	Modulated Condenser Signal A	RM454-D AOUT1	AI:46
	Comp Status Input A	RM454-D BIN1	BI:77
	Emergency Shutdown	RM454-D BIN4	BI:83
	Comp Enable A	RM454-D RLY1	BI:84
	Comp Unload Signal A	RM454-D COMP1	AI:44
	Condenser Enable A	RM454-D RLY3	BI:86
ASM01670	MODULATING HOT GAS REHEAT MODULE		
	Reheat HGR Valve	MHGRV-X	AI:42

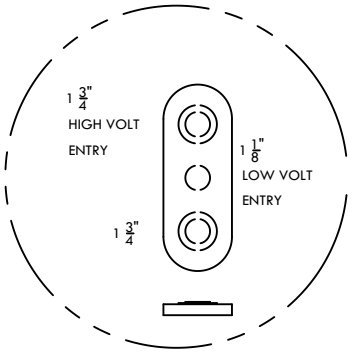
RN SERIES A - CABINET
~ ECONOMIZER, ENERGY RECOVERY SECTION AND POWER EXHAUST
~ 6-10 TON

CLEARANCES

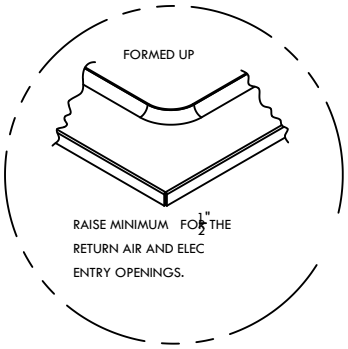
LOCATION	• UNIT SIZE • 6 - 10 TON
OUTSIDE AIR (BACK)	36*
CONTROLS SIDE (FRONT)	48
LEFT SIDE	6
RIGHT SIDE	48
TOP	UNOBSTRUCTED

*CLEARANCE IS MEASURED FROM THE END OF THE OUTSIDE AIR RAIN HOOD

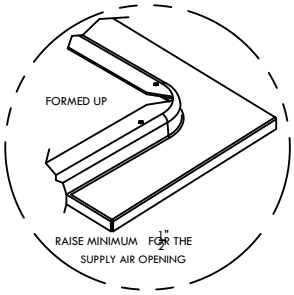
NOTE: THE RNA UNIT IS NOT COMPATIBLE WITH PREVIOUS GENERATIONS OF AAON CURBS. AN ADAPTER CURB IS AVAILABLE IN ECAT.



DETAIL A

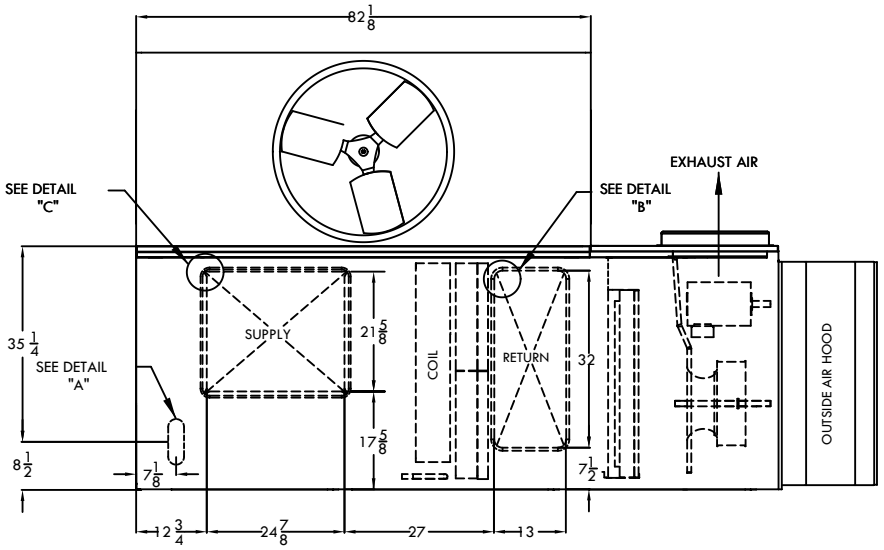


DETAIL B

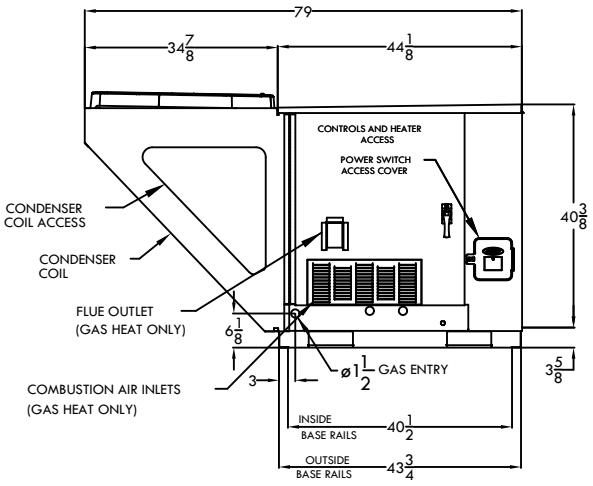


DETAIL C

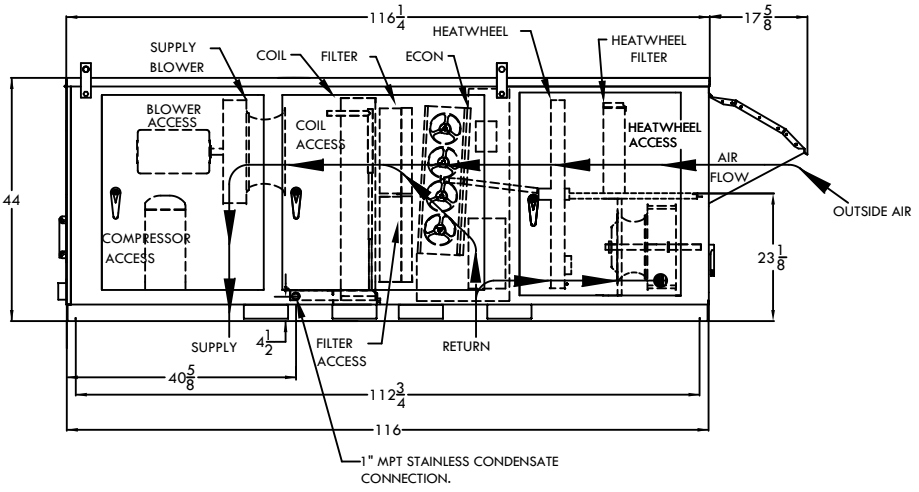
TOP VIEW



FRONT VIEW



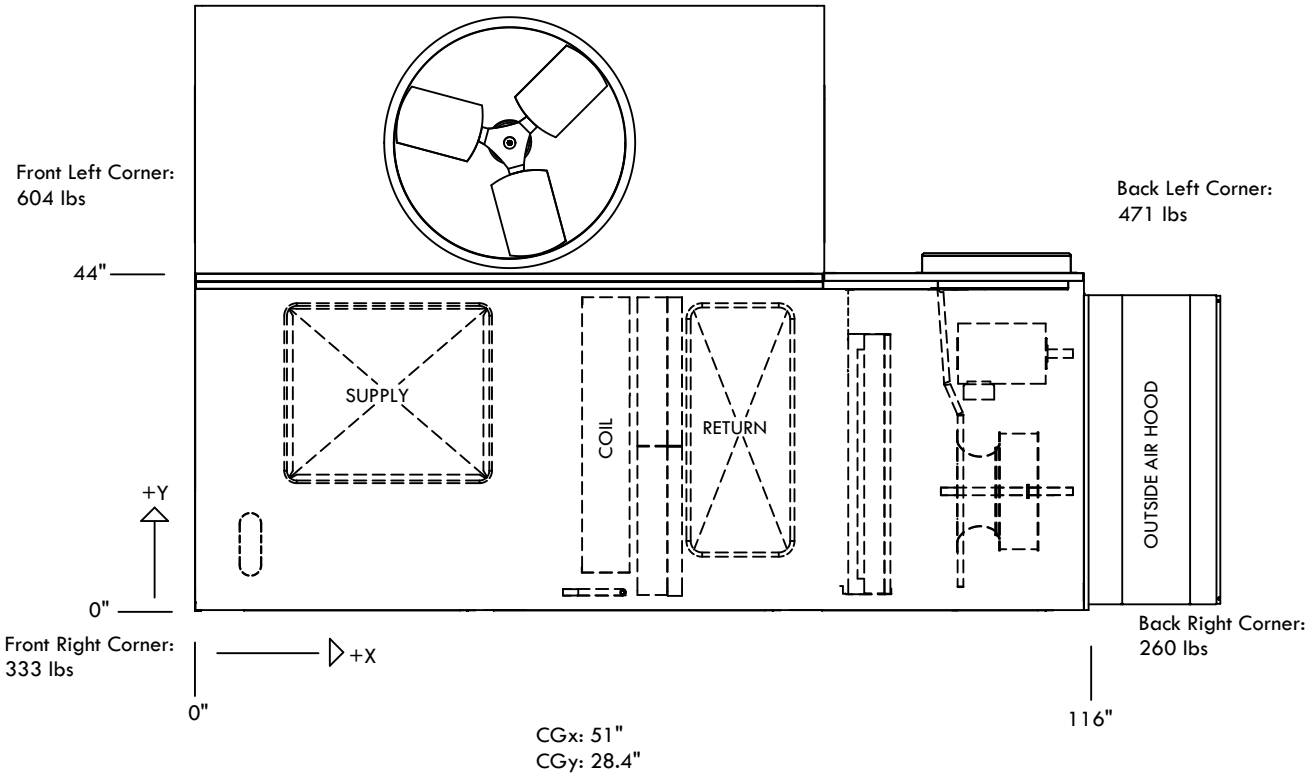
RIGHT SIDE VIEW



RNA-00027 REV:C 02/20/23 JWC
NOTE: ALL DIMENSIONS ARE IN INCHES

RNA CABINET
AIR COOLED CONDENSING UNIT
WITH ENERGY RECOVERY SECTION

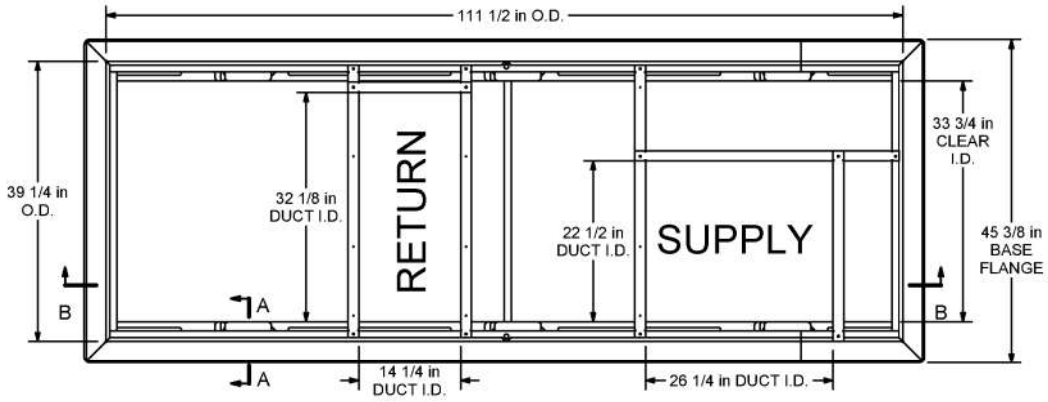
RNA-010-A-A-3-GAB0A-A01N0:00-0ACAG-QAA-00000-ABHBG-DC-000A-00-E0-B-AN0-EB-EA0A-00-000-A00A00-J000AB-0000B0B



This does not meet the scheduled value of 1345 lbs. Structural to confirm this is acceptable.

Disclaimer:
This weight estimate does not account for any SPAs.

RTU 1-1 thru RTU 1-6

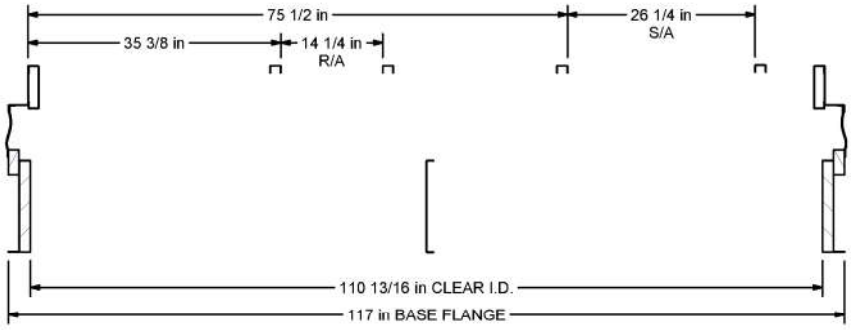


SUBMITTAL

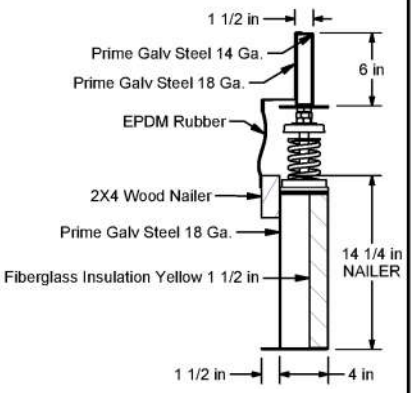
Curb wall thickness, Curbs clear ID and restraint requirements to be determined by seismic/windload calculations if required.

Verify roof pitch and direction

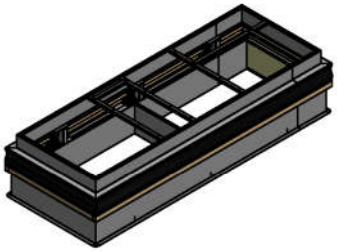
NON SEISMIC



SECTION B-B



SECTION A-A
1" Spring Deflection
26" Min. Height



Thybar Corporation has a policy of continuous product improvement and reserves the right to change the product design without notice

(DO NOT SCALE DRAWING) Unless otherwise specified dimensions are in inches tolerances are

± 1/16 ± 0.0625 ± 1°

Date: 12/29/2021

Vibrocurb III Insulated Top Duct Supports
New Aaon RN006-010 with energy recovery
Existing

Curb Weight
326 lbs.
Total Weight
326 lbs.

Qty.: Job # :

Tag:

Drawn: JColnar

File: VIDS1AN0327526FL000N0

Rev: E

thybar CORPORATION
Thybar makes it right the first time, every time

Unit Rating

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Ecat Version: 352.0

RNA-015-B-A-3-GAB0C-A03N0:00-0FEAG-E00-00000-00000-DC-CB0A-00-E0-B-AN0-EB-EA0A-00-000-A00A00-J000AB-0000B0B

Tag: RTU 1-7

R-454B is alternate to phased out R-410A. R-454B is A2L. Rooms served by RTU 1-7 have large enough volume to meet ASHRAE 15 requirements for R-454B.

Job Information

Job Name:	*Amazon LCK062 New Albany County OH*
Job Number:	*OH62*
Site Altitude:	*940 ft*
Refrigerant:	*R-454B*
System Charges (oz):	*238 / 396*

Unit Information

Approx. Op./Ship Weights:	*2057 lbs / 2057 lbs (±5%)*
Ambient Temperature (DB/WB):	*99.3 °F / 82.1 °F*
Coil Filter FV / Qty:	*252.0 fpm / 4*
Min. Room Area/Height/Airflow**:	*372.0 ft² / 7.2 ft / 670 SCFM*
Supply Airflow/ESP:	*3500 SCFM / 1.00 in. w.g.*
Outside Airflow:	*1000 SCFM*
Return Temperature (DB/WB):	*75.0 °F / 62.0 °F*

This does not meet the scheduled value of 1982 lbs. Structural please confirm if acceptable.

Static Pressure

External:	*1.00 in. w.g.*	Economizer:	*0.25 in. w.g.*
Cooling Coil:	*0.23 in. w.g.*	Heating:	*0.02 in. w.g.*
Filters Clean:	*0.17 in. w.g.*	Cabinet:	*0.15 in. w.g.*
Dirt Allowance:	*0.35 in. w.g.*	Total:	*2.21 in. w.g.*
Reheat Coil:	*0.03 in. w.g.*		

Cooling Section

	Gross	Net
Total Capacity:	*196.6 MBH*	*191.5 MBH* 193.7 MBH
Sensible Capacity:	*112.0 MBH*	*106.9 MBH* 110.5 MBH
Latent Capacity:	*84.6 MBH*	
Mixed Air Temp (DB/WB):	*88.8 °F / 74.6 °F*	
Entering Air Temp (DB/WB):	*88.8 °F / 74.6 °F*	
Lv Air Temp (Coil) (DB/WB):	*57.5 °F / 57.4 °F*	
Lv Air Temp (Unit) (DB/WB):	*58.8 °F / 57.9 °F*	

Supply Air Fan:	*1 x 220D70 @ 1.81 BHP Ea.*
SA Fan RPM / Width:	*1378 RPM / 3.450 in*
SA Fan FEI:	*1.40*
Evaporator Coil:	*14.6 ft² / 6 Rows / 12 FPI*
Evaporator Face Velocity:	*240.0 fpm*

1.67 BHP scheduled

Heating Section

Preheat Type:	*Std (No Preheat)*
Auxiliary Heating Type:	*Electric Heat*
Heating Airflow:	*3500 SCFM*
Total Capacity:	*136.5 MBH*
Entering Air Temp (DB/WB):	*30.2 °F / 26.0 °F*
Leaving Air Temp (DB/WB):	*67.4 °F / 46.4 °F*
Input:	*40.0 kW*
Electric Heat FLA:	*48.1*

Re-heat Coil:

Capacity:	*62.4 MBH*
Leaving Air Temp (DB/WB):	*75.0 °F / 63.6 °F*
Relative Humidity:	*54.2%*

Rating Information

Listing Model	*RN-015-3-0-GABY-V0-21-000-A*
Cooling Capacity:	*174.0 MBH*
Cooling EER:	*11.27 BTU/h·W*
Cooling IEER:	*15.48 BTU/h·W*

**Rated in accordance with AHRI Standard 340/360 (I-P)*

Application EER @ Op. Conditions: ***11.2 BTU/h·W***

Electrical Data

Circuit 1

Rating:	✓ *460V/3Ø/60Hz*	*Minimum Circuit Amp:*	✓ *66*
Unit FLA:	✓ *53*	*Maximum Overcurrent:*	✓ *70*
SCCR:	✓ *10 KAIC*		

	Qty	HP	VAC	Phase	RPM	FLA	RLA
Compressor 1:	1		460	3			12.8
Compressor 2:	1		460	3			11.0
Condenser Fan:	2	0.75	460	3	1080	1.8	
Supply Fan:	1	3.00	460	3	1760	4.8	

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Ecat Version: 352.0

*Cabinet Sound Power Levels**

Octave Bands:	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
Discharge LW (dB):	*88*	*87*	*91*	*80*	*75*	*73*	*69*	*63*
Return LW (dB):	*79*	*77*	*80*	*66*	*64*	*58*	*47*	*36*

**Sound power levels are given for informational purposes only. The sound levels are not guaranteed.*

The minimum floor area for the Lower Flammability Limit (LFL) is calculated in accordance with UL60335-2-40 4th ed. (operating or storage).

