MIDDLETON ASSOCIATES · INC ARCHITECTS
1702 W. College Ave. Suite E
Normal, IL 61761-2793
p: 309.452.1271
f: 309.454.8049
www.middletonassociates.net

Specification
LINCOLN ELEMENTARY SCHOOL DOAS PROJECT
EDISON ELEMENTARY SCHOOL DOAS PROJECT
MACOMB COMMUNITY SCHOOL DISTRICT #185
323 W WASHINGTON ST., MACOMB, IL 61455
PROPOSAL DUE 10:00 AM - Thursday, June 12, 2025

Middleton Associates Project No. 27350025
Dated may 22, 2025

Proposals will be publicly opened and read at that time and location.

Contractor shall submit with proposal basic descriptive information on included work and excluded work attached to his proposal to describe the design build proposal offered.

Contractor is in charge of directing the work, safety, barricades and all aspects of the means and methods of construction.

BID SECURITY – 5% as Bid Bond or certified or non-cancelable bank check payable to Macomb CUSD 185.

OWNER'S PROTECTIVE BONDS – Labor and Materials and Performance - Not required if proposal is less than $100,000; required if proposal is over $100,000.

INSURANCE –Upon award, Contractor shall provide insurance listing the Owner, Macomb CUSD #185 and the A/E Middleton Associates Incorporated as named insureds or additional insureds.

A. Workman's Comp, statutory
B. General Liability, personal injury not less than $1,000,000/occurrence $2,000,000 aggregate.
C. Property damage, Broad Form $1,000,000 occurrence/ $2,000,000 aggregate.
D. Business and completed operations one year and $1,000,000
E. Auto rented and owned, $1,000,000 occurrence / $1,000,000 per person bodily injury.
F. Limits can be met with umbrella coverage.

PROPOSALS

A. All proposals shall be signed (live signatures, no copies of signatures accepted) by persons fully and duly authorized to sign same. See attached Bid Form.

B. Any bid signed by a person other than set forth above shall enclose with his bid proposal evidence of Power of Attorney.

C. No faxed proposals or modifications.

D. By submitting a proposal as design build the contractor recognizes that each proposal will be considered on the merits of its schedule, content as well as cost. While the intent is to accept the lowest bid meeting the criteria, voluntary alternates may be considered or award if found to be advantageous and in the best interest to the District. Time to deliver the project may govern the award as the equipment replacement is necessary to keep facility functional.

AWARD OR REJECTION

A. Although it is the intention of the Owner to accept the lowest qualified bid the Owner specifically reserves the right to waive all formalities and/or informalities, to reject any and all bids and/or accept the bid that, is determined to be in the best interest of Macomb CUSD 185.

    1. Best interest will be determined by the content of the proposal to the Owner in the event of an award, including the schedule of when work can be completed. The schedule to complete will be a basis for selection of the contractor along with price. Also include a list of any excluded work that is required to provide a complete and finished result.

COMMENCEMENT AND COMPLETION OF CONSTRUCTION

A. Contractor shall not commence work until the agreement/purchase Order has been executed by the Owner and Contractor and Insurance Certificate and Owner's Protective Bonds have been issued and accepted by the Owner and Architect.

    1. On site work may commence as soon as school is out for summer and Purchase Order Bonds are in order.
    2. It is desired that all interior work be completed prior to August 15 2025 with arrangements to be made regarding setting new equipment on a non-attendance school day., but we are aware of limited resources and ability to timely receive materials to produce the new equipment. Blanks are provided on the bid form to indicate the schedule applicable to the bid equipment.
        a. The contractors proposed schedule shall allow for no work on school days.
    3. Once started, work continuously through construction except during school hours.
    4. Work not completed prior to start of school shall be completed after hours or weekends in coordination with the Owner's building occupancy schedule.
        a. The Owner will be flexible to accommodate regular work hours for work not occurring in student occupied areas of the facility.

EXAMINATION OF SITE AND CONTRACT DOCUMENTS

A. Bidder shall carefully examine bidding documents and inspect on site to obtain first-hand knowledge of existing conditions.

B. Each Bidder, by submitting his bid, represents over his or her signature, that he has so examined the bidding documents and inspected the site premises, that he understands the provisions of the bidding documents, and that he has familiarized himself with the local conditions under which the work is to be performed. Bidders will not be given extra payment or contract time for conditions, which could have been determined by such examination.

BIDDER QUALIFICATIONS

A. Competency and responsibility of the Bidder, and of their proposed subcontractors, will be considered in making awards. Owner may require of the Bidder, prior to awarding the Contract, a detailed statement regarding the business, technical organization and plant facilities for the work that is contemplated. Information pertaining to the financial resources, experience of personnel and previously completed construction projects may also be required. The Owner may use this information in considering proposal.

B. The Owner may reject a Bidder, if an updated financial statement prepared by a CPA not on the Contractor's payroll (bearing the CPA's live signature) shows the net worth of a Contractor to be less than 30% of the Contractor's bid including elected alternates for this work. Said statement, if required by the Owner, shall be furnished and paid for by the Bidder.

C. The Owner reserves the right to reject any subcontractor to a prime contractor that cannot produce a favorable recommendation from a minimum or three (3) school districts or commercial owners involving a like size project or from said school district's Architect of record.

PROGRESS PAYMENTS

A. Payment will be made for satisfactorily in place labor and on-site materials

   a. Prepare a CSV for prior approval, and billings shall be made according to progress values listed.
   b. No payment for offsite stored materials.
   c. No payment for materials and equipment on site if site not manned and ongoing progress is not occurring.
   d. If partial down payment is necessary to secure a manufacturing date the Owner will negotiate and may agree to make such down payment or portion thereof, if determined to be necessary for timely completion of the work.

B. Ten percent (10%) withholding through project completion, if Performance and Payment Bonds are in place, of each pay request may be withheld pending final inspection. This

retainage will be paid when the project is completed and the Contractor provides lien waivers and affidavit showing all material suppliers, subcontractors and labor as paid.

EQUAL OPPORTUNITY EMPLOYMENT: The following clause is applicable unless this Contract is exempt under the rules and regulations of the Secretary of Labor of the State of Illinois.

"During the Performance of the Contract, the Contractor agrees as follows:

The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, age or national origin. The Contractor will take affirmative action to ensure that applicants are considered and that employees are treated, during employment, without regard to their race, color, religion, sex, age or national origin."

PREVAILING WAGE

A. The Contractor shall pay and shall require his subcontractors to pay the prevailing hourly wages for the type of work performed in the job locality as is determined by the Illinois Department of Labor pursuant to the Illinois Prevailing Wage (280 ILCS 130/.01 et. seq.), see IDLR website for rates.

B. Comply with HB188; enter payroll records on the state of Illinois IDLR wage portal.

SALES TAX

A. Materials supplied to a public school district are exempt from state sales taxes.

B. The Contractor shall determine the extent of exemption and shall comply with the regulations established by the Illinois Department of Revenue and allow for this in his proposal.

TOBACCO PRODUCTS

A. Smoking, chewing, etc. shall not be permitted anywhere on school property by State Statute.

SEXUAL HARASSMENT POLICY

A. The Owner will not tolerate sexual harassment in any form. Sexual harassment is defined, for the purpose of the policy, as "unsolicited, deliberate or repeated sexually derogatory statements, gestures or physical contact which cause discomfort or humiliation. Sexual harassment may involve pressure from a person of either sex against a person of the opposite sex or same sex…"

Should evidence be discovered that a Contractor, or a Contractor's employee, has harassed a student or other individuals, the harasser shall be removed from the job site pending resolution of the claim.

EMPLOYEE-STAFF/STUDENT RELATIONSHIPS

A. Except in an emergency situation involving safety, intermingling of the Contractor's employees and the school facility, staff and students is to be avoided. Contractor or Subcontractor personnel violating this requirement shall be removed from employment at this site. The Contractor Superintendent shall monitor this to the best of his ability. Contractor employees experiencing problems with students or faculty shall report same to their Project Superintendent, who shall promptly report the problem to an authorized representative of the Owner.

   Avoid profanity and inappropriate subject matter in conversation as students and staff may be within audible range and walls or ceiling spaces may allow sound transmission.

   Verbal or physical action interpreted as sexual in nature or as sexual harassment will be grounds for removal of the employee. Further legal action remains the option of the persons affected.

   In all aspects of this provision the Contractor shall be dealt with by the school, the Contractor's employees as adults have the greater responsibility and should not respond to inappropriate student behavior.

B. Employees working on site may be subject to background check per the Illinois School Code, and upon request of the Owner or the Regional Office of Education.

BUILDING PERMITS

A. The building permit will be required by the Owner through the Regional Office of Education and comply with local regulations and requirements.

B. Provide all necessary permit related information to local city authorities.

TERMINATION OF CONTRACT

Termination of the agreement can be instituted with seven (7) days notice by the Owner for failure to perform in accordance with the agreement, schedules, non-payment of goods or services or other evidence of failure to perform to the intent of the agreement. Cost of said termination will be subject to the project completion by the Owner with the Contractor paying any shortfall in cost to complete. If the project is completed for less than the outstanding contract balance, then the Contractor will receive the remainder after all claims are satisfied.