Unit Submittal

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A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	1	2	3A	3B	3C	3D	3E	4A	4B	4C	5A	5B	5C	5D	5E	6A	6B	6C	6D	6E	7	8	9A	9B	9C
R	N	A	-	0	1	5	-	B	-	A	-	3	-	G	A	B	0	C	-	A	0	3	N	0	:	0	0	-	0	F	E	A	G	-
E	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	D	C	-	C	B	0													
A	-	0	0	-	E	0	-	B	-	A	N	0	-	E	B	-	E	A	0	A	-	0	0	-	0	0	0	-	A	0	0	A	0	0
-	J	0	0	0	A	B	-	0	0	0	0	B	0	B																					

9D	10A	10B	11A	11B	12	13A	13B	13C	14	15	16A	16B	16C	16D	17A	17B	18A	18B	18C	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
-	0	0	-	E	0	-	B	-	A	N	0	-	E	B	-	E	A	0	A	-	0	0	-	0	0	0	-	A	0	0	A	0	0	-	J	0	0	0	A	B	-	0	0	0	0	B	0	B

Tag: *RTU 1-7*

Job Name: *Amazon LCK062 New Albany County OH*

Job Number: *OH62*

Unit Worksheet For:

Unit Worksheet Date: *9/30/2024*

	Base Option	Description
RN	Generation	RN Series
A	Major Revision	Major Revision A
015	Unit Size	Fifteen
B	Series	B Series
A	Minor Revision	Minor Revision A
3	Voltage	460V/3φ/60Hz
G	Compressor Style	R-454B Variable Capacity Scroll Compressor
A	Condenser Style	Microchannel Air-Cooled Condenser
B	Indoor Coil Configuration	6 Row Evaporator
0	Cooling Heat Exchanger Construction	Standard
C	Cooling Staging	1 Variable Capacity Comp + 1 Two-Step Comp
A	Heat Type	Electric Heat (Vertical Unit Configuration)
0	Heat Construction	Standard
3	Heat Designation	40 kW
N	Heat Staging	Modulating SCR Electric - Temperature Control
0	Heat Pump Auxiliary Heating	No Auxiliary Heat

	Feature Option		Decription
0	F1.	Unit Orientation	Standard Access - Hinged Access Doors with Lockable Handles
0	F2.	Supply & Return Locations	Bottom Supply--Bottom Return
0	F3A.	Supply Fan Quantity	1 Fan
F	F3B.	Supply Fan Configuration	1 Fan per VFD + Narrow Width Fan
E	F3C.	Supply Fan Size	22" Direct Drive Backward Curved Aluminum
A	F3D.	Supply Fan Motor Type	High Efficiency Open Motor (1,800 nominal rpm)
G	F3E.	Supply Fan Motor Size	3 hp
E	F4A.	Outside Air Section	Economizer
0	F4B.	Energy Recovery Type	No Energy Recovery
0	F4C.	Energy Recovery Size	No Energy Recovery
0	F5A.	Return Fan Quantity	0 Return Fans
0	F5B.	Return Fan Configuration	No Return Fan
0	F5C.	Return Fan Size	No Return Fan
0	F5D.	Return Fan Motor Type	No Return Fan
0	F5E.	Return Fan Motor Size	No Return Fan
0	F6A.	Exhaust Fan Quantity	0 Exhaust Fans
0	F6B.	Exhaust Fan Configuration	No Exhaust Fan
0	F6C.	Exhaust Fan Size	No Exhaust Fan
0	F6D.	Exhaust Fan Motor Type	No Exhaust Fan
0	F6E.	Exhaust Fan Motor Size	No Exhaust Fan
D	F7.	Outside Air Control	Fully Modulating Actuator - Enthalpy Limit
C	F8.	Return and Exhaust Air Options	Standard Barometric Relief EA Dampers
C	F9A.	Unit Filter Type	2" Pleated MERV 8 + 4" Pleated MERV 13
B	F9B.	Unit Filter Size & Location	High Efficiency Filters in Standard Position
0	F9C.	Final Filter Type	No Final Filters
A	F9D.	Filter Options	Clogged Filter Switch - Unit Filters
0	F10A.	Refrigeration Control A	Standard - Adj Comp. Cooling Lock Out Through Unit Controls

	Feature Option		Decription
0	F10B.	Refrigeration Control B	Standard
E	F11A.	Refrigeration Options A	Modulating Hot Gas Reheat Microchannel Coil [MHGR-MC]
0	F11B.	Refrigeration Options B	Standard Packaged Unit
B	F12.	Refrigeration Accessories	Compressor Isolation Valves
A	F13A.	Unit Disconnect Type	Single Point Power - Non-fused Disconnect Power Switch
N	F13B.	Disconnect 1 Size	100 Amps
0	F13C.	Disconnect 2 Size	Standard - None
E	F14.	Safety Options	Remote Safety Shutdown Terminals
B	F15.	Electrical Accessories	Phase & Brown Out Protection
E	F16A.	Control Sequence	Constant Air Volume Unit Controller - CAV Cool + CAV Heat
A	F16B.	Control Supplier	AAON Controls
0	F16C.	Control Supplier Options	None
A	F16D.	BMS Connection & Diagnostics	BACnet IP or MSTP
0	F17A.	Preheat Configuration	Standard - None
0	F17B.	Preheat Sizing	Standard - None
0	F18A.	Option Box Location	None
0	F18B.	Option Box Size	None
0	F18C.	Option Box Accessories	None
A	F19.	Outside Air Accessories	Outside Air Hood
0	F20.	Cabinet Options	Standard - None
0	F21.	Accessories	Standard
A	F22.	Maintenance Accessories	Factory Wired 115V Convenience Outlet
0	F23.	Code Options	Standard - ETL U.S.A. Listing
0	F24.	Shipping Splits	Standard
J	F25.	Air-Cooled Condenser Accessories	Cond Coil Guards + VFD Cond Fan Head Pressure Control
0	F26.	Evap-Cooled Condenser Accessories	Standard
0	F27.	Water-Cooled Condenser Accessories	None
0	F28.	Energy Recovery Accessories	None
A	F29.	VFD Options	Shaft grounding kit on all SA, RA, EA motors
B	F30.	Miscellaneous Options	SCCR (10kA)
0	F31.	Blank	Standard
0	F32.	Blank	Standard
0	F33.	Blank	Standard
0	F34.	Blank	Standard
B	F35.	Warranty	5 Year Parts Warranty
0	F36.	Cabinet Material	Galvanized Cabinet - Double Wall + R-13 Foam Insulation
B	F37.	Specials & Paint	Premium AAON Gray Paint Exterior Paint

AAON

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Controller Components

Ecat Version: 352.0

A1 A2 A3 A4 A5 B1 B2 B3 B4 B5 1 2 3A 3B 3C 3D 3E 4A 4B 4C 5A 5B 5C 5D 5E 6A 6B 6C 6D 6E 7 8 9A 9B 9C

RNA-015-B-A-3-GAB0C-A03N0:00-0FEAG-E00-00000-00000-DC-CB0
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9D 10A 10B 11A 11B 12 13A 13B 13C 14 15 16A 16B 16C 16D 17A 17B 18A 18B 18C 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Tag: RTU 1-7

Job Name:	Amazon LCK062 New Albany County OH	VCCX For:	
Job Number:	OH62	VCCX Date:	September 30, 2024

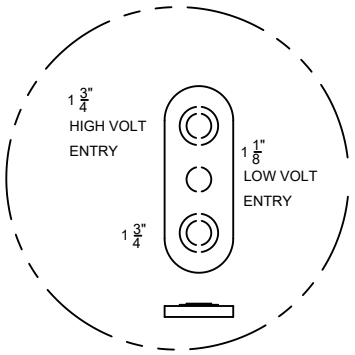
Part#	Included Parts	Assigned Channel	BACnet Point
ASM07503	VCCX-454 CONTROLLER		
ASM01692	OSA Temp/Hum Sensor	EBUS2 Communicating Sensor	AI:16,AI:17,AI:18,AI:19
ASM01820	Space Digital Temp/Hum Sensor	EBUS3 Communicating Sensor	AI:12,AI:13
R82890	Supply Temp Sensor - Field Installed	VCCX Control Point AI3	AI:9
	Supply Fan Control Signal 0-10VDC	VCCX Control Point AO1	AI:22
	Economizer	VCCX Control Point AO2	AI:30
	Modulated Heating (0-10VDC)	VCCX Control Point AO3	AI:35
R62330	Proof of Air Flow	VCCX Control Point BI1	BI:6, BI:24
G150620	Clogged Filter Switch (Standard Filters)	VCCX Control Point BI2	BI:25
	A2L Airstream Leak Detect Status	VCCX Control Point BI5	BI:9
	Safety Shut Down	VCCX Control Point BI8	BI:26
	Supply Fan	Configured Relay Point	BI:0
	Heat 1	Configured Relay Point	BI:1
ASM07563	A2L MITIGATION BOARD 1		
G137750	Gas Sensor 1	A2L MB1 AI1	
	Supply Fan Proof of Flow	A2L MB1 BI1	
	Alarm Output	A2L MB1 Fixed RO3	
ASM07716	REFRIGERATION MODULE		
V38391	Suction Pressure Sensor A	RM454-D SP-1	AI:48
V38410	Discharge Pressure Sensor A	RM454-D HP-1	AI:50
V38391	Suction Pressure Sensor B	RM454-D SP-2	AI:73
V38410	Discharge Pressure Sensor B	RM454-D HP-2	AI:75
	Comp Discharge Temp A	RM454-D TEMP1	AI:66
	Modulated Condenser Signal A	RM454-D AOUT1	AI:46
	Modulated Condenser Signal B	RM454-D AOUT2	AI:47
	Comp Status Input A	RM454-D BIN1	BI:77
	Comp Status Input B	RM454-D BIN2	BI:78
	Emergency Shutdown	RM454-D BIN4	BI:83
	Comp Enable A	RM454-D RLY1	BI:84
	Comp Enable B1	RM454-D RLY2	BI:85
	Comp Unload Signal A	RM454-D COMP1	AI:44
	Comp Load Signal B2	RM454-D COMP2	AI:45
	Condenser Enable A	RM454-D RLY3	BI:86
	Condenser Enable B	RM454-D RLY4	BI:87
ASM01670	MODULATING HOT GAS REHEAT MODULE		
	Reheat HGR Valve	MHGRV-X	AI:42

RNB 9-15 TON STANDARD

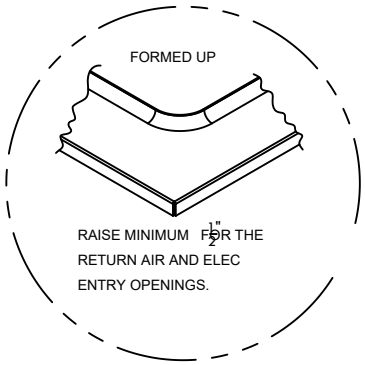
AAON ®

CLEARANCES

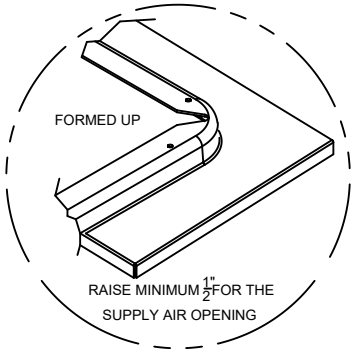
LOCATION	• UNIT SIZE • 9 - 15 TON
OUTSIDE AIR (BACK)	48
CONTROLS SIDE (FRONT)	48
LEFT SIDE	6
RIGHT SIDE	48
TOP	UNOBSTRUCTED



DETAIL A

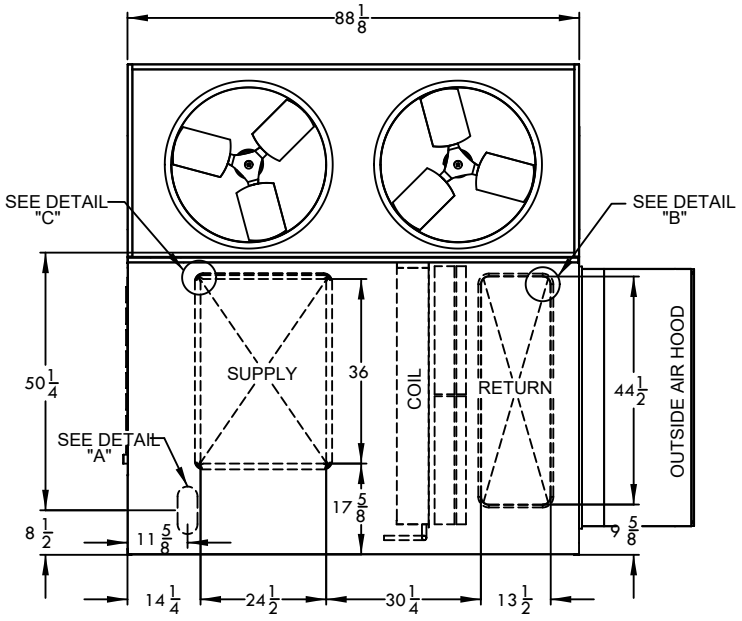


DETAIL B

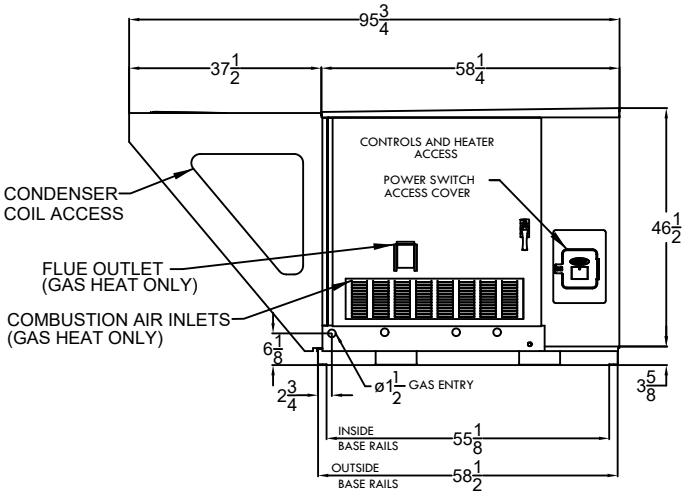


DETAIL C

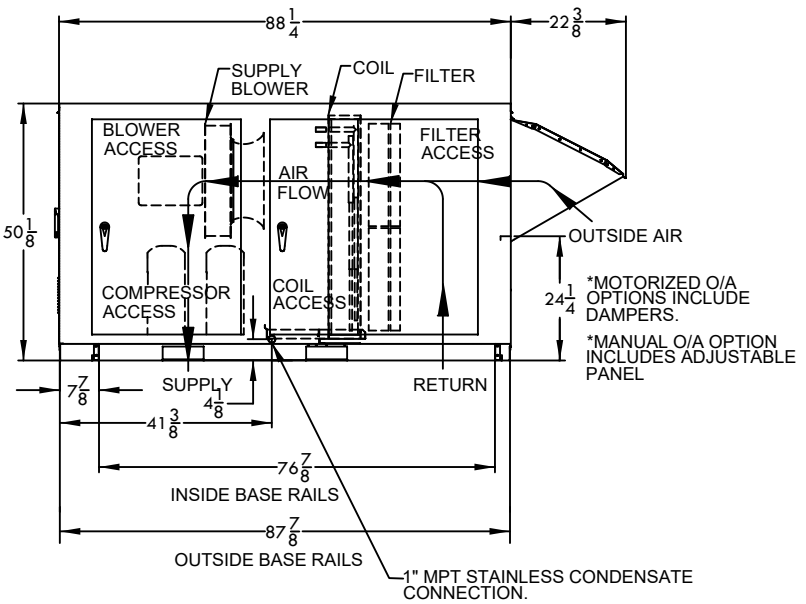
TOP VIEW



FRONT VIEW



RIGHT SIDE VIEW

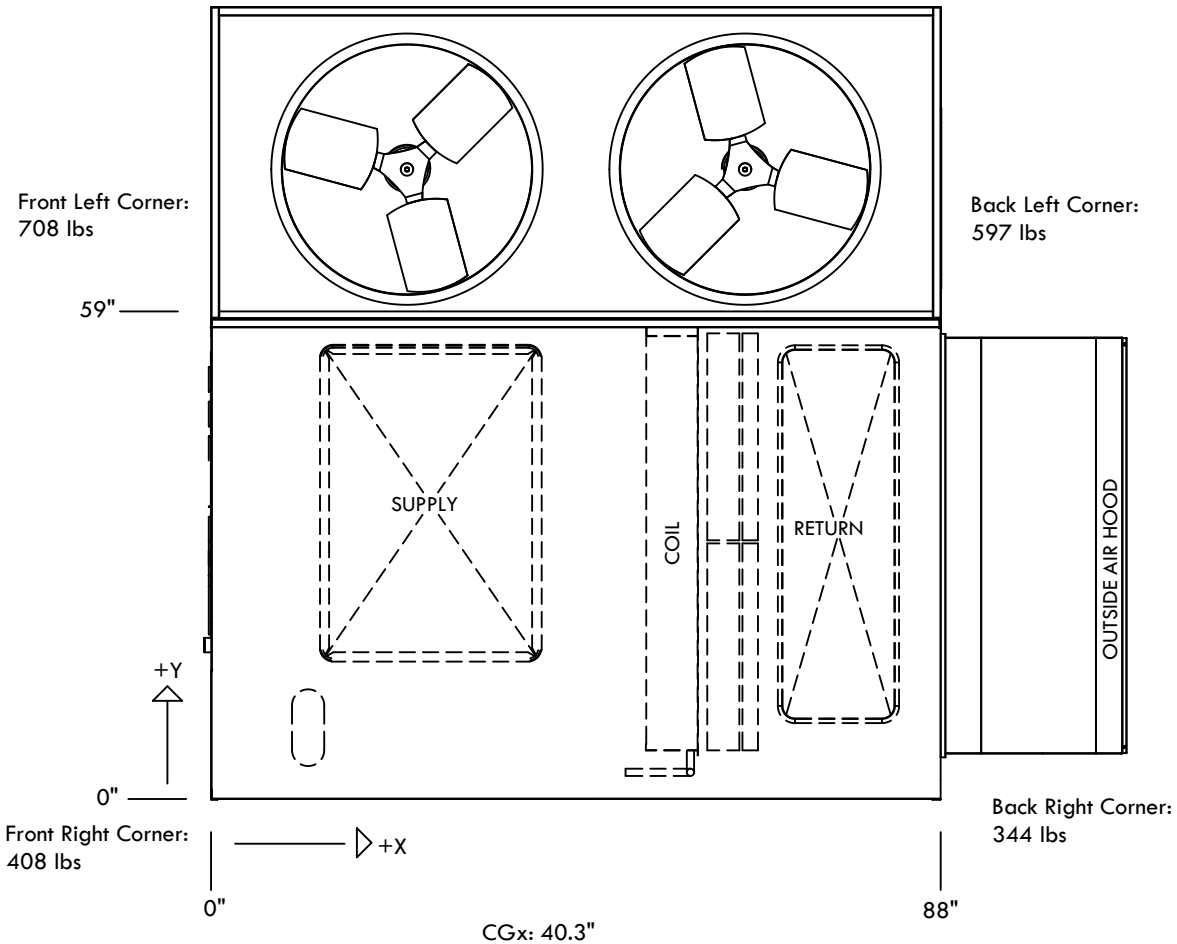


RNB-00001 REV:E 02/22/23 JWC

NOTE: ALL DIMENSIONS ARE IN INCHES

RNB CABINET
AIR COOLED CONDENSING UNIT

RNA-015-B-A-3-GAB0C-A03N0:00-0FEAG-E00-00000-00000-DC-CB0A-00-E0-B-AN0-EB-EA0A-00-000-A00A00-J000AB-0000B0B



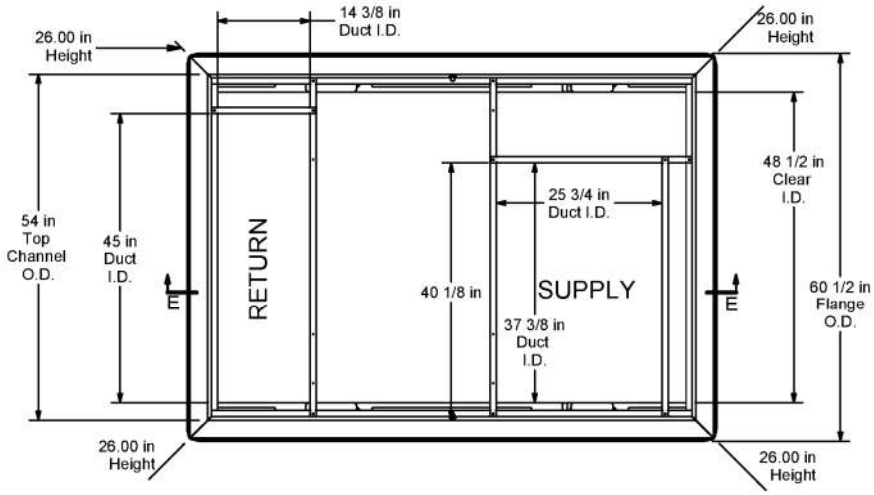
CGx: 40.3"
CGy: 37.4"

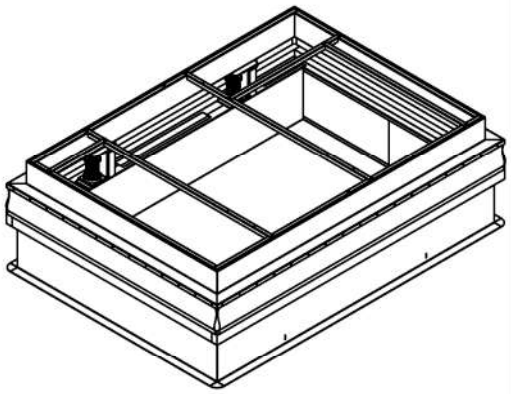
Total Weight:
2057 lbs

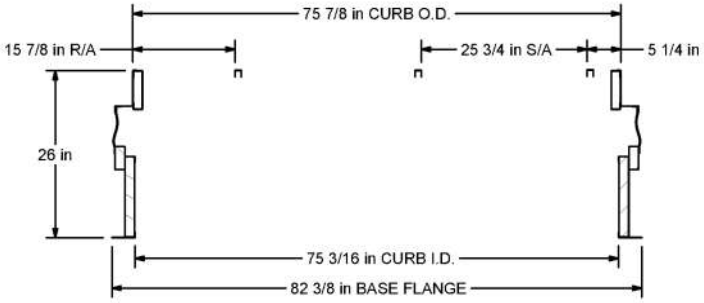
Disclaimer:
This weight estimate does not account for any SPAs.

RTU 1-7

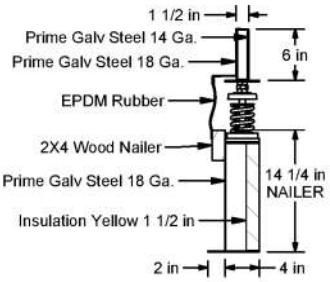
Thybar Corporation has a policy of continuous product improvement and reserves the right to change the product design without notice







SECTION E-E



SECTION A-A
1" Spring Deflection
26" Min. Height

SUBMITTAL

Curb wall thickness, Curbs clear ID and restraint requirements to be determined by seismic/windload calculations if required.

Verify roof pitch and direction

Non Seismic Curb

(DO NOT SCALE DRAWING) Unless otherwise specified dimensions are in inches tolerances are

± 1/16 ± 0.0625 ± 1°

Date: 12/3/2021

Vibrocurb III Insulated Top Duct Supports
New Aaon RN009-015 STD
Existing
Single End Walls, 18 ga. Base

Curb Weight
268 lbs.
Total Weight
268 lbs.

Qty.: Job # :

Tag:

Drawn: AGarcia

File: VIDS1AN0229226FL000N0

Rev: F

thybar CORPORATION
Thybar makes it right the first time, every time

Unit Rating

2425 South Yukon Ave • Tulsa, OK 74107 • Ph: (918) 583-2266
Ecat Version: 352.0

A1 A2 A3 A4 A5 B1 B2 B3 B4 B5 1 2 3A 3B 3C 3D 3E 4A 4B 4C 5A 5B 5C 5D 5E 6A 6B 6C 6D 6E 7 8 9A 9B 9C

RNA-060-D-B-3-GAB0B-A01N0:00-AAHAL-QAA-00000-BBNBK-DC-000
A-00-F0-B-AV0-EB-DA0A-00-000-A00A00-J00BAB-0000B0B

9D 10A 10B 11A 11B 12 13A 13B 13C 14 15 16A 16B 16C 16D 17A 17B 18A 18B 18C 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Tag: RTU 1-8

R-454B is alternate to phased out R-410A. R-454B is A2L. Rooms served by RTU 1-8 have large enough volume to meet ASHRAE 15 requirements for R-454B.

Job Information

Job Name:	*Amazon LCK062 New Albany County OH*
Job Number:	*OH62*
Site Altitude:	*940 ft*
Refrigerant:	*R-454B*
System Charges (oz):	*370 / 370 / 581 / 581*

Unit Information

Approx. Op./Ship Weights:	*8997 lbs / 8997 lbs (±5%)*
Ambient Temperature (DB/WB):	*99.3 °F / 82.1 °F*
Coil Filter FV / Qty:	*408.3 fpm / 24*
Min. Room Area/Height/Airflow**:	*545.0 ft² / 7.2 ft / 983 SCFM*
Exhaust Airflow/ESP/TSP:	*19600 SCFM / 0.50 in. w.g. / 2.12 in. w.g.*
Supply Airflow/ESP:	*19600 SCFM / 1.50 in. w.g.*
Outside Airflow:	*6000 SCFM*
Return Temperature (DB/WB):	*75.0 °F / 62.0 °F*

Static Pressure

External:	*1.50 in. w.g.*	Economizer:	*0.12 in. w.g.*
Cooling Coil:	*0.66 in. w.g.*	Heating:	*0.11 in. w.g.*
Filters Clean:	*0.21 in. w.g.*	Cabinet:	*0.09 in. w.g.*
Dirt Allowance:	*0.35 in. w.g.*	Energy Recovery:	*0.72 in. w.g.*
Reheat Coil:	*0.15 in. w.g.*	Total:	*4.03 in. w.g.*

Cooling Section

	Gross	Net	
Equivalent Total Capacity:	*978.4 MBH*	*923.1 MBH*	
Total Capacity:	*648.3 MBH*	*592.9 MBH*	
Sensible Capacity:	*492.0 MBH*	*436.7 MBH*	503.3 MBH
Latent Capacity:	*156.3 MBH*		
HW Total Cooling Capacity:	*330.2 MBH*		
Mixed Air Temp (DB/WB):	*76.6 °F / 64.0 °F*		75.6 F / 62.8 F
Entering Air Temp (DB/WB):	*76.6 °F / 64.0 °F*		
Lv Air Temp (Coil) (DB/WB):	*52.5 °F / 52.3 °F*		50.9 F / 50.8 F
Lv Air Temp (Unit) (DB/WB):	*55.1 °F / 53.4 °F*		

Supply Air Fan:	*2 x 300 @ 10.12 BHP Ea.*
SA Fan RPM / Width:	*1321 RPM / 6.040 in*
SA Fan FEI:	*1.03*
Exhaust Air Fan:	*2 x RM270-RN @ 6.04 BHP Ea.*
EA Fan RPM / Width:	*1257 RPM / 6.130 in*
EA Fan FEI:	*0.94*
Evaporator Coil:	*45.0 ft² / 6 Rows / 14 FPI*
Evaporator Face Velocity:	*435.6 fpm*
Energy Recovery:	*2 x ERC-5245*

Heating Section

Preheat Type:	*Std (No Preheat)*	
Auxiliary Heating Type:	*Electric Heat*	
Heating Airflow:	*13635 SCFM*	
Total Capacity:	*136.5 MBH*	
Entering Air Temp (DB/WB):	*70.5 °F / 58.8 °F*	67.1 F
Leaving Air Temp (DB/WB):	*80.0 °F / 62.1 °F*	78.8 F
Input:	*40.0 kW*	
Electric Heat FLA:	*48.1*	

Values in green are scheduled on M903 (typ). Confirm these scheduled values can be met by the R-454B unit. Update selection for correct temps as shown.

Re-heat Coil:

Capacity:	*405.3 MBH*
Leaving Air Temp (DB/WB):	*72.4 °F / 60.0 °F*
Relative Humidity:	*49.0%*

Rating Information

Listing Model	*RN-060-3-0-GABY-V0-21-000-B*
Cooling Capacity:	*630 MBH*
Cooling EER:	*10.5 BTU/h·W*
Cooling IEER:	*13.6 BTU/h·W*

**Rated in accordance with AHRI Standard 340/360 (I-P)*

Application EER @ Op. Conditions: ***11.6 BTU/h·W***

Electrical Data

Circuit 1

Rating:	*460V/3Ø/60Hz*	*Minimum Circuit Amp:*	*164*
Unit FLA:	*158*	*Maximum Overcurrent:*	*175*
SCCR:	*10 KAIC*		

	Qty	HP	VAC	Phase	RPM	FLA	RLA
Compressor 1:	2		460	3	3500		19.9
Compressor 2:	2		460	3	3500		21.2
Condenser Fan:	6	0.75	460	3	1080	1.8	
Supply Fan:	2	15.00	460	3	1760	21.0	
Exhaust Fan:	2	7.50	460	3	1760	11.0	
Energy Recovery:	2	0.17	460	1	1075	0.6	

Cabinet Sound Power Levels*

Octave Bands:	63	125	250	500	1000	2000	4000	8000
Discharge LW (dB):	95	94	97	100	97	92	88	82
Return LW (dB):	93	91	91	91	91	87	83	79

*Sound power levels are given for informational purposes only. The sound levels are not guaranteed.

***The minimum floor area for the Lower Flammability Limit (LFL) is calculated in accordance with UL60335-2-40 4th ed. (operating or storage).**

Unit Rating

2425 South Yukon Ave • Tulsa, OK 74107 • Ph: (918) 583-2266
Ecat Version: 352.0

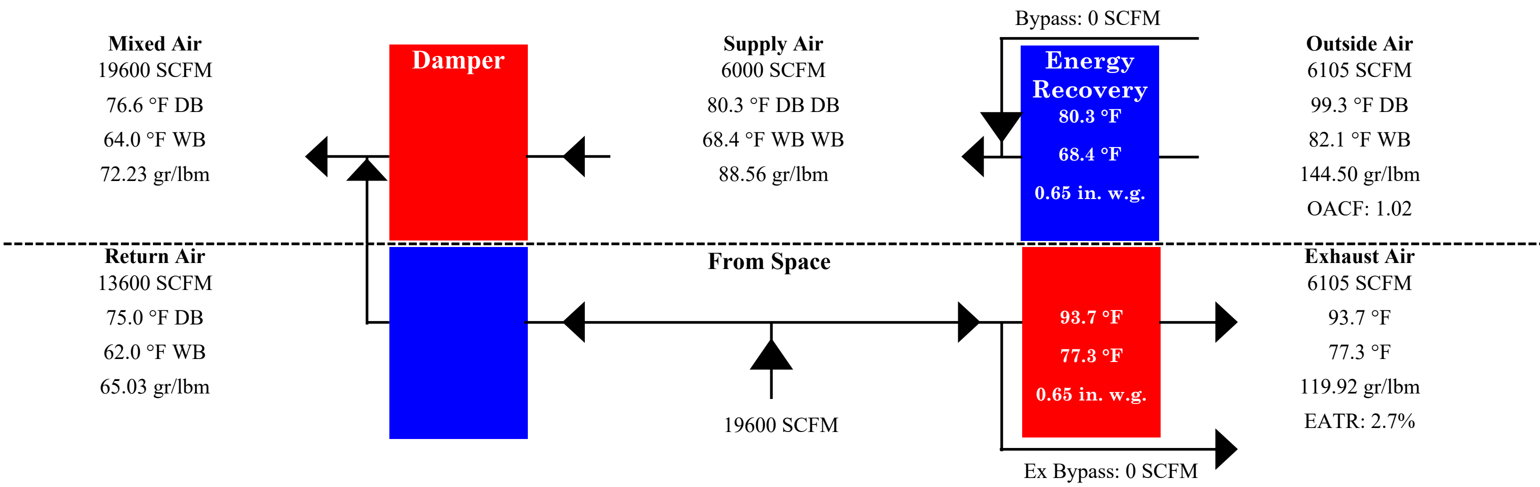
RNA-060-D-B-3-GAB0B-A01N0:00-AAHAL-QAA-00000-BBNBK-DC-000
A-00-F0-B-AV0-EB-DA0A-00-000-A00A00-J00BAB-0000B0B

Tag: RTU 1-8

Job Name:	**Amazon LCK062 New Albany County OH**	Energy Recovery Type:	**Total**
Job Number:	**OH62**	Energy Recovery Model:	**ERC-5245**
Site Altitude:	**940 ft**	Energy Recovery Qty:	**2**
Net Supply Airflow Sum/Win:	**5840 SCFM / 5842 SCFM**	Energy Recovery Software Ver:	**1.1.0.0**
Purge Angle:	**0.0°**		

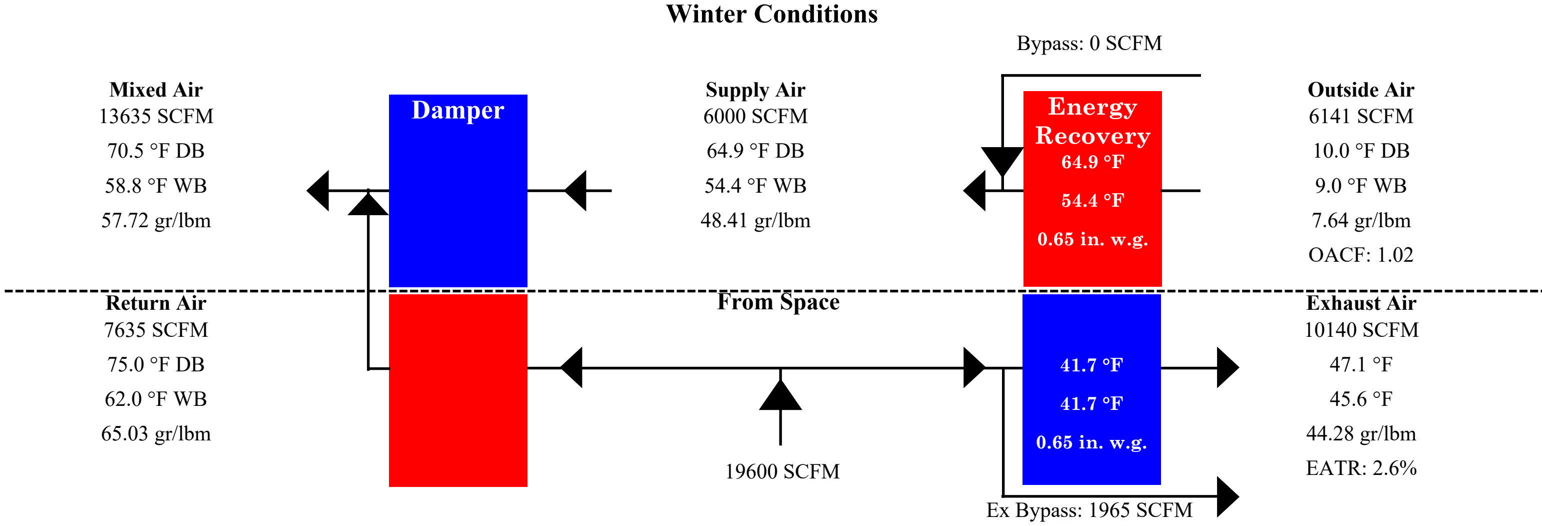
Application Rating is outside the scope of the AHRI ERV Certification Program but is rated in accordance with AHRI Standard 1060.

Summer Conditions



	Cooling/Dehumidification	Heating/Dehumidification	Effectiveness
Total Capacity:	**330.2 MBH**	**0.0 MBH**	**72.4%**
Sensible Capacity:	**111.9 MBH**	**0.0 MBH**	**77.8%**
Latent Capacity:	**218.2 MBH**	**0.0 MBH**	**69.6%**

Winter Conditions



Frost Warning - Conditions for frost forming on the energy recovery exists. Outside air preheat is required to prevent frost formation. Optionally, the return air humidity ratio could be lowered to prevent frost formation. See AAON literature titled 'AAONAIRE ENERGY RECOVERY' for details.