BACKGROUND INVESTIGATION AND SEX OFFENDERS ON SCHOOL GROUNDS

A. Illinois Criminal Background checks may be applicable to this Contract. per 105 ILCS 5/10-21.9 and 105 ILCS 5/14-7.02.

1. According to current interpretation a background check is only required of persons working in direct contact with students.
2. This standard in no way reduces or eliminates restriction in the law for certain convictions and proximity to school grounds.
3. At any time, unannounced, the Owner or the Regional Office of Education may request fingerprint background check of any or all employees.
4. Be aware of this stipulation and make sure your on-site employees will pass such a background review.

B. The Contractor shall:

1. Maintain a list available to the Owner of all the employees who will be or are anticipated will be employed on site. This list shall be updated when new persons not originally listed will be working on site. This list shall also include names of personnel employed by subcontractors.
2. Persons temporarily on site such as truck drivers or employees making deliveries do not need to be listed, but the Owner reserves the right to request a background check if deemed in their interest.
3. Copies of employee lists shall be promptly provided to the Owner, or the ROE upon request and employees on site shall agree to submit to a background check if requested.
4. Persons failing or refusing such check shall be removed from working on this site.

C. The Contractor shall not knowingly employ on school grounds any person who has not signed or will not sign an authorization for a fingerprint criminal background check.

D. The Owner reserves the right to run fingerprint background checks on any or all employees on site, randomly or specifically, and the cost of this check will be borne by the Owner. Upon request, provide information, which will not be shared, as needed to complete checks. This may include SSN, home addresses, fingerprint, address, etc. and any alias or former names used.

E. The Contractor shall assume the responsibility to notify all on site employees or potential employees of this provision, and of the consequences of this provision.

EXPIRATION OF PROPOSAL – I/We agree that this proposal shall be binding for a period of not less than twenty (20) days following the bid due date set forth in the advertisement for bids.

WORK INCLUDED – DESIGN BUILD PROPOSAL

A. All work necessary to prepare, install, access concealed spaces, repair surfaces after work is complete, remove and properly dispose of the existing equipment as removed, and adapt piping and controls to accommodate the proposed new or replacement DOAS equipment

1. Existing BAS, (building automation) controls both facilities are ECSI, Environmental Controls Solutions Automated Logic, Peoria office, phone 309 683 5252, fax 309 713 1800
2. Include Control pricing in each proposal.

3. Verify all details of the existing installation and configuration for demolition and reconfiguration to fit new equipment

    a. Particularly be aware of available space, dimensions, service access etc.
    b. At Lincoln School be aware of and include:
        1) ductwork installation conditions and requirements.
        2) Structural accommodations required
        3) Gas line requirements
        4) Power service requirements

    c. At Edison School be aware of and include:
        1) Existing Ductwork connection conditions and requirements.
        2) Structural accommodations required
        3) Gas line requirements
        4) Power service requirements

4. Valent DOAS equipment specification is an attachment to this specification

B. Proposed equipment is Valent, as this is the equipment already in use in the district.
    1. Other manufacturers may be considered as voluntary alternates.

        a. Provide information with the proposal for consideration.

    2. Electrical verify circuit extensio0n conditions and panel conditions. Revise, supplement and replace as need to properly feed new downsized equipment.

        a. Weather tight disconnects if not part of on-board equipment control package
        b. Fused disconnect or resize breakers for equipment as applicable
        c. Reconfigure power feed and conduits, IMC conduit inside, Rigid or PVC exterior.
        d. Pull new wire (copper THWN) if size changes or over-sized for new breaker amps.
        e. All exterior electrical to raintight, NEMA 4X corrosion resistant or stainless steel.

    3. Internal equipment controls to be compatible enable and monitoring by the existing BAS system ECSI Automated Logic.

    4. Schematic layout and operation:

        a. Schematic layout is shown on the drawings.

    5. Provide piping supports such that piping is supported against sway, movement and/or vibration.

        a. Gas pipe roof top supports to be roller style such as Miro3 RAH-8 set on EPDM roof walkway pad material.

C. Controls

    1. Existing BAS controls are to be extended to this equipment.
    2. Control by humidity and co2.

3. Contact for ECSI Controls, Ken Gallosky, **kgallosky@ecsi-alc.com**, 319 774 8709 ext 5254, mobile 319 432 4209.

D. Start up: by contractor, to include instructions and maintenance instruction.
   1. Quarterly for the first year of operation provide service visit, and additional instructions on operation as determined to be need for proper operation.

E. Balancing:

   1. Contractor shall provide T&B report to verify air delivered to rooms
   2. Adjust to +/- 10%.

F. Warranty

   1. One (1) year 100% labor and materials on the entire installation
   2. Five (5) year manufacturer on refrigeration components and compressors of the new equipment.
   3. Provide to the Owner the description cost of any additional extended warranties as might be available from the manufacturer.

VOLUNTARY ALTERNATES, OPTIONS OR SUBSTITUTIONS

A. The Contractor may offer options which they believe will improve the result, be more serviceable, lower initial cost, lower operating costs, time factors for lowest down time and maintenance. This might include:

   a. Other manufacturers.
   b. compressor/condenser options.
   c. such options as determined to offer comparable and suitable results.

ATTACHMENTS PROVIDED

A. Bid Form
B. Valent cut sheet for selected equipment
C. Drawings

PROJECT: **2025 DOAS work at Lincoln Elementary School**
315 N Bonham Steet Macomb IL 61455
2025 ERU replacement with DOAS Edison School
521 S Pearl St Macomb IL 61455

DATE OF PROPOSAL **Thursday, June12, 2025** TIME: **10:00 AM C.D.T.**

DELIVER TO: SUPERINTENDENT'S OFFICE
Macomb Community School district #185
323 W Washington St
Macomb, IL 61455

NAME OF FIRM _____

PROPOSAL FOR: All work single contract

Middleton Associates project NO. 27350025, Documents dated May 22, 2025

THE BID ACKNOWLEDGES THE FOLLOWING ADDENDA:
Failure to acknowledge issued addenda may be cause for bid rejection

NO. 1 _____, NO. 2 _____ , NO. 3_____ ,

BID SHALL INCLUDE:
A. The bid forms and certifications completed and signed, (*this form may be copied.)*
B. Bid security (*standard industry forms may be employed)*

BASE BIDS:
1. At each Project Location, the bidder agrees to perform all work, single contract, inclusive of all trades for the sum entered.
2. The bidder recognizes the bids are listed by project and the projected delivery date
3. The bidder proposes using bid **base bid** manufacturer equipment, but may offer an alternate substitution.
4. The projected delivery date will be a consideration in the award as equipment is in current need of replacement. Based on award within 10 days of the proposal date.

Lincoln Elementary School work

_____**Dollars**
WRITTEN AMOUNT

$_____

Edison School Work

_____**Dollars**
WRITTEN AMOUNT

$_____

Combined bid for Lincoln and Edison schools if less than the separate bids added together.

_____**Dollars**
WRITTEN AMOUNT

$_____

VOLUNTARY ALTERNATES OR SUBSTITUTIONS ABOVE

Are you offering any voluntary alternates or product substitution on form provided.

YES _____ **NO** _____

Attach description.

Voluntary Alternate_____

_____*(provide selection data with proposal)*

Add or deduct_____**Dollars**
SELECT WRITTEN AMOUNT

$_____

It is the intention that work will be executed when students are not in attendance and surrounds can be replaced to finished conditions for occupancy. Exterior work can be done as coordinated with the owner, and setting of equipment on a day when students are not in attendance.

Propose to complete the interior work and roof curb work, including duct work, control wiring, electrical work by

Lincoln Building _____date

Edison Building _____date

Propose to complete the entire project by:

Lincoln Building_____date

Edison Building _____date

THE BIDDER AGREES TO:

1. Hold this bid open for twenty (20) calendar days after bid opening date.
2. Enter into and execute a contract with MACOMB CUSD #185 if awarded this contract.
3. Comply with the contract and bidding documents with respect to bid security, all bonds, insurance, work requirements, schedule a
4. Comply with the Contract Documents with respect to scheduling as described in the documents, noted on drawings and this proposal form.

THE BIDDER MAKES THE FOLLOWING REPRESENTATIONS AND CERTIFICATIONS:

A. A surety company has agreed to issue payment and performance bonds to fulfill the contracting requirements as required in the specification.
B. The Bidder is not barred from contracting with any unit of state or local government as a result of violating the bid rigging or bid rotating provisions contained in 720 ILCS 5/33E.
C. The Bidder is not barred from contracting with the State of Illinois as a result of a bribery

conviction per 30 ILCS 505/10.2.

D. All on site labor and wage compensation provided by this contractor or his subcontractors will comply with the Illinois Prevailing Wage Act (820 ILCS 130E).

E. This proposal is made without any connection with any person making another bid for the same contract, that the bid is in all respects fair and without collusion or fraud, that no member of the Lincoln Elementary School Board, other officer or any person in the employment of Macomb CUSD No. 185 is directly or indirectly interested in the bid or any portion of the profit there from, except as allowed by the Illinois Law or the Illinois School Code.

F. I agree to provide a drug-free workplace as required by the Illinois Drug-free Workplace Act.

H. I do hereby certify that I am either the bidder or duly authorized agent of the referenced bidder, and I am authorized to execute the certifications hereon.

G. I certify that by submission of this proposal the bidder confirms that he is familiar with the site, existing conditions, the Bid Documents, requirements and the project schedule.

CONTRACTOR:

Firm Name: _____

Address: _____

_____

Telephone: _____

FAX: _____

Email: _____

Date: _____

Signature:

_____

Title: _____

ACCEPTANCE BY Macomb CUSD #185

By Board of Education as follows:

Base Bid Lincoln $_____

Base Bid Edison $_____

Combined Bid $_____

Total award this agreement

$_____

_____
date

_____
signature

_____
title

END 00 4000

VXE-112-36D-10I-G-A2

Unit Performance

Design Conditions

Elevation (ft)	Summer		Winter DB (F)	Supply (CFM)	Outdoor Air (CFM)	Exhaust Air (CFM)
	DB (F)	WB (F)				
663	95.0	76.0	-10.0	2,500	2,500	2,375

Unit Specifications

Qty	Weight (lb)	Cooling Type	Heating Type	Unit Installation	Unit ETL Listing	Furnace ETL Listing
1	3,119 (+/- 5%)	Packaged DX	Indirect Gas	Outdoor	60335-2-40	ANSI Z83.8 / CSA 2.6

Configuration

Outdoor Air		Exhaust Air	
Intake	Discharge	Intake	Discharge
End	Bottom	Bottom	Side

ASHRAE 90.1 Compliance

	ASHRAE 90.1 Min. Efficiency	Calculated Efficiency	Compliance
ISMRE2 (ASHRAE 90.1-2022)	5	8.1	✓
Enthalpy Recovery Ratio (%)	50	65.24	✓

Energy Recovery Performance

Design Condition	Temperature (F)								Capacity Reduction (BTU/h)
	Outdoor Air		Supply Air		Return Air		Exhaust Air		
	DB	WB	DB	WB	DB	WB/RH	DB	WB	
Summer	95.0	76.0	81.7	67.7	75.0	62.4/50	88.9	72.1	84593.42
Winter	-10.0	-11.1	40.2	35.4	70.0	54.2/35	15.0	14.9	135521.68

Cooling Specifications

Type	Total Capacity (MBH)	Sensible Capacity (MBH)	Lead Compressor Type	Coil (DB/WB)		Reheat	
				EAT (F)	LAT (F)	Capacity (MBH)	LAT (F)
Packaged DX	119.2	77.2	Inverter Scroll	81.7 / 67.7	51.5 / 51.4	74.4	80.0

Heating Specifications

Type	Gas Type	Input (MBH)	Output (MBH)	Temperature Rise		Turndown	Performance	
				Min (F)	Max (F)		EAT (F)	LAT (F)
Indirect Gas	Natural	200.0	162.0	3.7	59.9	16:1	40.2	100.1

Motor Specifications

Motor	Qty	Operating Power (hp)	Size (hp)	Enclosure	Efficiency	RPM
Supply	1	1.86	2	ODP	NEMA Premium	1165
Exhaust	1	1.28	1 1/2	ODP	NEMA Premium	1170

Electrical Specifications

Power Supply	Rating (V/C/P)	MCA (A)	MOP (A)	FLA (A)	Fan Power (W/CFM)*
Unit	208/60/3	65.3	90.0	56.7	0.936

*Fan Power (W/CFM) = (Supply BHP + Exhaust BHP) / Supply CFM

Construction Features And Accessories

Unit	
Unit Installation - Outdoor	Std
Unit Construction - Double Wall	Std
Insulation - 2 inch 2.4# R13 foam	Std
Corrosion Resistant Fasteners	Std
Hinged Access	Std
Factory Wired Non-Fused Disconnect Switch	Std
Direct Drive Plenum Blower & Motor Assemblies	Std
Factory Wired VFDs	Std
Unit Finish - Permatector, Concrete Gray (RAL 7023)	X
Stainless Steel Condensate Drain Pan and Connection	Std
Condensate Drain Trap	Std
Short Circuit Current - 5 kA	X
Energy Recovery Device - Polymer Wheel w/ Silica Gel Desiccant	Std

Controls	
Unit Controls - Full Factory Control	Std
Internally Mounted Control Center with 24 VAC control transformer(s) and control circuiting fusing	Std
BMS Protocol - BACnet MSTP	X
BMS Monitoring Points	
Supply Fan Control - Constant Volume - Adj. Setpoint	X
Exhaust Fan Control - Constant Volume - Adj. Setpoint	X
Economizer Control - Temperature	X
Exhaust Fan Only Power	
Web-Based User Interface	Std
Energy Wheel Economizer Control - Modulating Wheel	X
Energy Wheel Rotation Sensor	Std
Damper Control - 100% OA-Unocc. Recirculation	X
Unoccupied Recirc Mode	X

Control Accessories	
Remote Display	
Dirty Filter Sensor(s) - All	X
Airflow Monitor	
Room Thermostat - Space Temperature	X
Phase/Brownout Protection	Std
Economizer Fault Detection Diagnostics	

Accessories	
Frost Control - Modulating Wheel	X
Outdoor Air Damper - Low Leakage	X
Return Air Damper	
Roof Curb - GKD - 45.9/142.9-G24	X
Supply Air Filters - 2" Merv 13, 2-20x20x2, 2-20x24x2	X
Service Outlet - Factory mounted and wired	X
Piping Vestibule	
Service Lights	
Condensate Overflow Switch	X
Spare Filters - All, Qty: 1 set(s)	X
Exhaust Discharge Gravity Backdraft Damper	X
ElectroFin Coil Coating	
Motor Shaft Grounding	X
Bipolar Ionization	
Smoke Detector(s)	
Barometric Relief Damper	
UV Lights	
Return Air Filters - 2" Merv 8, 2-20x25x2	Std
Outdoor Air Filters - 2" Merv 8, 2-20x25x2	Std
Furnace Control - 16:1	X
Spare Energy Wheel Belt	X
Spare Energy Wheel Segments	
Energy Wheel Bypass Damper	
Power Venting	Std
Hail Guards	

Warranty Options	
Unit Warranty - 18 Months (Std.)	Std
Energy Wheel Warranty - 5 Yrs Less Motor	Std
Compressor Warranty - 5.5 Yrs. (4 Yrs. Extended)	X
Furnace HX Warranty - 25 Yrs.	Std

Standard Option	Std
Not Included	
Included	X

Notes
Verify that the correct BMS Protocol has been selected before ordering
Outdoor Air Damper supplied is low leakage, motorized VCD-23 (leakage rate of 3 CFM/ft^2 @ 1 in. wg), Class 1A
Frosting of the energy recovery device is possible. Please contact the factory to assess frost control options.
Leak detection sensors

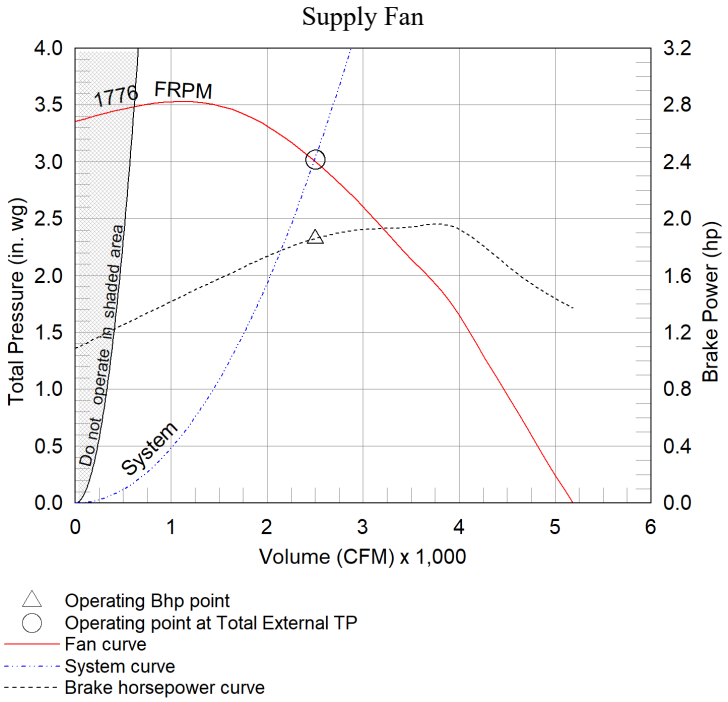
Supply Fan Charts And Performance

Supply Fan Performance									
Total Volume (CFM)	External SP (in. wg)	Total SP (in. wg)	RPM	Operating Power (hp)	Motor		Fan		
					Qty	Size (hp)	Qty	Type	Drive-Type
2,500	1.5	3.019	1776	1.86	1	2	1	Plenum	Direct

Pressure Drop (in. wg)							
Weatherhood	Filter	Damper	Cooling	Heating	External	Energy Wheel	Total
0.047	0.143	0.022	0.145	0.139	1.5	1.003	3.019

Sound Performance in Accordance with AMCA										
Sound Power by Octave Band								Lwa	dBA	Sones
62.5	125	250	500	1000	2000	4000	8000			
76.0	80.9	88.3	75.6	70.8	66.7	75.3	63.5	82.5	71.0	19.0