	Cooling/Dehumidification	Heating/Dehumidification	Effectiveness
Total Capacity:	**0.0 MBH**	**496.1 MBH**	**78.9%**
Sensible Capacity:	**0.0 MBH**	**334.5 MBH**	**84.0%**
Latent Capacity:	**0.0 MBH**	**161.6 MBH**	**70.4%**

2425 South Yukon Ave • Tulsa, OK 74107 • Ph: (918) 583-2266
Ecat Version: 352.0

A1 A2 A3 A4 A5 B1 B2 B3 B4 B5 1 2 3A 3B 3C 3D 3E 4A 4B 4C 5A 5B 5C 5D 5E 6A 6B 6C 6D 6E 7 8 9A 9B 9C

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A-00-F0-B-AV0-EB-DA0A-00-000-A00A00-J00BAB-0000B0B

9D 10A 10B 11A 11B 12 13A 13B 13C 14 15 16A 16B 16C 16D 17A 17B 18A 18B 18C 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Tag: *RTU 1-8*

Job Name: *Amazon LCK062 New Albany County OH*

Job Number: *OH62*

Unit Worksheet For:

Unit Worksheet Date: *9/30/2024*

	Base Option	Description
RN	Generation	RN Series
A	Major Revision	Major Revision A
060	Unit Size	Sixty
D	Series	D Series
B	Minor Revision	Minor Revision B
3	Voltage	460V/3φ/60Hz
G	Compressor Style	R-454B Variable Capacity Scroll Compressor
A	Condenser Style	Microchannel Air-Cooled Condenser
B	Indoor Coil Configuration	6 Row Evaporator
0	Cooling Heat Exchanger Construction	Standard
B	Cooling Staging	2 Variable Capacity Comp + 2 Two-Step Comp
A	Heat Type	Electric Heat (Vertical Unit Configuration)
0	Heat Construction	Standard
1	Heat Designation	40 kW
N	Heat Staging	Modulating SCR Electric - Temperature Control
0	Heat Pump Auxiliary Heating	No Auxiliary Heat

	Feature Option		Decription
0	**F1.**	Unit Orientation	Standard Access - Hinged Access Doors with Lockable Handles
0	**F2.**	Supply & Return Locations	Bottom Supply+Bottom Return
A	**F3A.**	Supply Fan Quantity	2 Fans
A	**F3B.**	Supply Fan Configuration	1 Fan per VFD + Full Width Fan
H	**F3C.**	Supply Fan Size	30" Direct Drive Backward Curved Aluminum
A	**F3D.**	Supply Fan Motor Type	High Efficiency Open Motor (1,800 nominal rpm)
L	**F3E.**	Supply Fan Motor Size	15 hp
Q	**F4A.**	Outside Air Section	Economizer + Energy Recovery + Bypass Damper
A	**F4B.**	Energy Recovery Type	Polymer Energy Recovery Wheel
A	**F4C.**	Energy Recovery Size	Low CFM Enthalpy
0	**F5A.**	Return Fan Quantity	0 Return Fans
0	**F5B.**	Return Fan Configuration	No Return Fan
0	**F5C.**	Return Fan Size	No Return Fan
0	**F5D.**	Return Fan Motor Type	No Return Fan
0	**F5E.**	Return Fan Motor Size	No Return Fan
B	**F6A.**	Exhaust Fan Quantity	2 Fans
B	**F6B.**	Exhaust Fan Configuration	1 Fan per VFD + Full Width Fan
N	**F6C.**	Exhaust Fan Size	27" Backward Curved Aluminum
B	**F6D.**	Exhaust Fan Motor Type	High Efficiency Open Motor (1,800 nominal rpm)
K	**F6E.**	Exhaust Fan Motor Size	7.5 hp
D	**F7.**	Outside Air Control	Fully Modulating Actuator - Enthalpy Limit
C	**F8.**	Return and Exhaust Air Options	Standard Barometric Relief EA Dampers
0	**F9A.**	Unit Filter Type	2" Pleated - MERV 8
0	**F9B.**	Unit Filter Size & Location	Standard Filters in Standard Position
0	**F9C.**	Final Filter Type	No Final Filters
A	**F9D.**	Filter Options	Clogged Filter Switch - Unit Filters
0	**F10A.**	Refrigeration Control A	Standard - Adj Comp. Cooling Lock Out Through Unit Controls

	Feature Option		Decription
0	F10B.	Refrigeration Control B	Standard
F	F11A.	Refrigeration Options A	Dual Circuit MHGR -MC
0	F11B.	Refrigeration Options B	Standard Packaged Unit
B	F12.	Refrigeration Accessories	Compressor Isolation Valves
A	F13A.	Unit Disconnect Type	Single Point Power - Non-fused Disconnect Power Switch
V	F13B.	Disconnect 1 Size	250 Amps
0	F13C.	Disconnect 2 Size	Standard - None
E	F14.	Safety Options	Remote Safety Shutdown Terminals
B	F15.	Electrical Accessories	Phase & Brown Out Protection
D	F16A.	Control Sequence	VAV Unit Controller - VAV Cool + CAV Heat
A	F16B.	Control Supplier	AAON Controls
0	F16C.	Control Supplier Options	None
A	F16D.	BMS Connection & Diagnostics	BACnet IP or MSTP
0	F17A.	Preheat Configuration	Standard - None
0	F17B.	Preheat Sizing	Standard - None
0	F18A.	Option Box Location	None
0	F18B.	Option Box Size	None
0	F18C.	Option Box Accessories	None
A	F19.	Outside Air Accessories	Outside Air Hood
0	F20.	Cabinet Options	Standard - None
0	F21.	Accessories	Standard
A	F22.	Maintenance Accessories	Factory Wired 115V Convenience Outlet
0	F23.	Code Options	Standard - ETL U.S.A. Listing
0	F24.	Shipping Splits	Standard
J	F25.	Air-Cooled Condenser Accessories	Cond Coil Guards + VFD Cond Fan Head Pressure Control
0	F26.	Evap-Cooled Condenser Accessories	Standard
0	F27.	Water-Cooled Condenser Accessories	None
B	F28.	Energy Recovery Accessories	Energy Recovery Wheel Rotation Detection
A	F29.	VFD Options	Shaft grounding kit on all SA, RA, EA motors
B	F30.	Miscellaneous Options	SCCR (10kA)
0	F31.	Blank	Standard
0	F32.	Blank	Standard
0	F33.	Blank	Standard
0	F34.	Blank	Standard
B	F35.	Warranty	5 Year Parts Warranty
0	F36.	Cabinet Material	Galvanized Cabinet - Double Wall + R-13 Foam Insulation
B	F37.	Specials & Paint	Premium AAON Gray Paint Exterior Paint

RNA-060-D-B-3-GAB0B-A01N0:00-AAHAL-QAA-00000-BBNBK-DC-000
A-00-F0-B-AV0-EB-DA0A-00-000-A00A00-J00BAB-0000B0B

Tag: RTU 1-8

Job Name:	Amazon LCK062 New Albany County OH	VCCX For:	
Job Number:	OH62	VCCX Date:	September 30, 2024

Part#	Included Parts	Assigned Channel	BACnet Point
ASM07503	VCCX-454 CONTROLLER		
ASM01692	OSA Temp/Hum Sensor	EBUS2 Communicating Sensor	AI:16,AI:17,AI:18,AI:19
R82890	Supply Temp Sensor - Field Installed	VCCX Control Point AI3	AI:9
ASM01820	Space Digital Temp/Hum Sensor	EBUS3 Communicating Sensor	AI:12,AI:13
R82890	Return Temp Sensor	VCCX Control Point AI4	AI:14
ASM01832	Building Pressure Sensor	VCCX Control Point AI5	AI:23
ASM01640	Duct Static Pressure Sensor	VCCX Control Point AI8	AI:21
	Supply Fan Control Signal 0-10VDC	VCCX Control Point AO1	AI:22
	Economizer	VCCX Control Point AO2	AI:30
	Modulated Heating (0-10VDC)	VCCX Control Point AO3	AI:35
	Building Pressure Control Signal	VCCX Control Point AO4	AI:24
R62330	Proof of Air Flow	VCCX Control Point BI1	BI:6, BI:24
G150620	Clogged Filter Switch (Standard Filters)	VCCX Control Point BI2	BI:25
	A2L Airstream Leak Detect Status	VCCX Control Point BI5	BI:9
	Safety Shut Down	VCCX Control Point BI8	BI:26
	Supply Fan	Configured Relay Point	BI:0
	Exhaust Fan	Configured Relay Point	BI:1
	Energy Recovery Wheel	Configured Relay Point	BI:2
	Heat 1	Configured Relay Point	BI:3
	Morning Warm-Up	Configured Relay Point	BI:4
ASM01687	REHEAT EXPANSION MODULE		
	Reheat Enable	Reheat Expansion Module	
	Reheat HGR Valve	Reheat Expansion Module	AI:42
ASM07563	A2L MITIGATION BOARD 1		
G137750	Gas Sensor 1	A2L MB1 AI1	
G137750	Gas Sensor 2	A2L MB1 AI2	
	Supply Fan Proof of Flow	A2L MB1 BI1	
	Alarm Output	A2L MB1 Fixed RO3	
ASM07716	REFRIGERATION MODULE 1		
V38391	Suction Pressure Sensor A	RM454-D 1 SP-1	AI:48
V38410	Discharge Pressure Sensor A	RM454-D 1 HP-1	AI:50
V38391	Suction Pressure Sensor C	RM454-D 1 SP-2	AI:73
V38410	Discharge Pressure Sensor C	RM454-D 1 HP-2	AI:75
	Comp Discharge Temp A	RM454-D 1 TEMP1	AI:66
	Modulated Condenser Signal A	RM454-D 1 AOUT1	AI:46
	Modulated Condenser Signal C	RM454-D 1 AOUT2	AI:47
	Comp Status Input A	RM454-D 1 BIN1	BI:77
	Comp Status Input C	RM454-D 1 BIN2	BI:78

	Emergency Shutdown	RM454-D 1 BIN4	BI:83
	Comp Enable A	RM454-D 1 RLY1	BI:84
	Comp Unload Signal A	RM454-D 1 COMP1	AI:44
	Comp Enable C	RM454-D 1 RLY2	BI:85
	Comp Load Signal C	RM454-D 1 COMP2	AI:45
	Condenser Enable A/C	RM454-D 1 RLY3	BI:86
ASM07716	REFRIGERATION MODULE 2		
V38391	Suction Pressure Sensor B	RM454-D 2 SP-1	AI:73
V38410	Discharge Pressure Sensor B	RM454-D 2 HP-1	AI:75
V38391	Suction Pressure Sensor D	RM454-D 2 SP-2	AI:73
V38410	Discharge Pressure Sensor D	RM454-D 2 HP-2	AI:75
	Comp Discharge Temp B	RM454-D 2 TEMP1	AI:91
	Modulated Condenser Signal B	RM454-D 2 AOUT1	AI:71
	Modulated Condenser Signal D	RM454-D 2 AOUT2	AI:72
	Comp Status Input B	RM454-D 2 BIN1	BI:89
	Comp Status Input D	RM454-D 2 BIN2	BI:90
	Emergency Shutdown	RM454-D 2 BIN4	BI:95
	Comp Enable B	RM454-D 2 RLY1	BI:96
	Comp Unload Signal B	RM454-D 2 COMP1	AI:69
	Comp Enable D	RM454-D 2 RLY2	BI:97
	Comp Load Signal D	RM454-D 2 COMP2	AI:70
	Condenser Enable B/D	RM454-D 2 RLY3	BI:98
ASM01670	MODULATING HOT GAS REHEAT MODULE		
	Reheat HGR Valve	MHGRV-X	AI:42

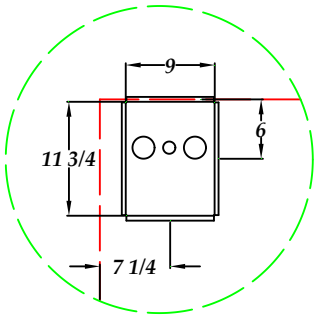
RN UNITS 40-70 TON
AIR COOLED, ENERGY RECOVERY WHEEL

AAON®

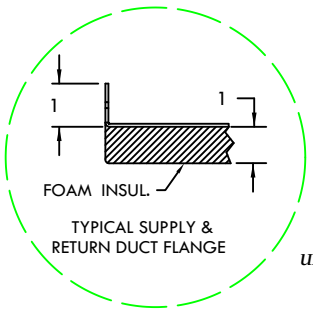
CLEARANCES

LOCATION	UNIT SIZE
	40-70 TON
RETURN AIR BACK	48
VENT SIDE FRONT	48
LEFT SIDE	48
RIGHT SIDE	70
TOP	UNOBSTRUCTED

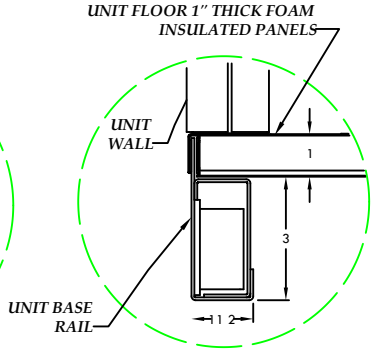
NOTE: RIGHT AND LEFT SIDE UNIT CLEARANCES ARE INTERCHANGEABLE ON UNITS THAT DO NOT HAVE THE HYDRONIC HEATING OPTION. (UNITS WITH HYDRONIC HEAT MUST HAVE 70" RIGHT SIDE ACCESS FOR SERVICE.)