*Energy Wheel pressure drop shown in above table also accounts for pressure drop across MERV8 OA filter



Exhaust Fan Charts And Performance

Exhaust Fan Performance

Mode	Total Volume (CFM)	External SP (in. wg)	Total SP (in. wg)	RPM	Operating Power (hp)	Motor		Fan		
						Qty	Size (hp)	Qty	Type	Drive-Type
Normal	2,375	1	1.919	1540	1.28	1	1 1/2	1	Plenum	Direct

Pressure Drop (in. wg)

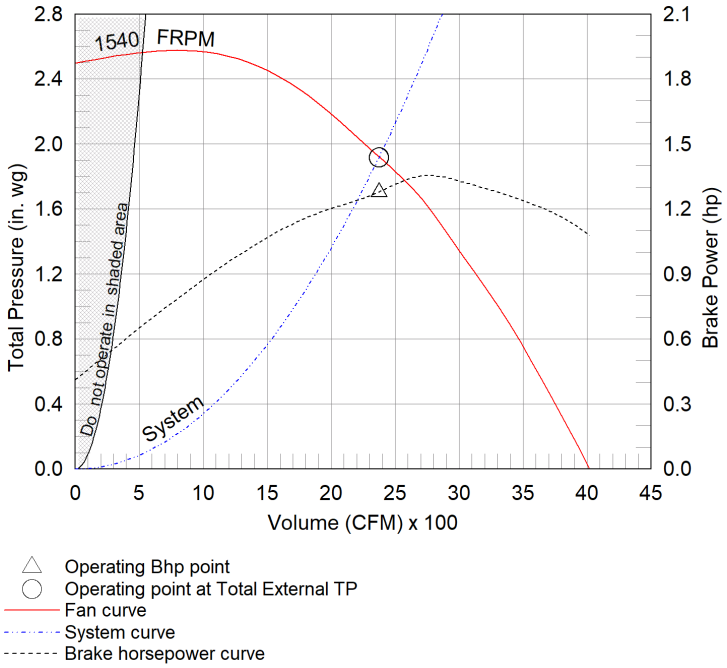
Mode	Weatherhood	Filter	Damper	Cooling	Heating	External	Energy Wheel	Total
Normal	0.057	-	-	-	-	1	0.862	1.919

Sound Performance in Accordance with AMCA

Mode	Sound Power by Octave Band								Lwa	dBA	Sones
	62.5	125	250	500	1000	2000	4000	8000			
Normal	79.2	76.6	72.6	66.8	61.4	60.3	63.9	56.3	71.0	59.5	10.7

*Energy Wheel pressure drop shown in above table also accounts for pressure drop across MERV8 return air filter

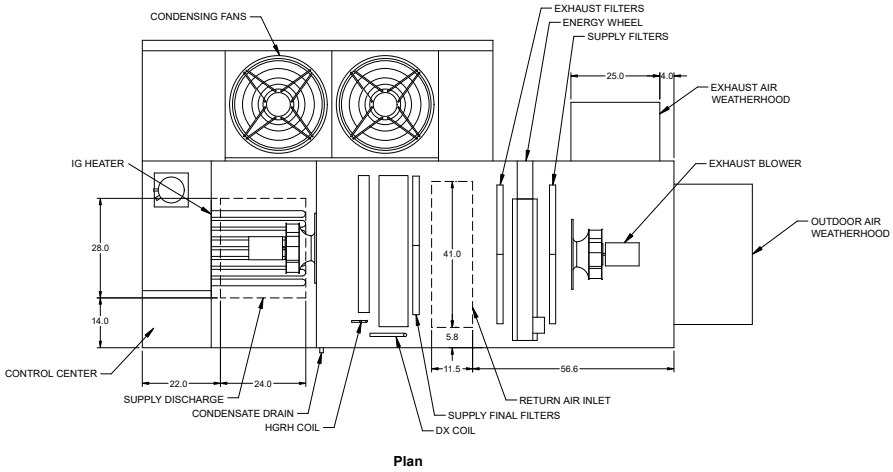
Exhaust Fan



Radiated Sound

Position A

Dimensional Overview



Plan

Position D

Position B

Position C

"E" is the Top Plane

Supply Air Flow Nominal, Largest Tonnage Condensing Section Available, PDX units only

Radiated Sound Levels										
Plane	Octave Bands (Lw)								Plane Lw	Plane LwA
	1	2	3	4	5	6	7	8		
A	73	86	81	79	77	73	69	63	89	82
B	71	79	77	71	69	64	63	55	82	75
C	79	76	69	66	64	59	53	46	81	69
D	74	77	72	72	69	62	58	51	81	74
E	77	84	80	76	76	70	66	60	87	80
Total	83	89	85	82	81	76	72	65	92	85

AMCA 320-07 - Laboratory Methods of Sound Testing of Fans Using Sound Intensity
Tests conducted in accordance with this standard.
Free field measurement plane created 1 foot from unit on all sides and top.
Sound Intensity measured in Watts/m^2.
Sound data converted to Sound Power (Lw) for the chart above.
A-Weighted Sound Power was determined using AMCA Standard 301-90 Clause 9.1.
Plane E sound data was measured above the top plane of the unit.

Cooling Performance

Cooling Specifications									
Nominal Tonnage	Entering Air (F)		Leaving Air (F)		Capacity (MBH)		Reheat		Condensing Ambient Temp (F)
	DB	WB	DB	WB	Total	Sensible	Capacity (MBH)	LAT (F)	
10	81.7	67.7	51.5	51.4	119.2	77.2	74.4	80.0	95.0

Coil Information								
PDX Coil Model	Fins Per Inch	Rows Deep	Face Vel. (ft/min)	Coil PD (in. wg)	Refrigerant	Refrig. Velocity (ft/min)	Face Area (ft2)	Suction Temp (F)
DX516L04S14-40X42.5-LH	14	4	212	0.145	R-454B	1,732	11.81	45.3

Compressor Details					
Lead Compressor Type	Compressor Qty	Compressor RLA/MRC (A)		Compressor LRA (A)	
		Comp. #1	Comp. #2	Comp. #1	Comp. #2
Inverter Scroll	1	34.2	NA	NA	NA

A2L Installation Requirement - UL 60335-2-40		
Largest Circuit Charge	Minimum Circulation Airflow	Minimum Total Conditioned Room Area
17.3lb / 7.82kg	468 CFM	259 ft2

Local codes and standards may have requirements regarding the installation of A2L refrigerants in addition to manufacturing instructions provided for listed and labeled equipment.

Unit Details
Refrigerant charges provided by the factory are approximate and may require adjustment in the field
Hermetic scroll type compressors
Compressors mounted on neoprene vibration isolation
Stainless steel double sloped drain pan
Moisture-indicating sight glass
Service/charging valves
Refrigerant high pressure switch (manual reset)
Liquid-Line filter drier
Leak detection sensors
Multiple low sound condensing fans with Lead ECM condensing fan for modulating head pressure control
Inverter scroll compressor
Electronic expansion valve
Unit cannot be mounted in an enclosed space.

Important Notes:
Capacity is based on incoming voltage selected. If incoming power varies it may affect the capacity of your selection.

Heating Performance

Heating Specifications								
Type	Gas Type	Input (MBH)	Output (MBH)	Temperature Rise		Turndown	Performance	
				Min (F)	Max (F)		EAT (F)	LAT (F)
Indirect Gas	Natural	200.0	162.0	3.7	59.9	16:1	40.2	100.1

Unit Details
ANSI standard Z83.8 and CSA 2.6
High Thermal efficiency
Direct spark ignition
3/4" NPT Gas Connection - Qty 1
At least 6 in. wg of natural gas pressure (11 in. wg for LP) is required at the units gas connection in order to achieve maximum performance
Power Venting
24 Volt Control Power
Stainless Steel heat exchange tubes
Unit controller maximum allowable supply discharge air set point is 100F (37.8C)
Discharge temperature assumes proper energy wheel operation and maintenance.

Energy Recovery Summer Performance

Outdoor Air		Supply Air	
Dry Bulb (F)	95.0	Dry Bulb (F)	81.7
Wet Bulb (F)	76.0	Wet Bulb (F)	67.7
Specific Humidity (gr/lb)	109	Specific Humidity (gr/lb)	82
Enthalpy (BTU/lb)	39.9	Enthalpy (BTU/lb)	32.4
Exhaust Air		**Return Air**	
Dry Bulb (F)	88.9	Dry Bulb (F)	75.0
Wet Bulb (F)	72.1	Rel. Humidity (%)	50
Specific Humidity (gr/lb)	94	Specific Humidity (gr/lb)	67
Enthalpy (BTU/lb)	36.0	Enthalpy (BTU/lb)	28.4

ENERGY WHEEL

Design Air Flow Conditions

OA Volume (CFM)	ASHRAE 90.1 OA Enthalpy Recovery Ratio	EA Volume (CFM)	EA Wheel Effectiveness
2,500	65.24	2,375	66.759

Outdoor Air Cooling Reduction

OA Load w/o Energy Recovery		OA Load with Energy Recovery		Equipment Reduction (tons)
(BTU/h)	(tons)	(BTU/h)	(tons)	
182,621.4	15.22	98,028.0	8.17	7.05

Note: Cooling Load Reduction assumes cooling 55/55 DB/WB

Summer Conditions

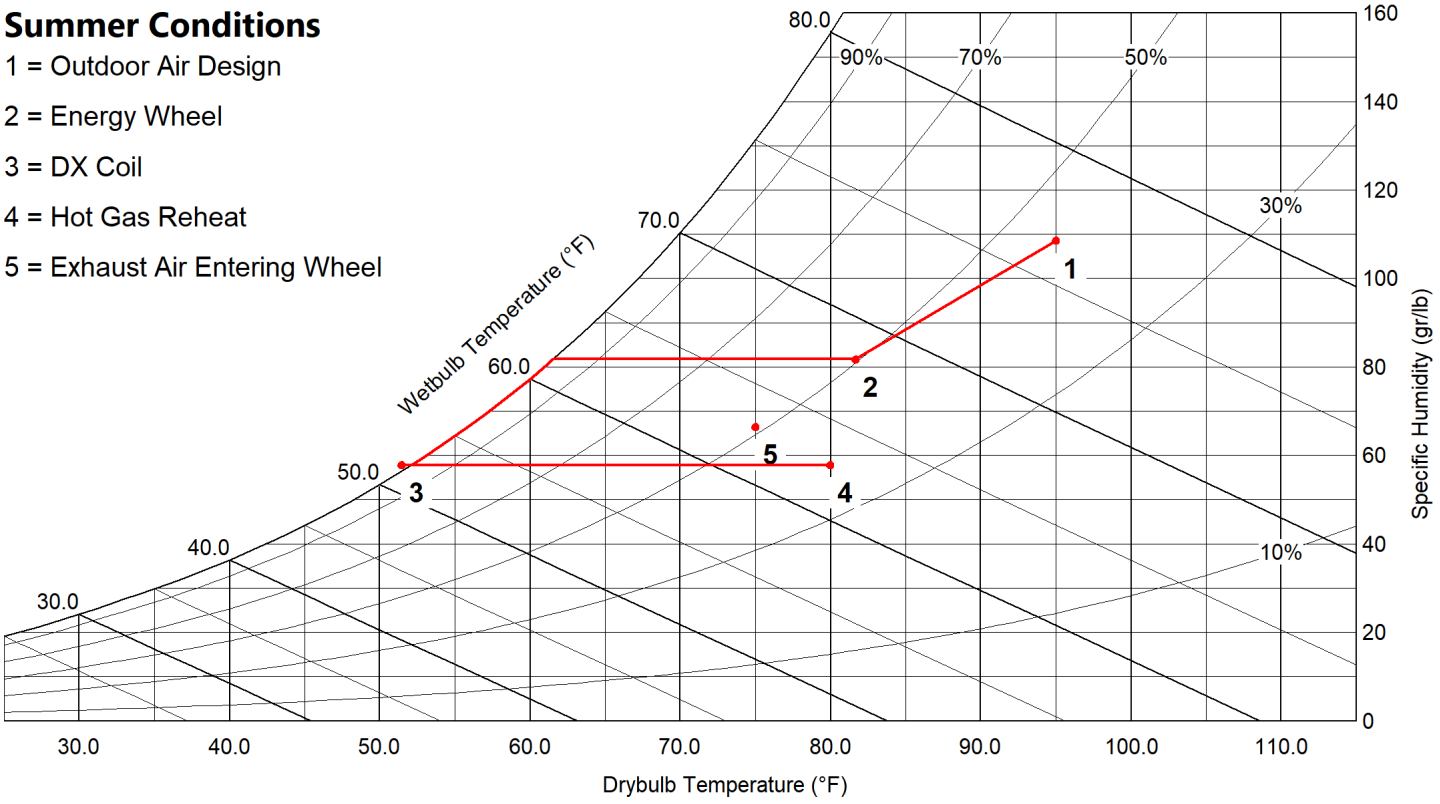
1 = Outdoor Air Design

2 = Energy Wheel

3 = DX Coil

4 = Hot Gas Reheat

5 = Exhaust Air Entering Wheel



Energy Recovery Winter Performance w/out Preheater

Outdoor Air		Supply Air	
Dry Bulb (F)	-10.0	Dry Bulb (F)	40.2
Wet Bulb (F)	-11.1	Wet Bulb (F)	35.4
Specific Humidity (gr/lb)	2	Specific Humidity (gr/lb)	24
Enthalpy (BTU/lb)	-2.2	Enthalpy (BTU/lb)	13.3
Exhaust Air		**Return Air**	
Dry Bulb (F)	15.0	Dry Bulb (F)	70.0
Wet Bulb (F)	14.9	Rel. Humidity (%)	35
Specific Humidity (gr/lb)	12	Specific Humidity (gr/lb)	39
Enthalpy (BTU/lb)	5.4	Enthalpy (BTU/lb)	22.9

ENERGY WHEEL

Design Air Flow Conditions

OA Volume (CFM)	ASHRAE 90.1 OA Enthalpy Recovery Ratio	EA Volume (CFM)	EA Wheel Effectiveness
2,500	61.61	2,375	68.85

Outdoor Air Heating Reduction

OA Load w/o Energy Recovery (BTU/h)	OA Load with Energy Recovery (BTU/h)	Equipment Reduction (BTU/h)	Sensible Effectiveness (%)
216,000	80,478	135,522	69.8

Note: Heating Load Reduction assumes heating to 70°F DB

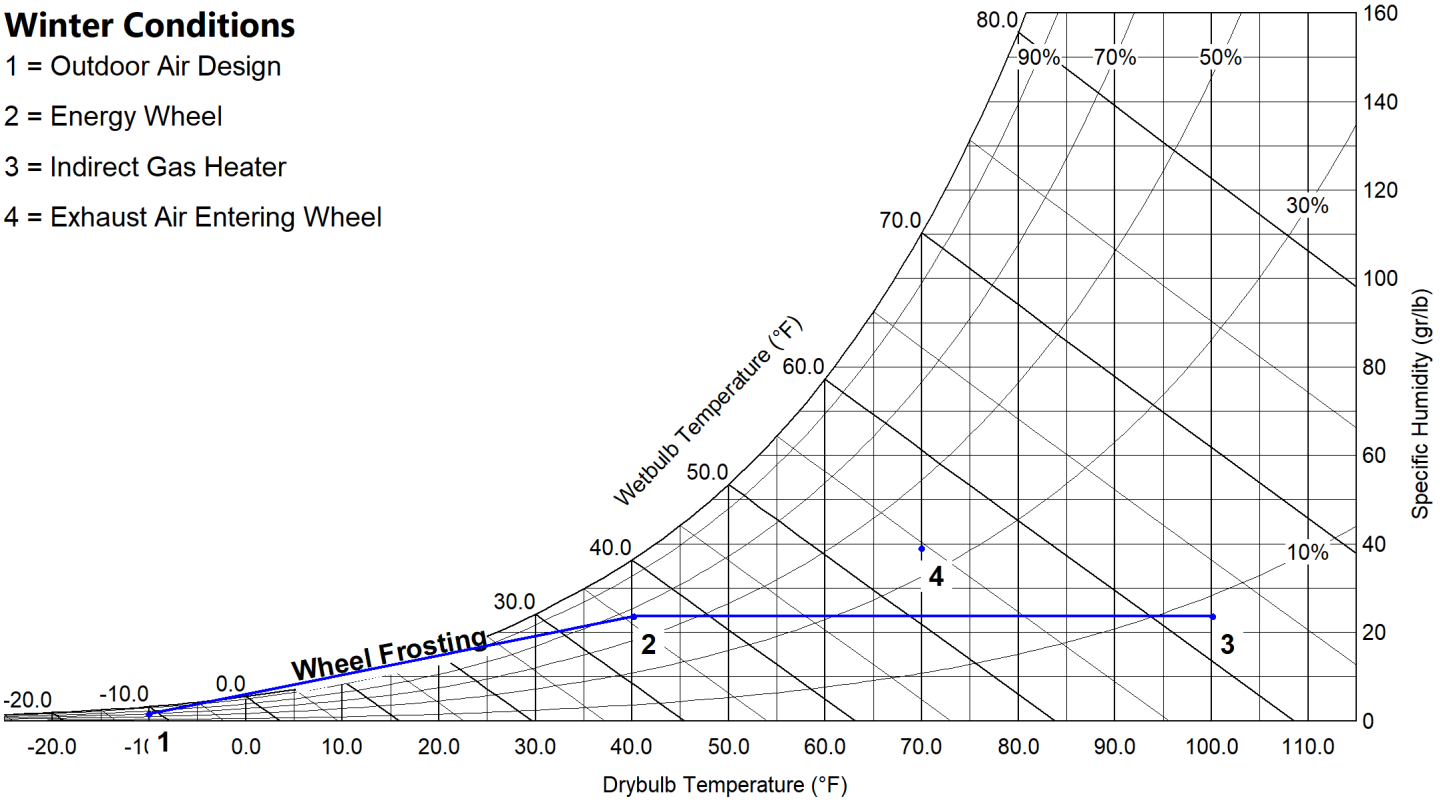
Winter Conditions

1 = Outdoor Air Design

2 = Energy Wheel

3 = Indirect Gas Heater

4 = Exhaust Air Entering Wheel



AHRI Performance Ratings

Energy Recovery Performance Rating in accordance with AHRI Standard 1060 (I-P)							
Rated Airflow (SCFM)		Net Supply Airflow (SCFM)	EATR (%)	OACF	Pressure Drop (in. wg)		Purge Angle (degrees)
Leaving Supply	Entering Exhaust				Supply	Exhaust	
2,387	2,439	2,564	2.5	1.03	0.80	0.75	0