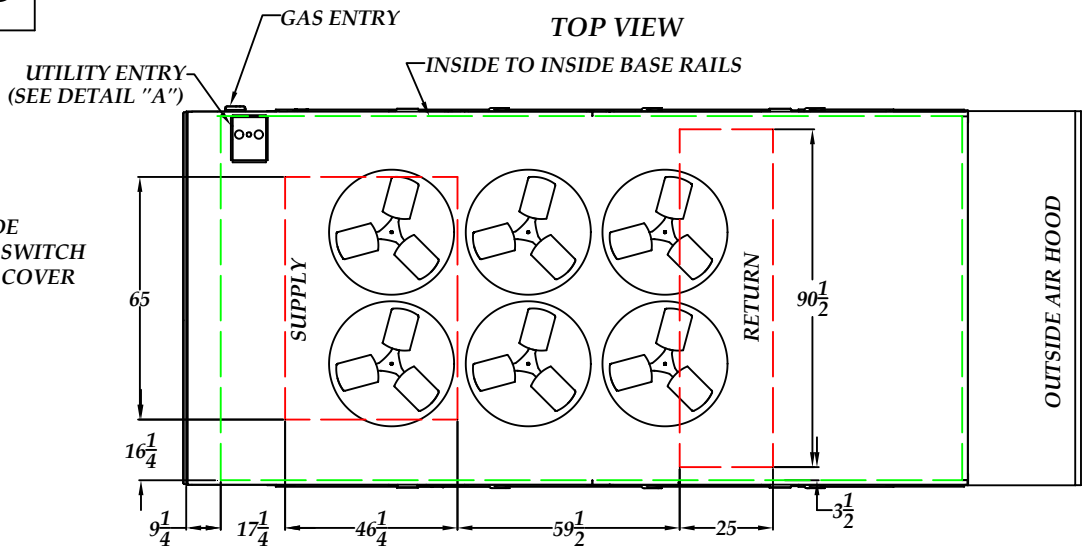
DETAIL A
UTILITY ENTRY

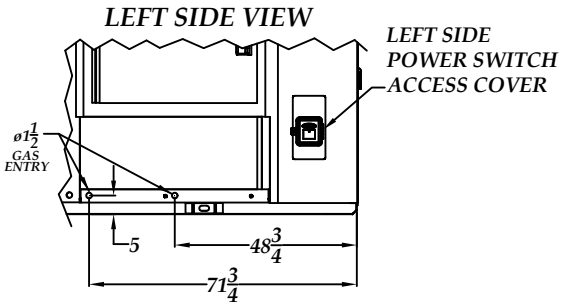


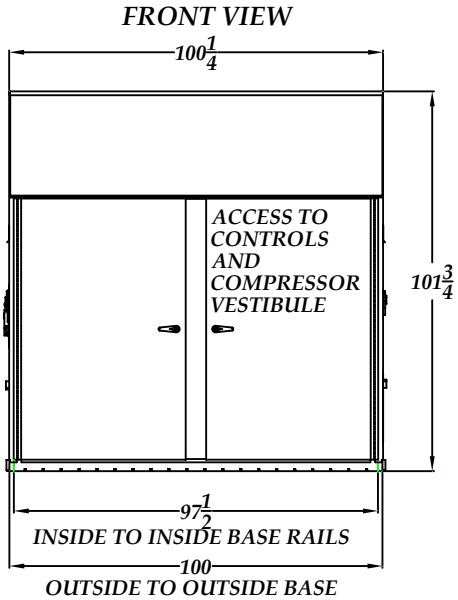
DETAIL B

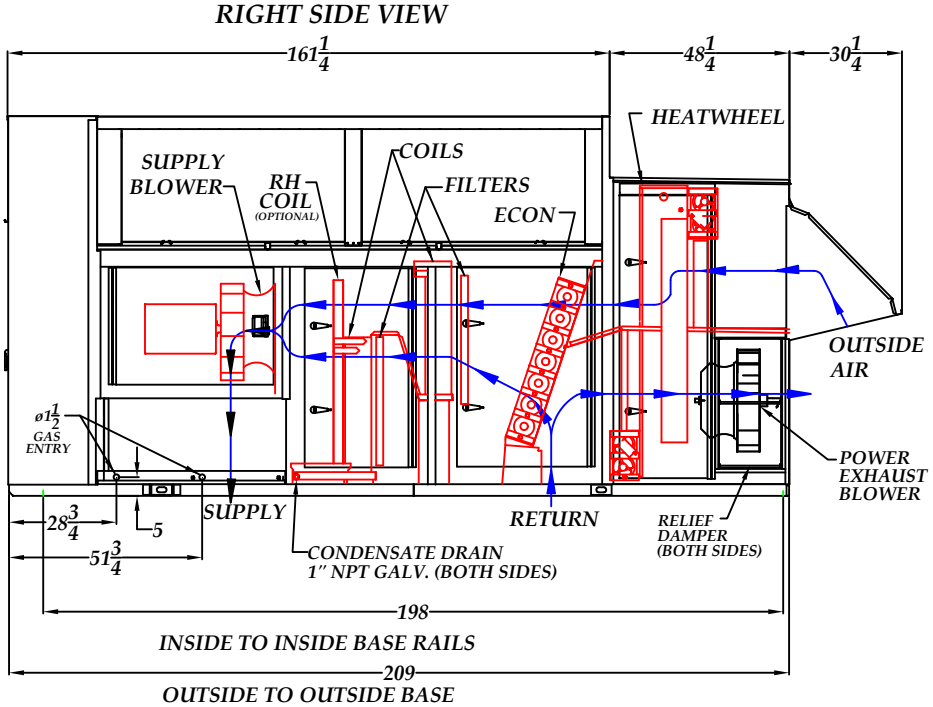


BASE RAIL CLEARANCE







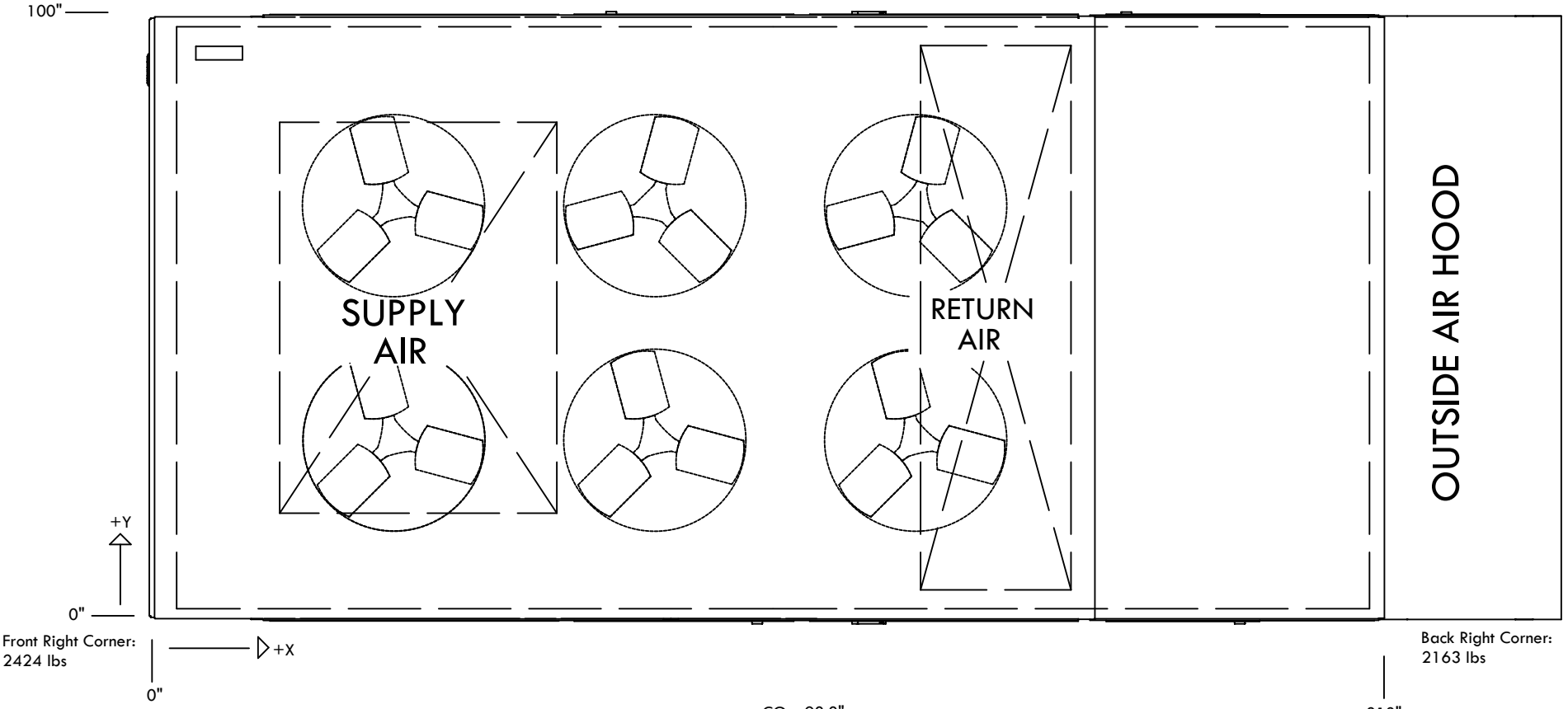


RND CABINET
AIR COOLED CONDENSING UNIT
ENERGY RECOVERY SECTION

RNA-060-D-B-3-GAB0B-A01N0:00-AAHAL-QAA-00000-BBNBK-DC-000A-00-F0-B-AV0-EB-DA0A-00-000-A00A00-J00BAB-0000B0B

Front Left Corner:
2330 lbs

Back Left Corner:
2080 lbs



Front Right Corner:
2424 lbs

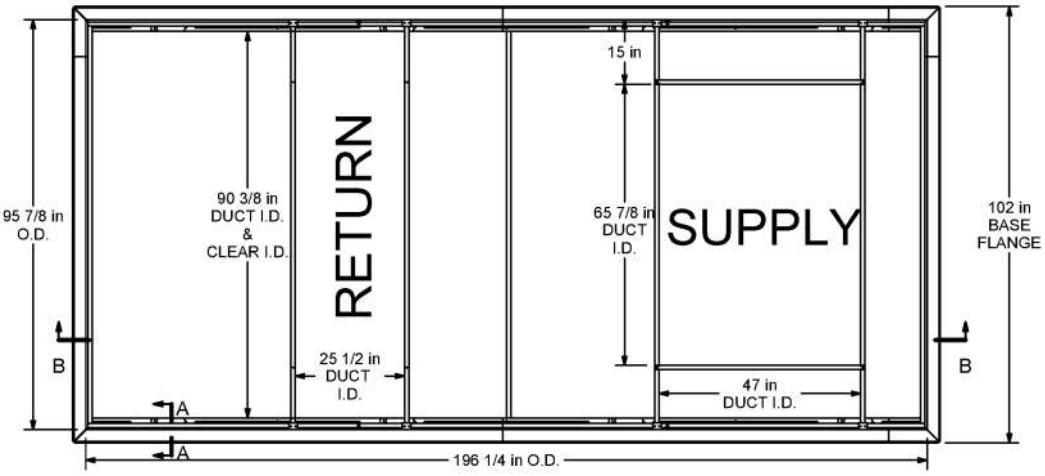
Back Right Corner:
2163 lbs

CGx: 98.8"
CGy: 49"

210"

Total Weight:
8997 lbs

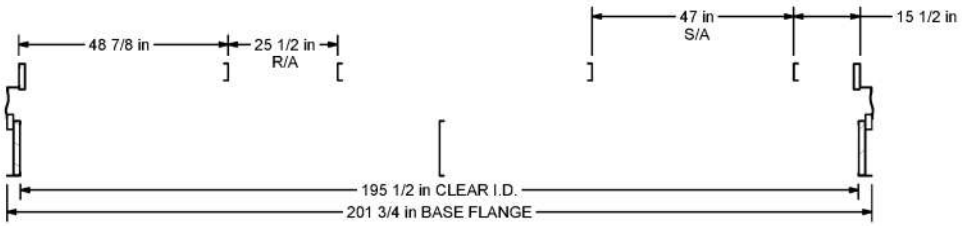
Disclaimer:
This weight estimate does not account for any SPAs.



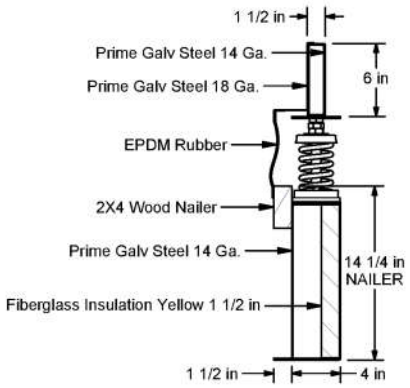
SUBMITTAL

Curb wall thickness, Curbs clear ID and restraint requirements to be determined by seismic/windload calculations if required.

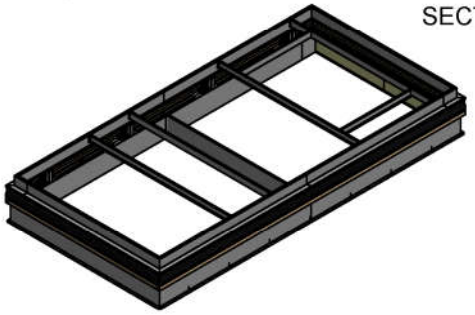
Verify roof pitch and direction



SECTION B-B



SECTION A-A
2" Spring Deflection
26" Min. Height



Non Seismic Curb

Vibrocurb III Insulated Top Duct Supports
New Aaon RN 26-70 HR
Existing

Curb Weight
780 lbs.
Total Weight
780 lbs.

(DO NOT SCALE DRAWING) Unless otherwise specified dimensions are in inches tolerances are
± 1/16 ± 0.0625 ± 1°

Qty.: Job # :
Tag:
Drawn: LAmpongan
Date: 2/9/2021
File: VIDS2AN0073826FL000N0
Rev: M

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Thybar Corporation has a policy of continuous product improvement and reserves the right to change the product design without notice

VCCX-454 Controller Components

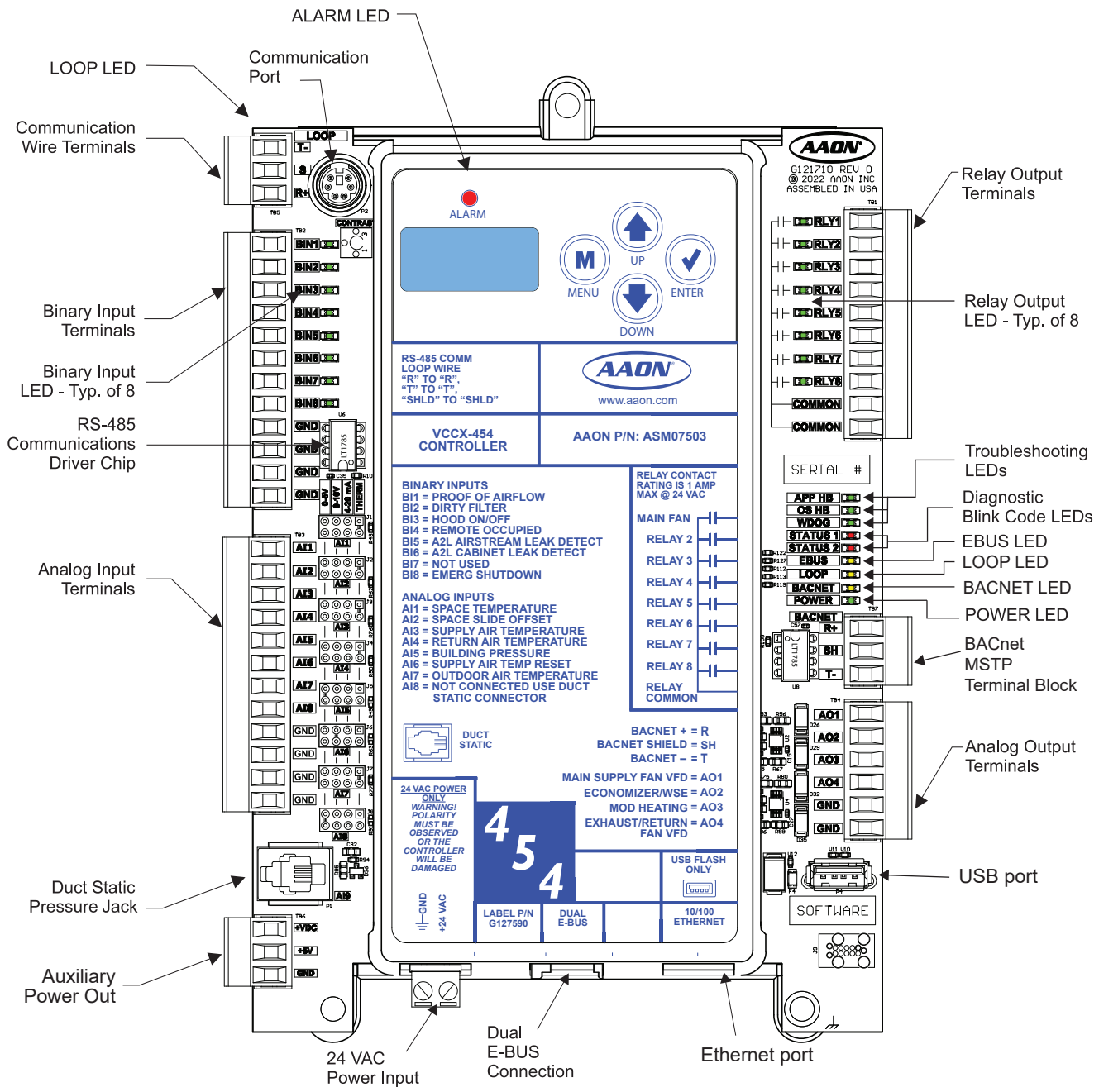
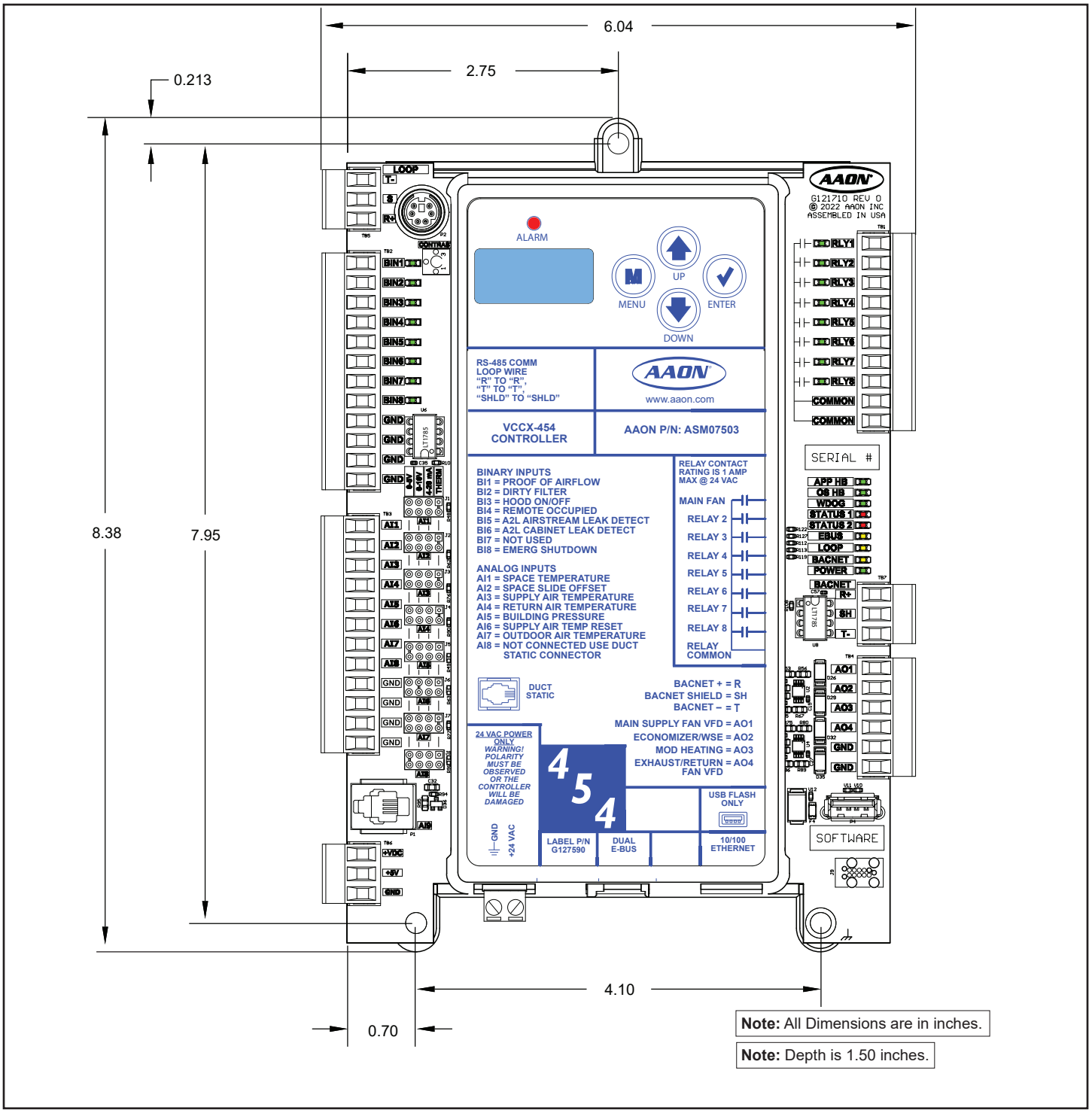


Figure 1: VCCX-454 Controller Components

VCCX-454 Controller



Note: All Dimensions are in inches.

Note: Depth is 1.50 inches.

Figure 2: VCCX-454 Controller Dimensions

Airflow Station

The E-BUS Adapter Board attaches to the VCCX-454 Controller with an E-BUS cable. The Adapter Board is used for connecting the EBTRON, GreenTrol, or Paragon Airflow Measurement Digital Transmitter to the VCCX-454 Control System. Wire the airflow Measurement Digital Transmitter to the adapter board as shown in **Figure 18, this page**.

Up to four EBTRON, GreenTrol, or Paragon MicroTransEQ Airflow Measurement Digital Transmitters can be attached to each Adapter Board. Only one Paragon Multi-Trans Smart Ecosystem (MTSE) can be attached.

Only the EBTRON GTC116 or HTN104 series, GreenTrol GA-200-N Module (with GF series Airflow Station), or Paragon MicroTransEQ series of MODBUS RTU transmitters are compatible with the VCCX-454 Controller. No other series of transmitters will work for this application. Contact AAON Controls for information on other airflow station options.

The Airflow Station's baud rate needs to be set to 19,200 in order to communicate with the VCCX-454 Controller (excludes Paragon MTSE).

When configuring the GTC116 or HTN104 Series, be sure to set the parity to "NO PARITY, 1 STOP BIT."

Paragon MTSE must be configured for MODBUS communication with baud rate set to 57,600 and its MODBUS ID set to "9".

WARNING: Observe polarity! All boards must be wired with GND-to-GND and 24 VAC-to-24 VAC. Failure to observe polarity will result in damage to one or more of the boards.