Thermal Effectiveness Ratings							
Enthalpy Recovery		Sensible Effectiveness		Latent Effectiveness		Total Effectiveness	
Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
65.2	61.6	69.1	69.8	65.0	65.7	66.8	68.8

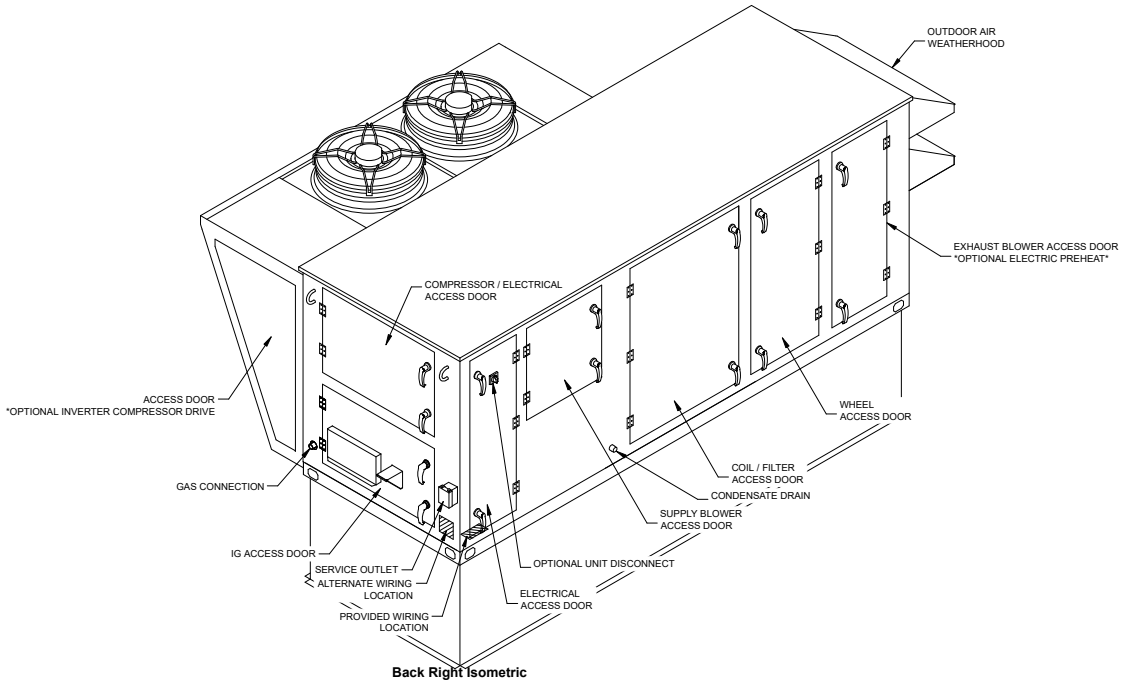
Note(s)

Summer Design Conditions:
Certified in accordance with the AHRI ERV Certification Program, which is based on AHRI Standard 1060. Certified units may be found in the AHRI Directory at www.ahridirectory.org.

Winter Design Conditions:
Application Rating is outside the scope of the AHRI ERV certification Program but is rated in accordance with AHRI Standard 1060.

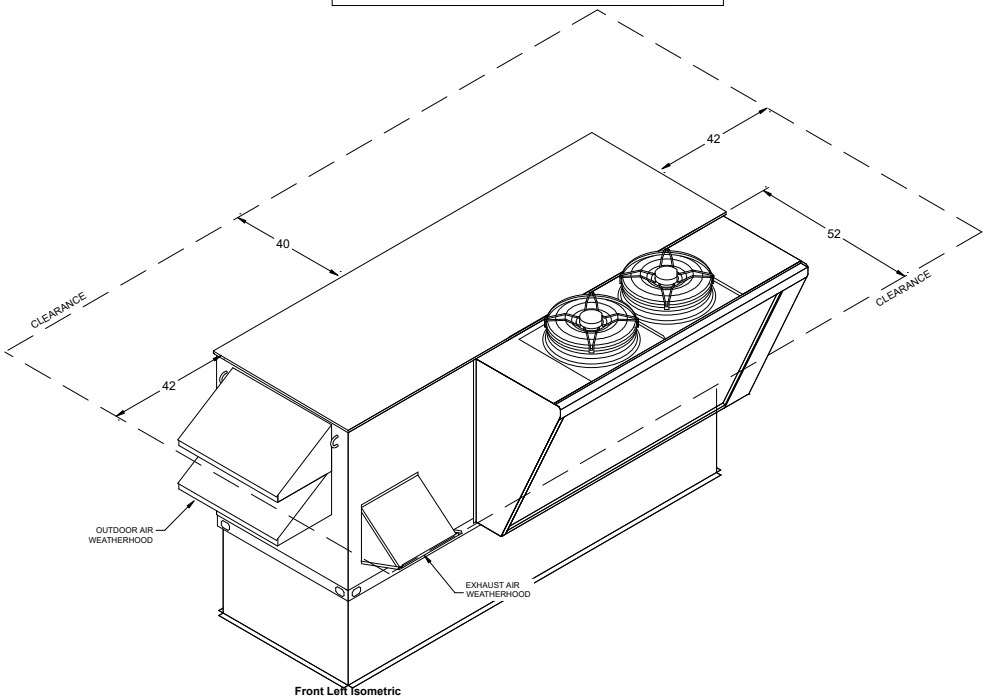
Isometric Drawings

Component Layout



Back Right Isometric

Service Clearances

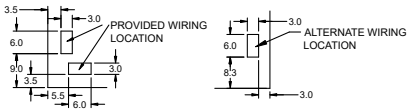


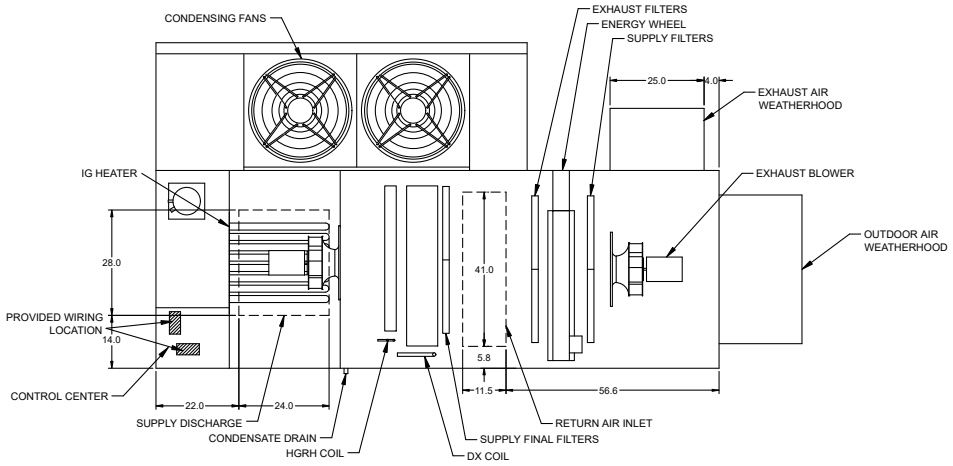
Front Left Isometric

Overview Drawings

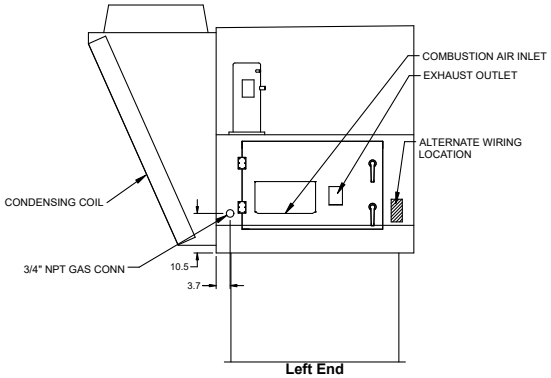
Dimensional Overview

Electrical Connections

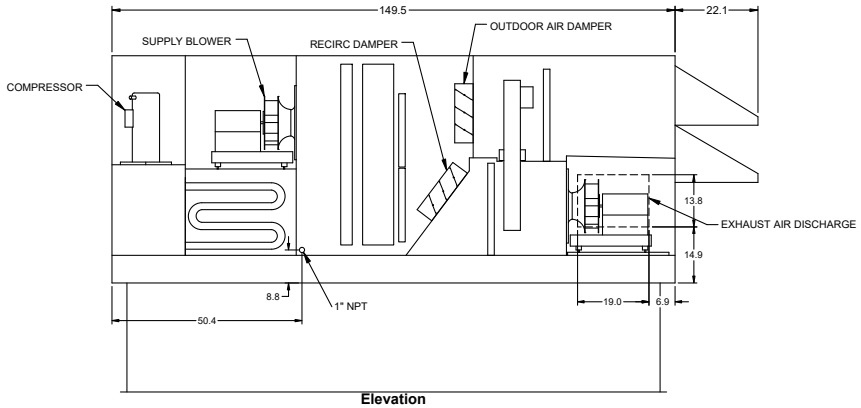




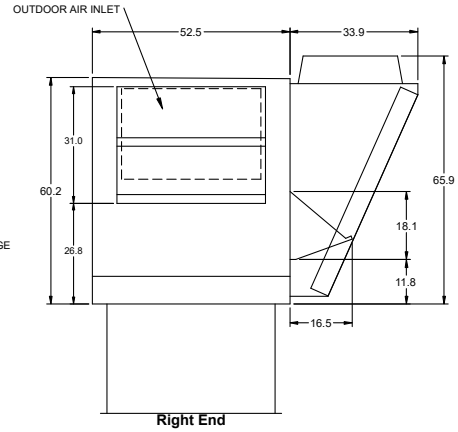
Plan



Left End

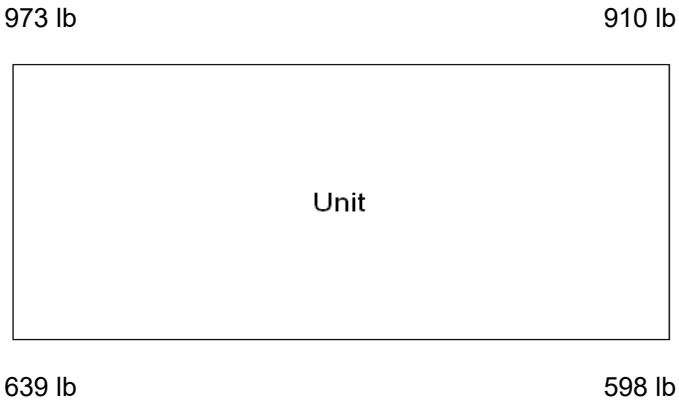


Elevation



Right End

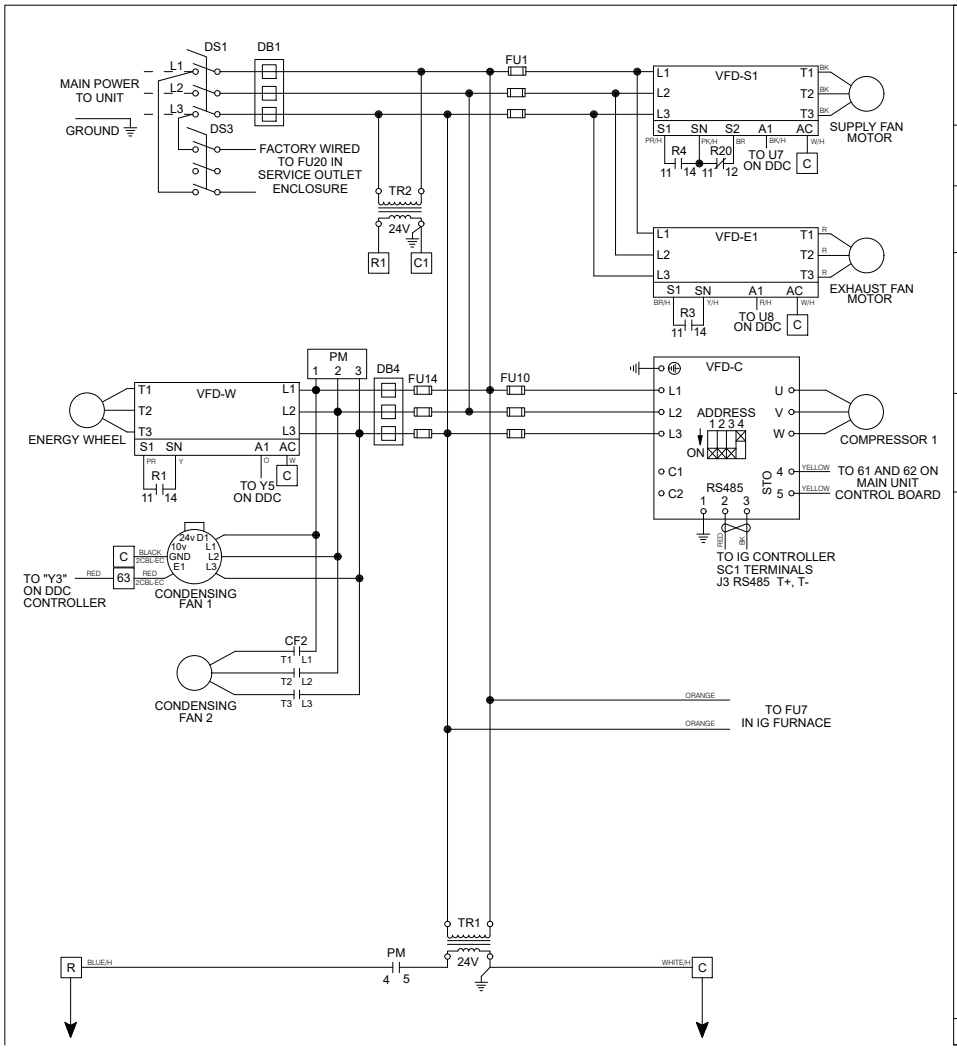
Unit Corner Weights



Note

Estimated corner weights are shown looking down on unit and the outside air intake will be on the right. Weights are applied at the base of the unit. Images not drawn to scale.

Wiring Diagram



Wiring Diagram Code:

V22N2A1AK52G45X00HF23H0300BH31

CAUTION

UNIT SHALL BE GROUNDED IN ACCORDANCE WITH N.E.C.
POWER MUST BE OFF WHILE SERVICING.

NOTES

USE COPPER CONDUCTORS ONLY
60° C FOR TERMINALS RATED LESS THAN 100 AMPS.
75° C FOR TERMINALS RATED 100 AMPS OR MORE.

FIELD CONTROL WIRING RESISTANCE SHOULD NOT EXCEED 0.75 OHM.

FIELD WIRED – – – – –
FACTORY SUPPLIED AND WIRED ————

WIRE COLOR CODE

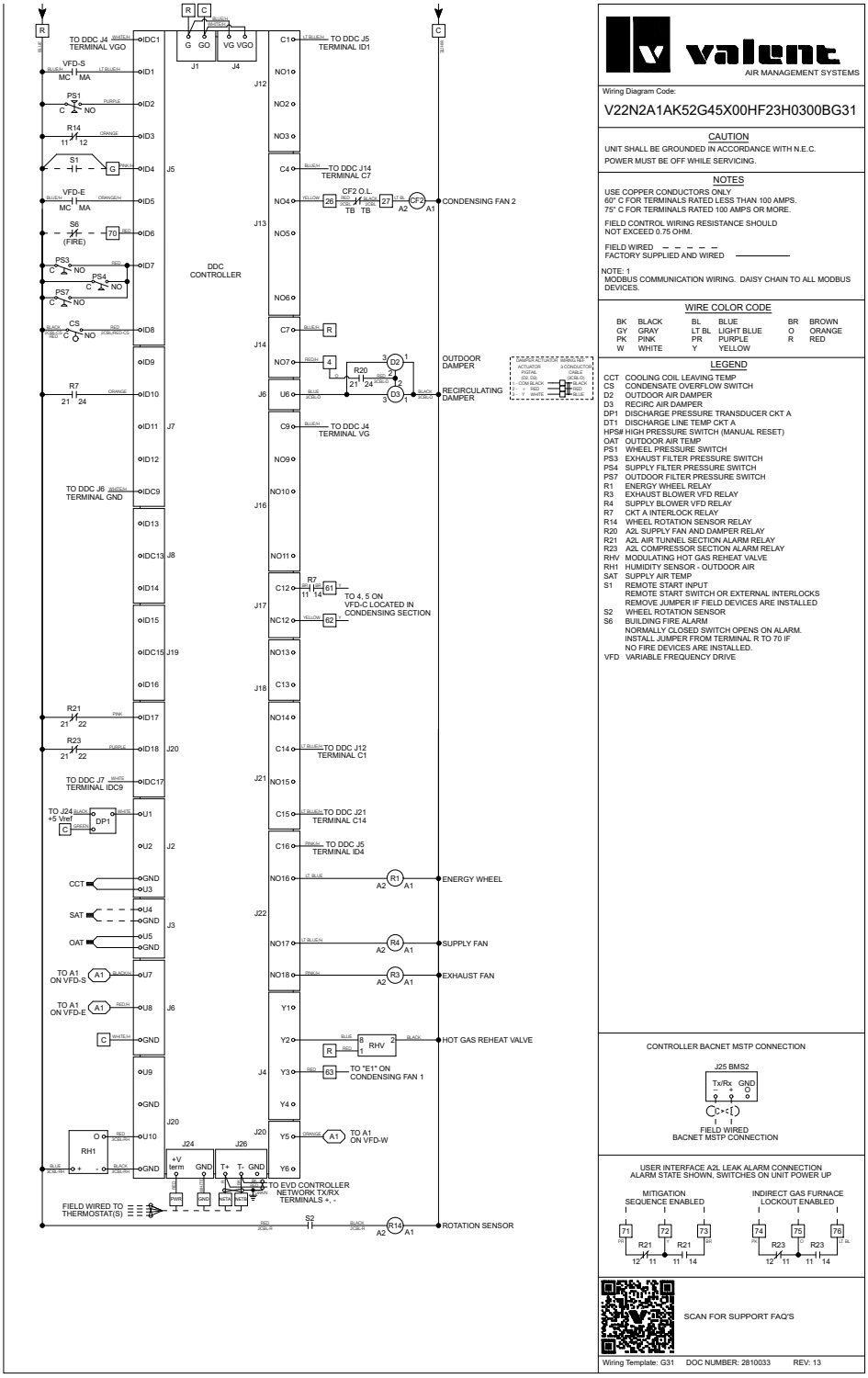
BK	BLACK	BL	BLUE	BR	BROWN
GY	GRAY	LT BL	LIGHT BLUE	O	ORANGE
PK	PINK	PR	PURPLE	R	RED
W	WHITE	Y	YELLOW		