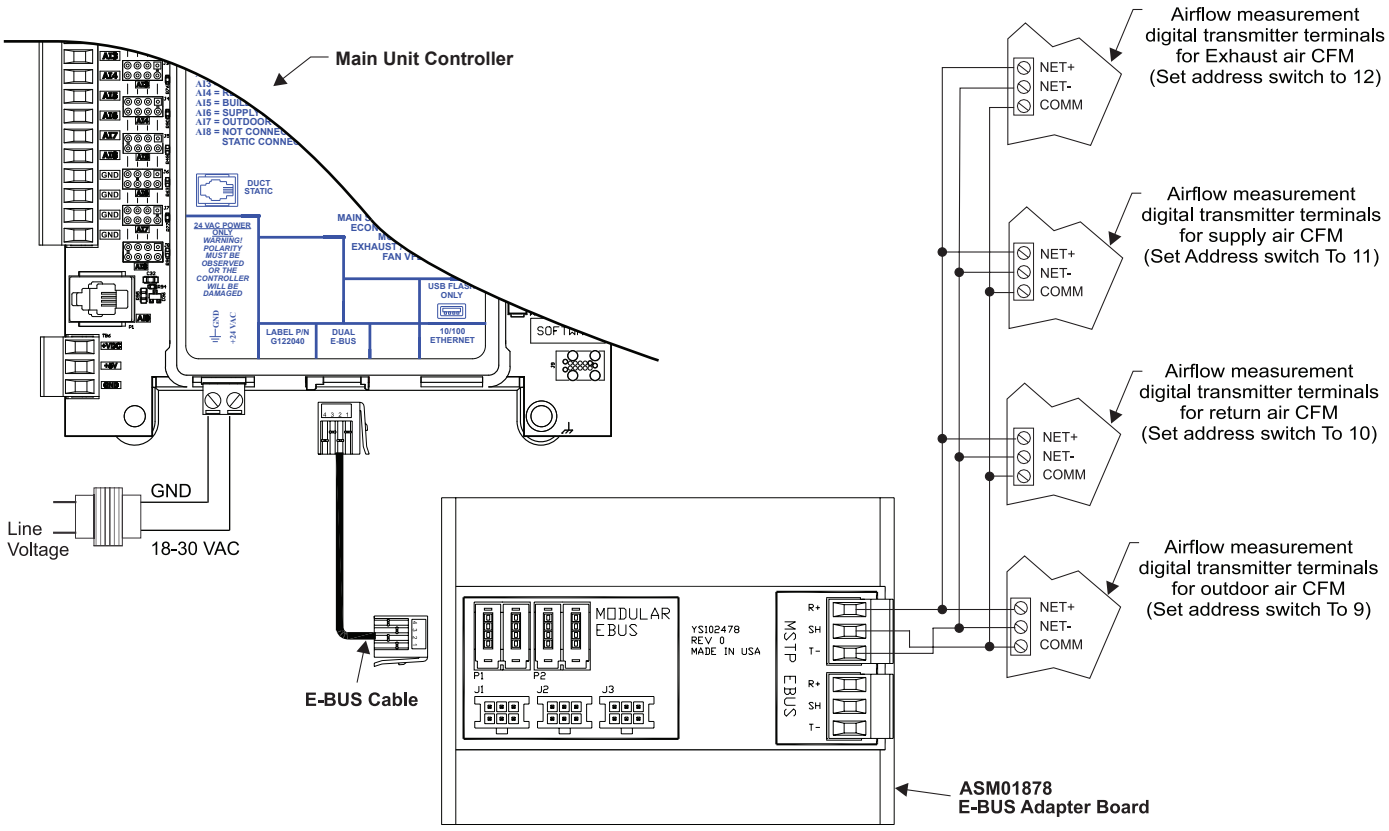


Figure 18: EBTRON GTC116 or HTN104 Series, GreenTrol GA-200-N Series, and Paragon MicroTransEQ Series Airflow Measurement Digital Transmitter Wiring

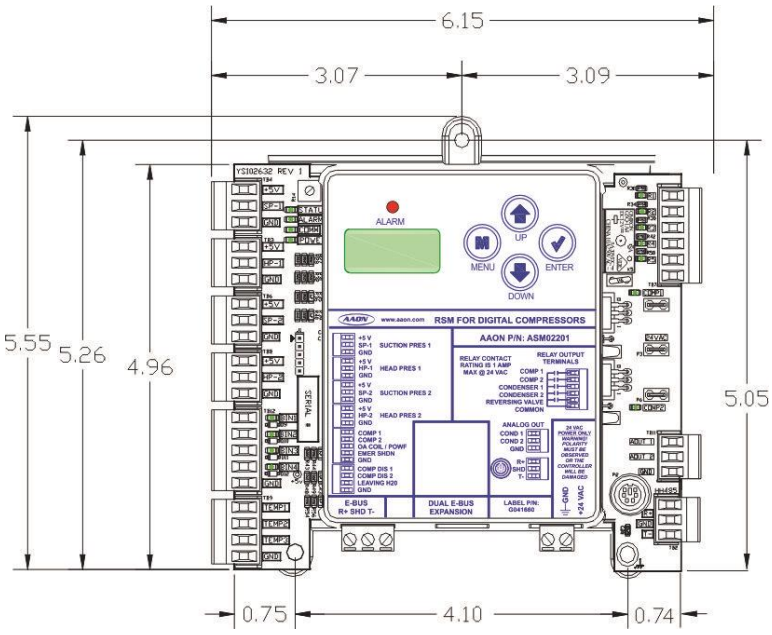
RSMD Module

ASM02201 ALT-REF number OE370-26-RSMD

Description

The Refrigerant System Module for Digital Compressors (RSMD) can monitor and control up to two compressors and condensers. The compressors can be in either a tandem or non-tandem configuration. The module is designed for R410-A refrigerant.

The RSMD Module is connected to the VCCX2 Controller. Up to 4 RSMD Modules can be connected, depending on the size of the system.



Additional Features

- Modulates the Compressors to satisfy the Suction Coil (Saturated) Temperature. The Suction Coil (Saturated) Temperature Setpoint is reset by the VCC-X/VCCX2 Controller to maintain the Supply Air Temperature during Cooling mode. During Dehumidification mode, it controls the Compressors to the Suction (Saturation) Temperature Setpoint.
- In Heating mode, the RSMD modulates and stages the compressors to maintain a given Supply Air Temperature Setpoint.
- Modulates the Condenser Fan or Valve to maintain the Head Pressure Setpoint.
- Provides alarms and safeties for the compressor and condenser operation.
- Allows connection of the Modular Service Tool SD to the module when required communication wire is run to the VCCX2 Controller.
- Provides a 2 x 8 LCD character display and 4 buttons that allow for status of system operation, system setpoints, system configurations, sensors, and alarms, and to change the module's address, if necessary.

Mounting

The RSMD Module is housed in a plastic enclosure. It is designed to be mounted by using the 3 mounting holes in the enclosure base. It is important to mount the module in a location that is free from extreme high or low temperatures, moisture, dust, and dirt. Be careful not to damage the electronic components when mounting the module.

Technical Data		RSMD Module	
Operating Power	18-30 VAC	Power Consumption	18 VA Maximum
Operating Temp	-30°F to 150°F	Operating Humidity	0-95% RH Non-Condensing
Communications	E-BUS	Weight	8 oz.
One Year Warranty		**AAON reserves the right to change specifications without notice**	

MHGRV-X Controller

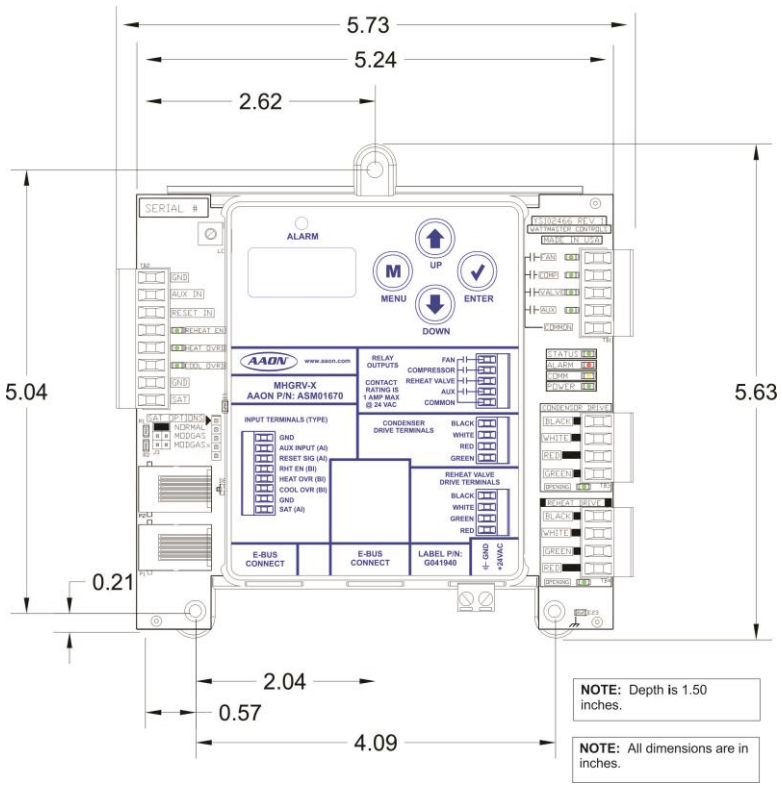
ASM01670 ALT-REF number OE377-26-00059

Description

The MHGRV-X Controller is designed to control a Modulating Hot Gas Reheat Valve to maintain a desired Supply Air Temperature during Dehumidification. The controller can be used as a stand-alone controller or it can be connected to and used in conjunction with the AAON Factory Packaged HVAC unit controller. The MHGRV-X controller is connected to the HVAC unit controller via a modular expansion cable and corresponding connectors on the controllers.

Additional Features

- Can Be Operated as a Stand-Alone Controller or Integrated with the HVAC Unit Controller
- Provides for Supply Air Temperature Setpoint Reset When Required
- Second Stage Reheat Capability When Using 2 Hot Gas Reheat Valves
- Control of Reheat Solenoid Valve to Provide Coil Flushing for Positive Refrigerant Oil Return
- Contains a 2 x 8 LCD character display and 4 buttons that allow for status display, setpoint changes, and configuration changes.



Mounting

The MHGRV-X Controller is housed in a plastic enclosure. It is designed to be mounted by using the 3 mounting holes in the enclosure base. It is important to mount the module in a location that is free from extreme high or low temperatures, moisture, dust, and dirt. Be careful not to damage the electronic components when mounting the module.

Technical Data		MHGRV-X Controller	
Operating Power	18-30 VAC	Power Consumption	18 VA Maximum
Operating Temp	-30°F to 150°F	Operating Humidity	0-95% RH Non-Condensing
Communications	E-BUS	Weight	1 lb.
One Year Warranty		**AAON reserves the right to change specifications without notice**	

E-BUS Digital Room Temperature & Humidity Sensor

ASM01820 ALT-REF number OE217-03

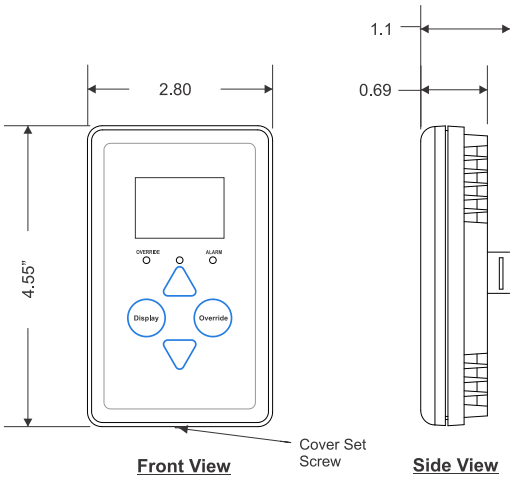
Description

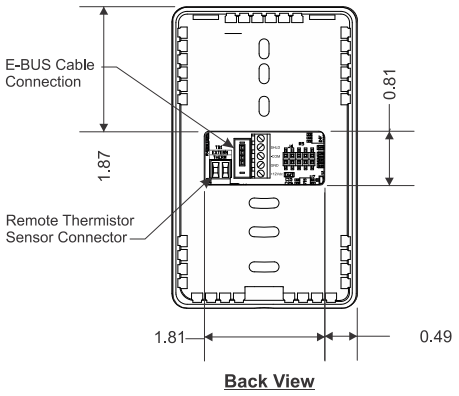
The Touch Screen E-BUS Digital Room Sensor is a combination Space Temperature & Space Humidity Sensor and can be used with the VCCX2, VCB-X, and various other AAON Unit Controllers.

Additional Features

- User Friendly Graphical LCD Display with LED Backlight
- Displays the Current Space and Outdoor Air Temperature
- Displays the Current Space Humidity and Outdoor Air Relative Humidity
- Displays the current Zone Setpoint Temperature
- Equipped with Push Buttons for Changing the Zone Setpoint Temperature
- Equipped with an Override Button for Forcing the Unit Controller into Occupied Operation from Unoccupied Operation
- Provides graphics to indicate the mode of operation
- Provides LEDs to indicate Schedule Override, Button Push, and Alarms

The sensor connects to the controllers using E-BUS cables of multiple lengths connected between the controller and the sensor. The E-BUS cables should not run in conduit with other AC line voltage wiring or with any conductors carrying highly inductive loads.





Mounting

The Digital Room Sensor is designed to be mounted to a vertical, 2” x 4” electrical box recessed in the wall. If the wall cannot be penetrated, a plastic surface mount box such as those made by Wiremold™, may be used to mount the sensor to the wall surface. The Sensor is mounted by removing the front cover and fastening the housing base to the electrical box using the supplied (2) 6-32” x 1” machine screws. The E-BUS cable is then plugged into the E-BUS connector located on the circuit board that is mounted on the cover. The cover is then placed onto the housing base and the Allen Screw on the bottom of the base is adjusted to hold the cover in place. An additional cover plate is provided in case the sheet rock cut-out is too large to be covered by the regular back plate.

Technical Data		**E-BUS Digital Room Temperature & Humidity Sensor**	
Sensor Element	Digital Sensing Device	Display	112 x 64 Monochrome Graphical LCD w/LED Backlight
Sensor Reading Range	40°F to 120°F RH = 0-100%	Connection	E-BUS
Ambient Temperature Limits	-40°F to 180°F	Weight	3.2 oz.
Accuracy	RH +/- 3%, Temp +/- .8°F		
One Year Warranty		**AAON reserves the right to change specifications without notice**	

Duct Temperature Sensors

G051240 & G051250 ALT-REF number OE230 & OE231

Description

The Duct Temperature Sensors are 10K Ohm Type III Thermistor Sensors. The Sensors are used for sensing Supply or Return Air Temperatures. The G051240 Temperature Sensor is 6” in length and the G051250 Temperature Sensor is 12” in length.

NOTE: Location of the Sensors is very important in order to obtain accurate temperature readings.

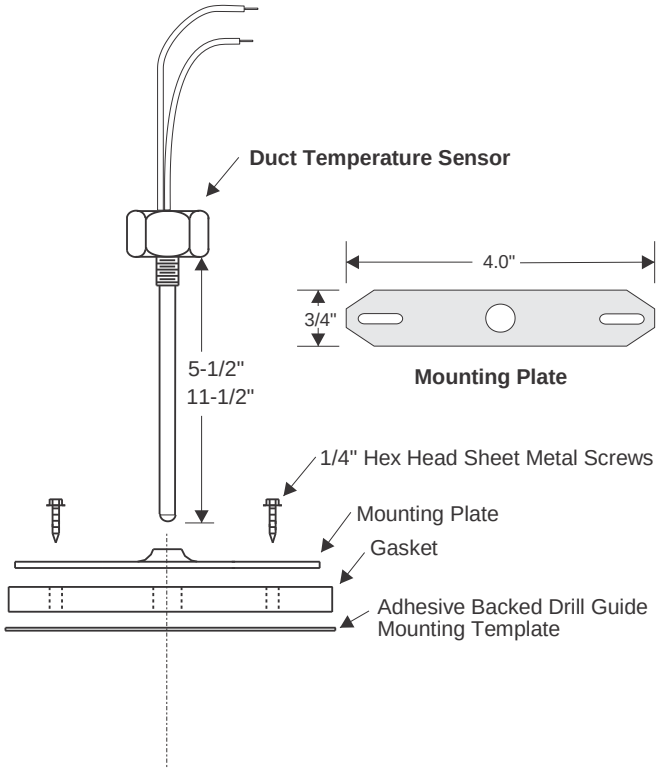
The following recommendations should be followed:

Supply Air Temperature Sensor

When used as a Supply Air Sensor, the Sensor should be mounted in the Supply Air Duct as close to the HVAC Unit as possible for best results. For best accuracy, apply insulation on the outside of the ductwork over the Sensor. This will help thermal gradients from affecting the Sensor.

Return Air Temperature Sensor

When used as a Supply Air Sensor, the Sensor should be mounted in the Return Air Duct as close to the HVAC Unit as possible for best results. For best accuracy, apply insulation on the outside of the ductwork over the Sensor. This will help thermal gradients from affecting the Sensor.



Mounting

The Duct Temperature Sensor is designed to be mounted to the ductwork using the adhesive backed drill guide mounting template to drill a 5/16” hole in the ductwork for the probe. Place the gasket over the ductwork and then attach the mounting plate using the ¼” Hex Head Sheet Metal Screws (provided). Thread together the Duct Temperature’s Probe to the mounting plate.

Technical Data		Duct Temperature Sensors	
Sensor Element	Type III Thermistor 10K ohm @ 77°F	Operating Temperature Range	-10°F to 200°F
Accuracy	Temp +/- 1.26°F between 40°F and 90°F	Weight	6” - 2.3 oz. 12” - 2.9 oz.
One Year Warranty		**AAON reserves the right to change specifications without notice**	

EBC E-BUS Cables

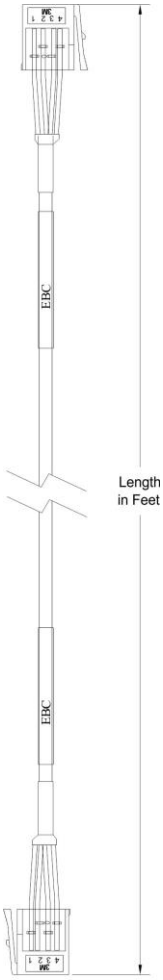
P/N: VARIES ALT-REF number EBC-XXF

Description

The EBC E-BUS Cables are used to connect power and communications between the VCCX2, VCB-X, various other AAON Unit Controllers, E-BUS Modules, and E-BUS Sensors.

The EBC E-BUS Cables are plenum-rated high flex wire cables with an EBC Connector on each end of the cable. The EBC E-BUS Cables are available in 1.5, 3, 10, 25, 50, 75, 100, 150, and 250 foot lengths and additionally a 1000-foot-long spool. These lengths should satisfy most job requirements. For length requirements other than those listed, the E-BUS Adapter Hub can be used to connect EBC E-BUS Cables together to provide for your specific-length requirements.

The plug-in design of the EBC E-BUS Cables eliminates costly wiring errors and makes system installation easy. The cable components are all UL approved.



CABLE SIDE VIEW

E-BUS CABLE

Technical Data		EBC E-BUS Cables	
EBC E-BUS Cable Available Lengths and Part Numbers	G029440 (1.5 Foot) G012870 (3 Foot) G029460 (10 Foot) G045270 (25 Foot) G029510 (50 Foot) G029530 (75 Foot) G029450 (100 Foot) G029470 (150 Foot) V36590 (250 Foot) G018870 (1000 Foot)	Current Rating of Cable Wire	300 Vrms Min = 10.15 Ohms per 1000 feet @ 20 Deg Celsius, Nominal
Cable Type	Plenum-rated High Flex Wire	Wire Colors	Red/Black First Pair; White/Blue Second Pair
Wire Size	19 Strands of 32 Gage Wire, 4 Conductor	UL Listing No.	CMP/CL3P/FPLP
Terminations	Cable – 2 EBC Connectors	Cable Sheath Color	White, Plenum Rated CL3P/CMP
One Year Warranty		**AAON reserves the right to change specifications without notice**	

Static Pressure Transducer

The OE271 Static Pressure Transducer plugs directly into the VCC-X Controller's Static Pressure port. The Duct Static Pressure Sensor reading is used to determine current Duct Static Pressure. This Static Pressure reading is used to control the output signal supplied to the Supply Fan VFD or Zoning Bypass Damper Actuator. If you have configured the HVAC unit for Constant Volume operation, this Sensor is optional. If it is installed on a Constant Volume unit, it will not affect operation, but rather will be used as a status-only reading. See **Figure 19, below** for detailed wiring.

CAUTION: It is strongly recommended that you use pneumatic tubing instead of relocating the sensor. Extending the wires could cause voltage drop problems.

RTU 1-8 Only

*Sensor is mounted/wired by the manufacturer.
*Installing contractor is responsible for furnishing tubing for proper location of pressure measurement.

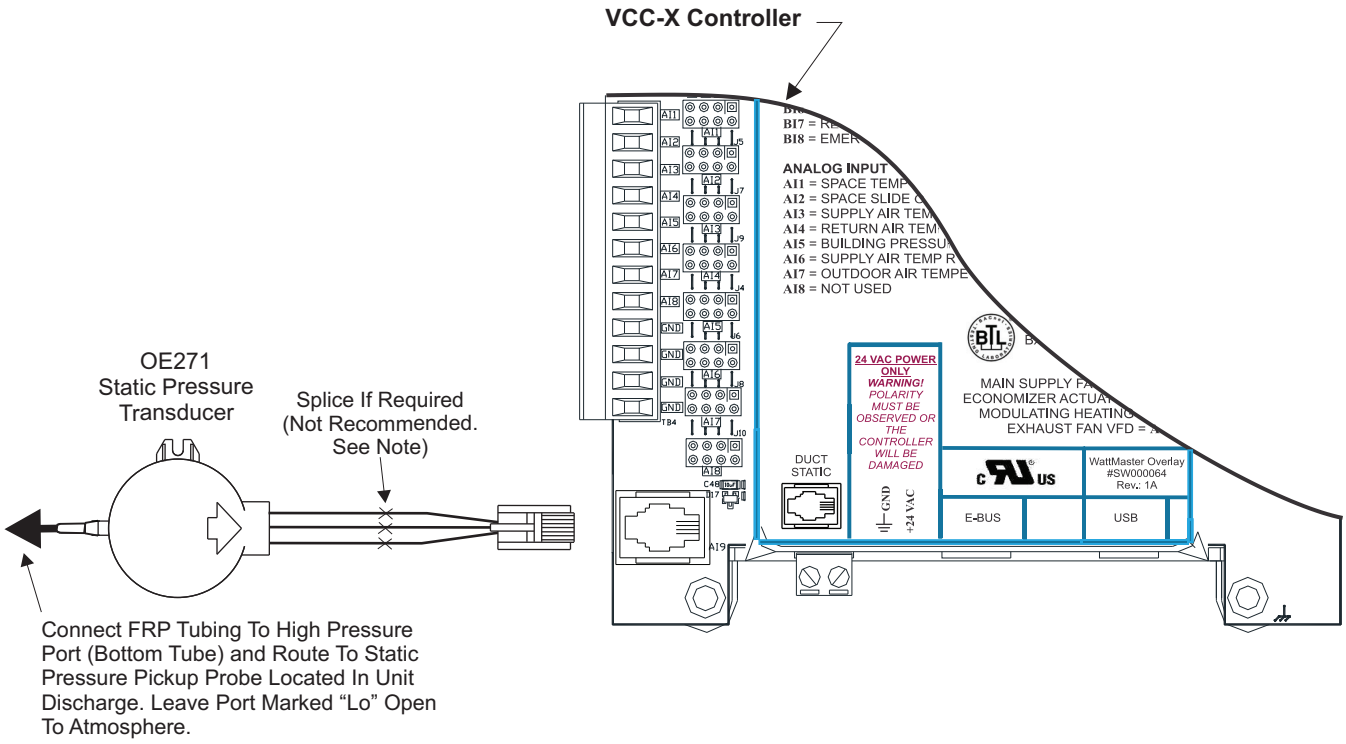


Figure 19: OE271 Static Pressure Transducer Wiring Diagram

Building Pressure Sensor Wiring

Building Pressure Sensor

The OE258-01 Building Static Pressure Sensor must be wired as shown in **Figure 14, below**. There are 3 terminal connections on the Building Pressure Sensor. Connect the power side of the 24 VAC power source to the terminal labeled "+ EXC." Connect the GND side of the 24 VAC power source to the terminal labeled "- COM." Connect the remaining terminal labeled "OUT" to AIN5 on the VCC-X Controller.

WARNING: It is very important to be certain that all wiring is correct as shown in the wiring diagram below. Failure to observe the correct polarity will result in damage to the HVAC Unit Controller, Building Pressure Sensor, and the VCC-X Controller.

*Sensor is mounted/wired by the manufacturer.
*Installing contractor is responsible for furnishing tubing for proper location of pressure measurement.

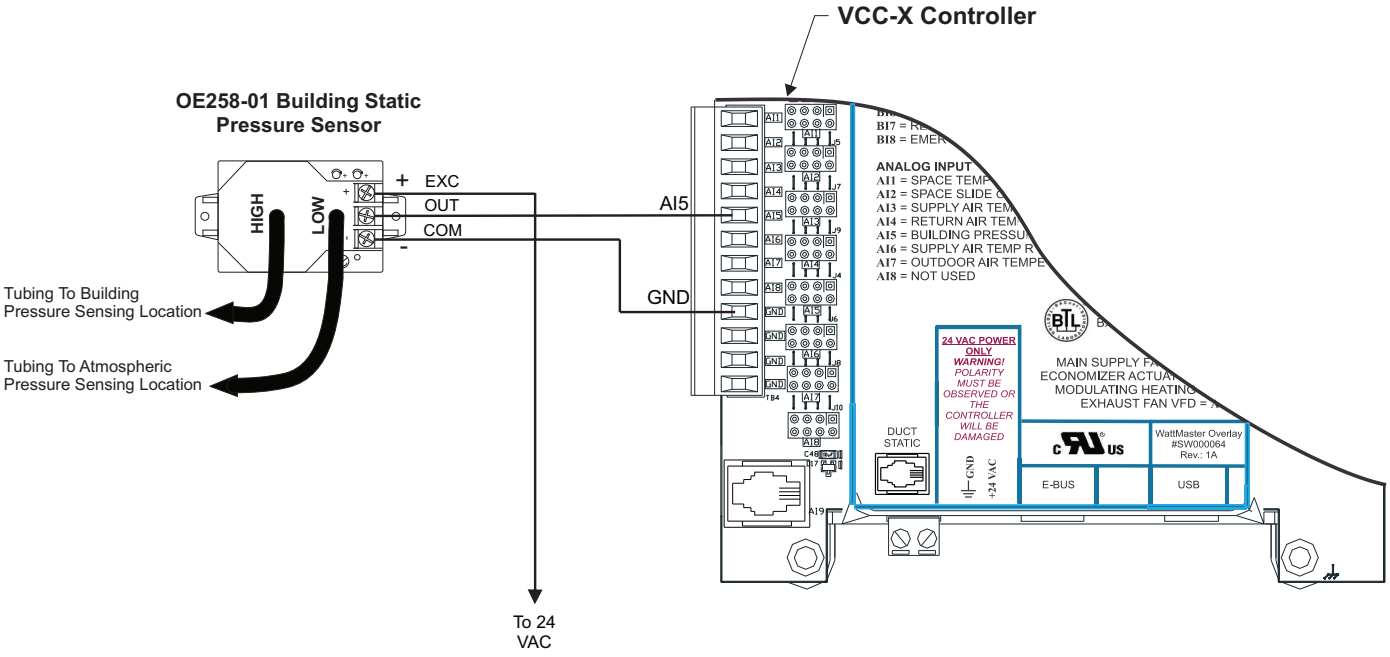


Figure 14: OE258-01 Building Pressure Sensor Wiring Diagram

Duct Static Pressure Sensor

ASM01640 ALT-REF number OE271

Description

The Duct Static Pressure Sensor senses differential or gauge (static) pressures and then converts this pressure difference (differential) to a proportional electrical output that then corresponds to 0 to 5 inches or WC pressure. The sensor can be used in Duct Static Pressure sensor applications and VAV Pressure Independent Airflow sensor applications.

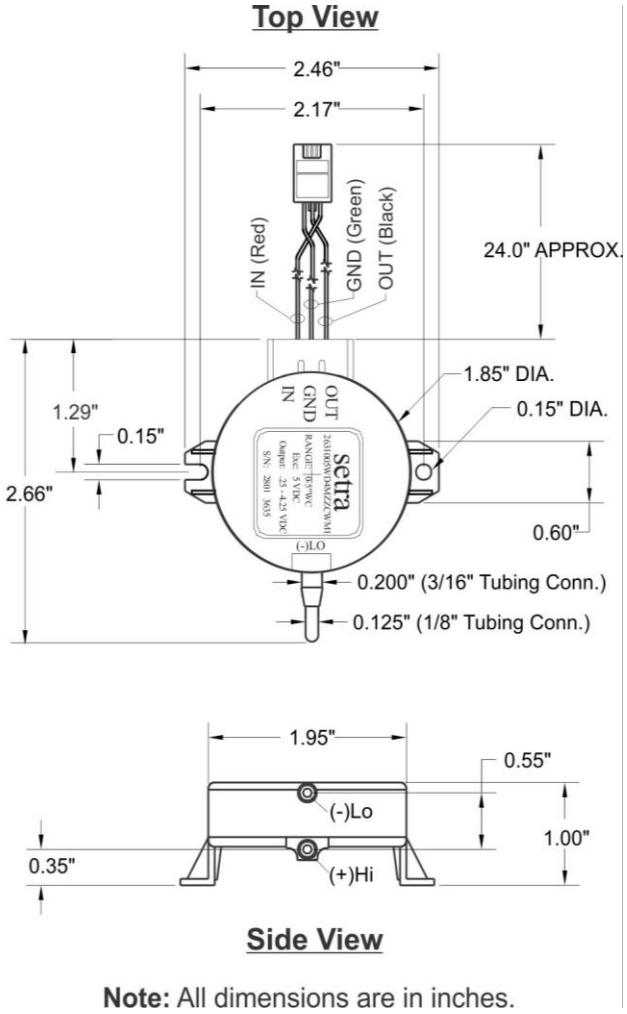
Warning: The plastic housing on the sensor is electrically conductive. Avoid contact with any electrical components. It is acceptable to mount the sensor on grounded sheet metal such as ductwork, electrical panels, etc.

Mounting

The Airflow Sensor should be mounted in a vertical position as shown with tubing connections pointing down. If this mounting position is not possible in your application, it may be mounted in a horizontal position. When mounted in a horizontal position, accuracy will be affected by approximately 2% full scale null shift due to diaphragm gravity effect error.

When the ASM01640 is used as a Duct Static Pressure Sensor, the sensor should be located near the controller, with the modular plug on the sensor directly connected to the mating controller jack. Tubing must be run from the sensor to the Static Pressure Pickup Tube. Tubing should not exceed 250 ft. and must be continuous without any splices.

When the ASM01640 is used as an Airflow Sensor for VAV applications, it should be mounted in the VAV Box control enclosure near the box controller board. The modular plug should be connected to the VAV Controller Board connection. Tubing must be run from the sensor to the Airflow Pickup Probe tubing connection.



Note: All dimensions are in inches.

Technical Data		Duct Static Pressure Sensor	
Operating Temperature	20°F to 150°F	Connection	24” Cable Leads with 4 position RJ22 Modular Plug
Accuracy RSS* (at constant temp)	±1.0% @ FS	Current Consumption	5 mA
		Weight	3 oz.
One Year Warranty		**AAON reserves the right to change specifications without notice**	

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Duct Static Pressure Pick Up Tube

ASM02242 ALT-REF number OE290

Description

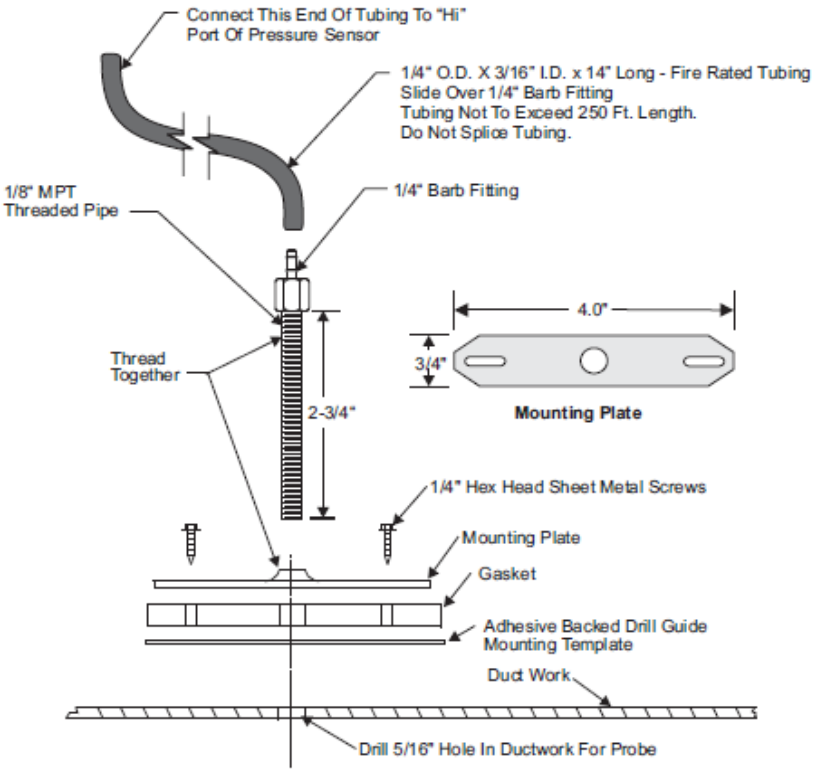
The Duct Static Pressure Pickup Tube is supplied with a 14” long FRP tubing for connection to the Duct Static Pressure Sensor. It also includes gasketed mounting bracket and screws for securing to the ductwork.

Mounting

The Static Pressure Sensor is designed to be mounted Adjacent to the location where the Static Pickup Tube Is mounted and wired back to the controller board.

The Static Pressure Sensor can also be mounted close to the controller board and tubing (By Others) routed from the sensor to the Static Pickup Probe. Be sure not to kink the tubing between the Static Pickup Probe and the Static Pressure Sensor.

In order to obtain accurate Static Pressure readings, the Static Pressure Pickup Probe should be mounted per the following recommendations:



- The probe should be mounted in a straight section of ductwork approximately 2/3 the length of the supply duct, downstream of the HVAC unit.
- The probe should not be mounted less than 3 duct diameters downstream or not less than 2 duct diameters upstream of any elbow or takeoff.

NOTE: Tubing is not to exceed 250 feet in length. Do not splice tubing.

Technical Data		**Duct Static Pressure Sensor Pick-Up Tube**	
Hose Barb Fitting	¼” O.D.	Tubing Dimensions	¼” O.D. x ¾” I.D. x 14” Long
One Year Warranty		**AAON reserves the right to change specifications without notice**	

OE258 – Building Pressure Sensor

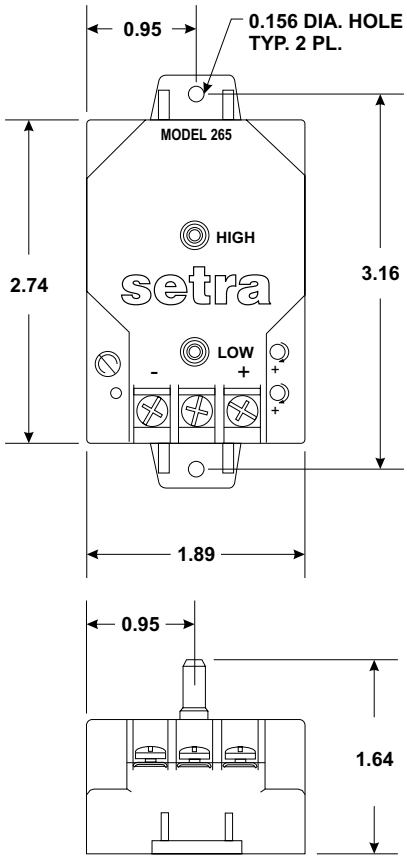
Description

The OE258 Building Static Pressure Sensor is used to sense building pressure in applications where monitoring of the building static pressure is required to insure the building maintains the proper air pressurization.

The OE258 Building Pressure Sensor case is molded from fire retardant glass filled polyester. The sensor utilizes a tensioned stainless steel diaphragm and insulated stainless steel electrode. This arrangement allows up to 10 PSI overpressure without damage to the unit. The sensor provides a 0.0 to 5.0 VDC output in response to a –0.25 to +0.25 inch WC pressure differential. Accuracy is ± 1% of full scale of the sensor.

For easy wiring the OE258 Building Static Pressure Sensor has (3) 6-32 screw terminal wiring connectors. The sensor has (2) ¼" barbed fittings provided for the connection of tubing to the high and low pressure ports.

The OE258 Static Pressure Sensor is designed to be mounted to a flat surface by means of the (2) 0.156 diameter holes provided in the sensor casing. For accurate readings the sensor must be mounted in a vertical position.



Technical Data		OE258 - Building Static Pressure Sensor	
Operating Pressure Range	-0.25" WC to +0.25" WC Pressure Differential	Power Input Signal Output	9-30 VDC 0 to 5 VDC
Operating Temp	0°F to 150°F	Hysteresis	± 0.1% of full scale
Circuit	3 Wire	Non-repeatability	± 0.05% of full scale
Accuracy	± 1% of full scale	Weight	3 ounces
Three Year Warranty		WattMaster reserves the right to change specifications without notice	

Condensate Drain Piping

6-25 and 30 ton units are equipped with one condensate drain pan connection on the right side of the unit. 26 and 31-140 ton units are equipped with two condensate drain connections, one on the left side of the unit and one on the right side of the unit. P-traps must be field provided and installed.

All drain connections must be used and individually trapped to ensure a minimum amount of condensate accumulation in the drain pans. Use ABS type cement to join the drain pipe connections.

Note: The drain pan connections are 1" MPT fitting for 6-50, 60, and 70 tons (A-D Cabinet sizes).The drain pan connections are 1.5" MPT fitting for 55,65, 75-140 tons (E Cabinet size). Drainage of condensate directly onto the roof may be acceptable in certain areas, refer to local codes. If condensate is to drain directly onto the roof, place a small drip pad below the drain to protect the roof from possible damage.

If condensate is piped into the building drainage system, the drain pipe must penetrate the roof external to the unit itself. The drain line must be pitched away from the unit at least 1/8 inch per foot. On longer runs an air break must be used to ensure proper drainage.

Draw-through cooling coils will have a negative static pressure in the drain pan area. This will cause an un-trapped drain to back up due to air being pulled up through the condensate drain piping.

Condensate drain trapping and piping must conform to all applicable governing codes.

⚠ CAUTION

Unit must not be operated without a p-trap. Failure to install a p-trap may result in overflow of condensate water into the unit.

⚠ CAUTION

All condensate drains must be trapped individually before they are connected to a common line.

⚠ CAUTION

All condensate drain connections must be used. Drain pans are sloped towards connections.

Draw-Through Coils

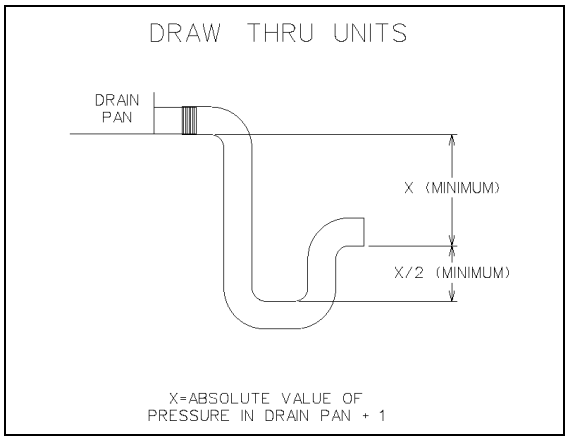


Figure 29 - Draw-Through Drain Trap

The X dimension on the draw-through trap must be at least equal to the absolute value of the negative static pressure in the drain pan plus one inch. To calculate the static pressure at the drain pan add the pressure drops of all components upstream of the drain pan, including the cooling coil, and add the return duct static pressure. Include the dirt allowance pressure drop for the filters to account for the worst-case scenario.

The height from top of the bottom bend of the trap to the bottom of the leaving pipe must be at least equal to one half of the X dimension. This ensures that enough water is stored in the trap to prevent losing the drain seal during unit startup

Note: The absolute value of the fan inlet pressure will always be greater than or equal to the absolute value of the static pressure in the drain pan on draw-through units, so the fan inlet pressure is a safe value to use for the drain pan static pressure.

Table 11 - Draw-Through Drain Trap Dimensions

Draw-Through		
Drain Pan Pressure	Trap Dimensions	
Negative Static	X	X/2
(inches of water)	(inch)	(inch)
-0.50	1.50	0.75
-1.00	2.00	1.00
-1.50	2.50	1.25
-2.00	3.00	1.50
-2.50	3.50	1.75
-3.00	4.00	2.00
-3.50	4.50	2.25
-4.00	5.00	2.50
-4.50	5.50	2.75
-5.00	6.00	3.00
-5.50	6.50	3.25
-6.00	7.00	3.50
-6.50	7.50	3.75
-7.00	8.00	4.00
-7.50	8.50	4.25
-8.00	9.00	4.50

C = Comply
D = Deviate
E = Exception

Document Information

Title and Number

Document Title	Document No.
Section 237413 - Commercial Packaged Rooftop Units	800-020939-001

Revision History

Rev	Alias	Change Description	BOD SIM #	Date
000	Sean Abbott	Initial Release		7/10/2015
001	Sean Abbott	Add SCCR for RTU		10/02/2017
002	Nic LeDuc	Revised format per consultant (DLR) effort.		10/28/2019
003	Byron Cervantes	Clarified requirements for seismic and wind restrains. Other minor updates.		12/04/2020
004	Byron Cervantes	Added post-construction cleaning requirements for rooftop units. **This section is only required for sites with VAV systems.**		06/04/2021
005	Byron Cervantes	Deleted reference to specification 220510		10/25/2021
4Q2021	Byron Cervantes	Revised minimum SCCR to 22 kAIC. Added submittal and approval requirements for “undesirable features”.		12/03/2021

Related Documents

Document Title	Description	Location
Mechanical Design Standard	Basis of Design	800-000051

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product complies with all applicable laws, codes, and requirements. Where local material availability or construction methods provide a more efficient method to achieve the same intent, submit a deviation request to Amazon.

SECTION 237413 – COMMERCIAL PACKAGED ROOFTOP UNITS

PART 1 - GENERAL

1.1 APPLICABLE REQUIREMENTS

C A. All work to be furnished and installed under this section shall comply with all the requirements of General Conditions, Supplemental Conditions, Division 01 - General Requirements, Section 230500 " HVAC Basic Materials and Methods", and other Sections in Division 23 specified herein.

1.2 SCOPE

C A. All work to be furnished and installed under this Section shall include, but not necessarily be limited to, the following:

1. Commercial packaged rooftop units, 30 tons or less.

1.3 RELATED SECTIONS

A. Section 220500: Plumbing Basic Materials and Methods.

B. Section 230500: HVAC Basic Materials and Methods.

C. Section 230548: Vibration and Seismic Design for Mechanical Systems

D. Section 230598: Testing, Adjusting, and Balancing.

E. Section 230902: Variable Frequency Drives.

F. Section 233113: Air Distribution System.

G. Division 26: Electrical.

1.4 PERFORMANCE REQUIREMENTS

C A. Wind-Restraint Loading:

1. See Structural Drawings.

C B. Seismic-Restraint Loading:

1. See Structural Drawings.

1.5 SUBMITTALS

C A. Submit in accordance with Sections 230500 and 013300. Only complete submittal packages, which include all required drawings, calculations, and product data sheets, shall be submitted for approval. Partial submittal packages may be returned to sender without being reviewed. All submittals shall include a statement of "undesirable features" per the Quality Assurance article in this Section and Section 230500 "HVAC Basic Materials and Methods."

C B. Product Data: Submit manufacturer's technical product data for each commercial packaged rooftop unit showing dimensions, weights, capacities, ratings, fan performance with operating point clearly indicated, motor electrical characteristics, and finishes of materials, installation instructions, and sound and vibration data.

C C. Shop Drawings: Submit shop drawings showing unit dimensions, weight loadings, required clearances, field connection details, wiring and control diagrams (as appropriate) and methods of support.

C D. Maintenance Data: Submit maintenance instructions, including instructions for lubrication, filter replacement, and spare parts lists. Include this data, product data, shop drawings, and wiring diagrams in operating and maintenance manuals.

C E. Test Reports: Submit field start up report.

1.6 PROJECT RECORD DOCUMENTS

C A. Submit under provisions of Section 230500 "HVAC Basic Materials and Methods."

1.7 QUALITY ASURANCE

C A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C B. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety code for Mechanical Refrigeration."

C C. Energy-Efficiency Ratio: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings" or as scheduled.

D D. IEER: Equal to or greater than scheduled value.

No IEER in the schedule

C E. ARI Certification: Units shall be ARI certified and listed.

C F. ARI Compliance for Units with Capacities 135,000 Btuh and More: Rate rooftop air-conditioner capacity according to ARI 340/360, "Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment."

C G. Sound Power Level Ratings: Comply with ARI 270, "Sound Rating of Outdoor Unitary Equipment."

C H. Undesirable features: The following features are prohibited in all systems and equipment. Where local codes or regulations require such features, and wherever equipment or systems may be proposed for installation that include these features, the supplier shall clearly identify the undesirable features in all submittals both prior to contract award and during the execution of the contract. The supplier shall provide justification describing why the undesirable feature is required, and the proposed mitigation actions that are in place to minimize the risk that they impose. Where code is the justification for their inclusion, a specific reference to the code or regulation shall be provided. The following features shall not be included in the project without proper justification and the Owner's prior written approval:

1. Any pushbutton or other feature on the exterior of the equipment, not used as part of normal operation of the equipment, that could be subject in inadvertent operation leading to the equipment not being in its normal operating state (e.g. an EPO required to be installed by local code or regulation).
2. Any unprotected pushbutton within a panel that could be subject to inadvertent operation (e.g. a pushbutton on a relay)
3. Any un-monitored device within a piece of equipment that does not raise an alarm when in a failed or isolated state (latent defect)
4. Any non-password protected HMI that could be used to change critical equipment parameters.
5. Programming ports that are enabled with non-password protected write access.
6. Any non-key or password protected feature that can take the equipment out of normal automatic operation without raising an alarm (triggering an alarm point that is specifically called out to be monitored by AWS control systems – e.g. individual alarms do not need to be added to AWS interface if common alarm is triggered)
7. Earth leakage circuit breakers / Ground Fault Interrupters within critical equipment control panels
8. Any non-standard trip function.
9. Any external input (i.e. controls interface) that could take the equipment out of normal state that is not specifically called for in the specification.
10. Devices with built in Bluetooth, Wi-Fi or Zigbee (and similar Wi-Fi protocols).
11. Devices with built in Modems (and similar devices).
12. Devices that include a built-in camera and/or microphone within the equipment (e.g. HMIs).
13. Any other feature that is included within the equipment that is not required by the specification, but whose operation could take the equipment out of its normal operating state (e.g. self-test facilities).

1.8 COORDINATION

A. Coordinate work under provisions of Section 230500 “HVAC Basic Materials and Methods.”

B. Coordinate the work with the structural system, and above ceiling installations of other trades.

1.9 WARRANTY

A. Special Warranty: Manufacturer’s standard form in which manufacturer agrees to replace components of rooftop air conditioners that fails in materials or workmanship within specified warranty period.

C 1. Warranty Period for Compressors: Manufacturer’s standard, but not less than five years from date of Substantial Completion.
C 2. Warranty Period of Heat Exchangers: Manufacturer’s standard, but not less than five years from date of Substantial Completion.
C 3. Warranty Period for Controls Boards: Manufacturer’s Standard, but no less than five years from date of Substantial Completion.
C 4. Warranty Period for Variable-Speed Fan Motors: Manufacturer’s Standard, but no less than five years from date of Substantial Completion.

1.10 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

No belt Driven Fans D 1. Fan Belts: One set for each belt-drive fan.
C 2. Filters: One set of filters for each unit.

PART 2 - PRODUCTS

2.1 MANUFACTURES

C A. Manufactures: Subject to compliance with requirements, provide products by one of the following:

1. Commercial Packaged Rooftop Units:

a. Trane Company (The).
b. Aaon.
c. Or Approved Equal.

2.2 COMMERCIAL PACKAGED ROOFTOP UNITS

C A. Description: Factory assembled and tested: designed for exterior installation; consisting of supply fan, filter bank, economizer, dampers, evaporation, coil, heating coil, compressors, refrigerant condenser coil, refrigeration and temperature controls.

D B. Casing: Manufacturer's standard single-wall galvanized sheet metal construction with exterior enamel paint finish, double wall insulated hinged access doors with neoprene gaskets for inspection and access to internal parts, minimum ½ inch-thick thermal insulation on casing, exterior condensate drain connection, and lifting lugs.

Double wall construction

D C. Supply Fan: Double width, double inlet, forward curved or airfoil, centrifugal fans. Belt driven with motor sheaves, grease-lubricated ball bearings, and motor. Mount fan and motor assembly on base with spring isolators having 2-inch deflection.

Direct driven / Backward curved

D D. General electrical: Manufacturer shall provide equipment rated for available short circuit current (SCCR) of 22,000 Amps.

SCCR 10,000 Amps as per the schedule

E. Motors and drives:

C 1. Motors shall be NEMA Premium Efficiency per NEMA Standards Publication MG 1-2003, Table 12-12 and 12-13; drip-proof motors with temperature rise not greater than 40 degrees C above ambient temperature.

D 2. Belt drive assemblies shall be capable of 150% of the motor rated horsepower on one less than the total number of belts required, for belt drives with two or more belts. All drives shall have adjustable sheaves to allow adjustment of ±20%.

Direct driven

C F. Variable Frequency Drives:

1. See Section 230902 "Variable Frequency Drives."

C G. Condenser Fans: Propeller type, directly driven by permanently lubricated motor, with built-in thermal overload protection.

C H. Refrigerant Coils: Aluminum-plate fin and seamless copper tube in galvanized-steel casing with equalizing-type vertical distributor and thermal expansion valve; tested to pressure 450 psig and leak tested to 225 psig with air under water. Insulate coil section. Provide stainless-steel drain pan under coil.

C I. Compressor(s): Hermetic scroll compressors with integral vibration isolators, internal over current and over temperature protection, internal pressure relief, and crankcase heater(s).

C J. Refrigeration System:

1. Compressors.
2. Outside condenser coils and fans.

C 3. Interior evaporator coil with interlace circuits.
Not a Heat Pump E 4. Four-way reversing valve and suction line accumulator.
C 5. Check valves.
C 6. Expansion valves with replaceable thermostatic elements.
C 7. Refrigerant dryers.
C 8. High-pressure switches.
C 9. Low-pressure switches.
C 10. Thermostats for coil freeze-up protection during low ambient temperature operation or loss of air.
C 11. Independent refrigerant circuits.
C 12. Brass service valves installed in discharge and liquid lines.
C 13. Charge of refrigerant.
C 14. Refrigerant Circuits: Interlaced refrigerant-coil circuiting with circuits per schedule.
C 15. Compressor Motor Overload Protection: Manual reset.
C 16. Anti-recycling Timing Device: Prevents compressor restart for five minutes after shutdown.
C 17. Head-Pressure Control: Designed to cycle outside condenser fans to control head pressure.
C 18. Oil-Pressure Switch: Designed to shut down compressors on low oil pressure.

C K. Pre-Filters: 2-inch-thick, MERV 8, fiberglass, throwaway filters in side access in filter rack. Provide Farr 30/30, or approved equal.

D L. Electric Heat: Helix-wound, nickel-chrome, electric-resistance elements, factory wired to main AHU power connection panel; with time delay for element staging, and over current and over heat protective devices; control in stages as scheduled. Electric heat modules shall be UL or CSA certified. <Editor's note – in California the climate may be so mild that heat is not required, however if it is required note that resistance heat is not permitted by the energy code. The designer must select a heat pump option instead>

SCR controls Heater no stages

C M. Economizer dampers: Return and outside-air dampers with neoprene seals, and OSA intake hood with bird screen.

1. Damper Motor: Fully modulating spring return with adjustable minimum position.
C 2. Control: Electronic-control system uses mixed-air temperature and selects between outside-air and return-air temperature to adjust mixing dampers to minimum position.
Not California E 3. <In California only> Provide dampers with controls feedback for fault detection diagnostics.
D 4. Ultra low leak dampers shall be provided with chlorinated polyvinyl chloride gasketing on the damper blades with a rolled stainless steel jamb seal at the top and bottom of the damper blades. Ultra low leak economizer dampers shall have a leakage rate of one percent based on test data completed in accordance with AMCA Standard 575 at AMCA Laboratories.

Leakage rate in accordance to AMCA 511

C N. Power Connection: Provide for single connection of power to unit with control-circuit transformer with built-in circuit breaker. Provide a non-fused disconnect at the point of

connection complying with NEC and authorities having jurisdiction. Power connection shall be through base of unit and roof curb.

O. Unit Controls:

C 1. General: Microprocessor controls shall be provided for all 24 volt 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.

C 2. Variable Air Volume controls with Variable Frequency Drive: Provide variable air volume supply air temperature control with variable frequency drive. Provide all necessary controls to operate a VAV rooftop from supply air temperature including microprocessor controller and supply air sensor. The microprocessor shall coordinate the economizer control and stages of cooling with supply air temperature reset capability based upon OA drybulb temperature. Variable frequency drive shall be factory installed and tested to provide supply fan motor speed modulation based upon the supply air static pressure setpoint.

C a. The following setpoints shall be accessible in the unit control panel: supply air cooling setpoint, morning warmup setpoint, reset setpoint, reset amount, static pressure setpoint, and static pressure deadband.

C b. Compensated Outside Air Control - shall be provided to control outside air damper positioning, maintaining minimum outside air requirements, during operation of variable air volume (VAV) systems.

C P. Unit Mounting: Contractor to provide a suitable curb for mounting, either pre-manufactured or field-built. Seismic attachment shall be fasteners drilled through the floor of the unit into the tube steel. Fasteners and their installation shall be provided by the installing contractor.

Q. Accessories:

C 1. Provide one spare set of filters.

C 2. Provide one duplex, 115v GFCI outlet with 15 amp overcurrent protection. Outlet to be powered off unit with integral transformer.

C 3. Provide one spare set of belts for fan.

R. Start- Up Service: See requirements under part 3 below.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install unit level and plumb, maintaining manufacturer's recommended clearances. Install according to AHRI Guideline B.

C B. Contractor shall engage a Licensed Structural Engineer for the design of anchorage and seismic/wind restraints for packaged rooftop unit to withstand all required wind and seismic forces.

C. Installation of packaged rooftop units shall comply with requirements for vibration isolation and seismic control devices per Section 230548 "Vibration and Seismic Design for Mechanical Systems."

D. Curb Support: Install roof curb on roof structure, level and secure, according to AHRI Guideline B. Install and secure rooftop air conditioners on curbs and coordinate roof penetrations and flashing with roof construction.

3.2 ACCESSORIES

A. Duct installation requirements are specified in other Division 23 Sections. Drawings indicate the general arrangement of ducts. The following are specific connection requirements.

1. Connect supply and return ducts to rooftop unit with flexible duct connectors specified in Section 233113 "Air Distribution".

B. Electrical System connections: Comply with applicable requirements in Division 16 Sections for power wiring, switches, and motor controls.

C. Ground equipment according to Division 16.

D. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Reports results in writing.

B. Perform the following field quality-control tests and inspections and prepare test reports:

1. After installing rooftop air conditioners and after electrical circuitry has been energized, test units for compliance with requirements.
2. Inspect for and remove shipping bolts, blocks, and tie-down straps.

3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

B. Complete installation and startup checks according to manufacturer's written instructions and do the following:
1. Inspect for visible damage to unit casing.
2. Inspect for visible damage to compressor, air-cooled outside coil, and fans.
3. Inspect internal insulation.
4. Verify that labels are clearly visible.
5. Verify that clearances have been provided for servicing.
6. Verify that controls are connected and operable.
7. Verify that filters are installed.
8. Clean outside coil and inspect for construction debris.
9. Adjust vibration isolators.
10. Inspect operation of barometric dampers.
11. Lubricate bearings on fan.
12. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
13. Adjust fan belts to proper alignment and tension.
14. Start unit according to manufacturer's written instructions.
    a. Start refrigeration system in summer only.
    b. Complete startup sheets and attach a copy with Contractor's start up report.
15. Inspect and record performance of interlocks and protective devices; verify sequences.
16. Operate unit for an initial period as recommended or required by manufacturer.
17. Adjust and inspect high-temperature limits.
18. Inspect outside-air dampers for proper stroke and interlock with return-air dampers.
19. Start refrigeration system and measure and record the following:
    a. Coil leaving-air, dry- and wet-bulb temperatures.
    b. Coil entering-air, dry-and wet-bulb temperatures.
    c. Outside-air, dry-bulb temperature.
    d. Outside-air-coil, discharge-air, dry-bulb temperature.
20. Inspect controls for correct sequencing of heating, mixing dampers, refrigeration, and normal and emergency shutdown.
21. Measure and record the following minimum and maximum airflows. Plot fan volumes on fan curve.

a. Supply-air volume.
b. Return-air volume.
c. Relief-air volume.
d. Outside-air intake volume.

22. Simulate maximum cooling demand and inspect the following:

a. Compressor refrigerant suction and hot-gas pressures.
b. Short circuiting of air through outside coil or from outside coil to outside-air intake.

23. Verify operation of remote panel, and failure modes. Inspect the following:

a. High-limit heat exchanger.
b. Warm-up for morning cycle.
c. Freeze stat operation
d. Economizer to limit outside-air changeover.
e. Alarms.

24. After startup and performance testing, change filters, vacuum heat exchanger and cooling and outside coils, lubricate bearings, adjust belt tension, and inspect operation of power vents.

3.5 ADJUSTING

A. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

B. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to site outside normal occupancy hours for this purpose, without additional cost.

3.6 CLEANING

A. After completing system installation; testing, adjusting, and balancing rooftop unit and air-distribution systems; and completing startup service, clean rooftop unit internally to remove foreign material and construction dirt and dust. Clean fan wheels, casings, dampers, coils, and filter housings, and install new, clean filters.

3.7 DEMONSTRATION

A. Train Owner’s maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.

B. Review data in the operation and maintenance manuals. Refer Section 017700 “Closeout Procedures”.

C. Schedule 4 hours training with Owner, through Architect, with at least 7 days’ advance notice.

END OF SECTION 237413