LEGEND

DB#	POWER DISTRIBUTION BLOCK
DS	DISCONNECT SWITCH
DT1	DISCHARGE LINE TEMP CKT A
FU#	FUSES
PM	PHASE VOLTAGE MONITOR
R1	ENERGY WHEEL RELAY
R3	EXHAUST BLOWER VFD RELAY
R4	SUPPLY BLOWER VFD RELAY
R20	A2L SUPPLY FAN AND DAMPER RELAY
TR#	TRANSFORMER
VFD	VARIABLE FREQUENCY DRIVE

Wiring Template: H31 DOC NUMBER: 2810033 REV: 13

Wiring Diagram 2



valent
AIR MANAGEMENT SYSTEMS

Wiring Diagram Code:

V22N2A1AK52G45X00HF23H0300BG31

CAUTION

UNIT SHALL BE GROUNDED IN ACCORDANCE WITH N.E.C.

POWER MUST BE OFF WHILE SERVICING.

NOTES

USE COPPER CONDUCTORS ONLY
60° C FOR TERMINALS RATED LESS THAN 100 AMPS.
75° C FOR TERMINALS RATED 100 AMPS OR MORE.

FIELD CONTROL WIRING RESISTANCE SHOULD NOT EXCEED 0.75 OHM.

FIELD WIRED – – – – –
FACTORY SUPPLIED AND WIRED ————

NOTE: 1
MODBUS COMMUNICATION WIRING. DAISY CHAIN TO ALL MODBUS DEVICES.

WIRE COLOR CODE

BK	BLACK	BL	BLUE	BR	BROWN
GY	GRAY	LT BL	LIGHT BLUE	O	ORANGE
PK	PINK	PR	PURPLE	R	RED
W	WHITE	Y	YELLOW		

LEGEND

CCT COOLING COIL LEAVING TEMP
CS CONDENSATE OVERFLOW SWITCH
D2 OUTDOOR AIR DAMPER
D3 RECIRC AIR DAMPER
DP1 DISCHARGE PRESSURE TRANSDUCER CKT A
DT1 DISCHARGE LINE TEMP CKT A
HPS# HIGH PRESSURE SWITCH (MANUAL RESET)
OAT OUTDOOR AIR TEMP
PS1 WHEEL PRESSURE SWITCH
PS3 EXHAUST FILTER PRESSURE SWITCH
PS4 SUPPLY FILTER PRESSURE SWITCH
PS7 OUTDOOR FILTER PRESSURE SWITCH
R1 ENERGY WHEEL RELAY
R3 EXHAUST BLOWER VFD RELAY
R4 SUPPLY BLOWER VFD RELAY
R7 CKT A INTERLOCK RELAY
R14 WHEEL ROTATION SENSOR RELAY
R20 A2L SUPPLY FAN AND DAMPER RELAY
R21 A2L AIR TUNNEL SECTION ALARM RELAY
R23 A2L COMPRESSOR SECTION ALARM RELAY
RHV MODULATING HOT GAS REHEAT VALVE
RH1 HUMIDITY SENSOR - OUTDOOR AIR
SAT SUPPLY AIR TEMP
S1 REMOTE START INPUT
REMOTE START SWITCH OR EXTERNAL INTERLOCKS
REMOVE JUMPER IF FIELD DEVICES ARE INSTALLED
S2 WHEEL ROTATION SENSOR
S6 BUILDING FIRE ALARM
NORMALLY CLOSED SWITCH OPENS ON ALARM.
INSTALL JUMPER FROM TERMINAL R TO 70 IF
NO FIRE DEVICES ARE INSTALLED.
VFD VARIABLE FREQUENCY DRIVE

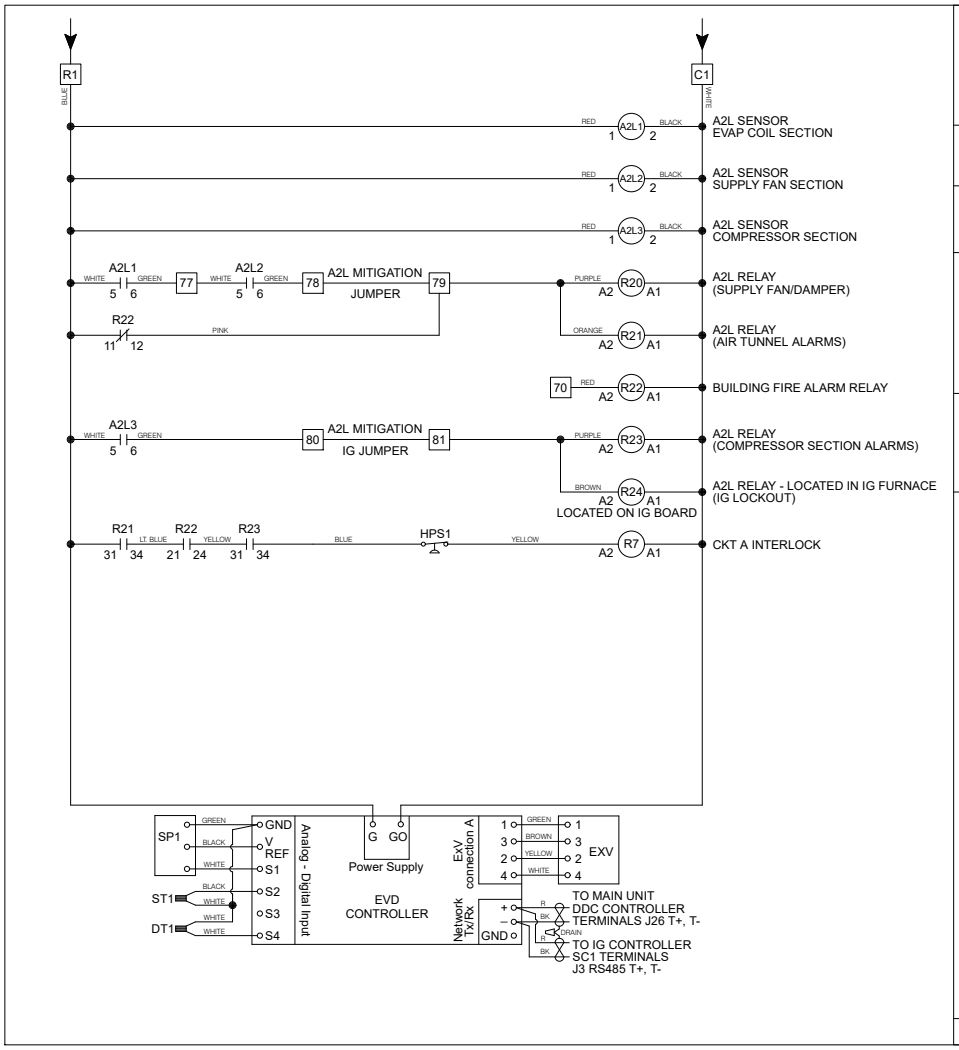
CONTROLLER BACNET MSTP CONNECTION

USER INTERFACE A2L LEAK ALARM CONNECTION
ALARM STATE SHOWN, SWITCHES ON UNIT POWER UP

SCAN FOR SUPPORT FAQ'S

Wiring Template: G31 DOC NUMBER: 2810033 REV: 13

Wiring Diagram 3



AIR MANAGEMENT SYSTEMS

Wiring Diagram Code:

V22N2A1AK52G45X00HF23H0300BL31

CAUTION

UNIT SHALL BE GROUNDED IN ACCORDANCE WITH N.E.C.
POWER MUST BE OFF WHILE SERVICING.

NOTES

USE COPPER CONDUCTORS ONLY
60° C FOR TERMINALS RATED LESS THAN 100 AMPS.
75° C FOR TERMINALS RATED 100 AMPS OR MORE.

FIELD CONTROL WIRING RESISTANCE SHOULD NOT EXCEED 0.75 OHM.

FIELD WIRED – – – – –
FACTORY SUPPLIED AND WIRED ————

WIRE COLOR CODE

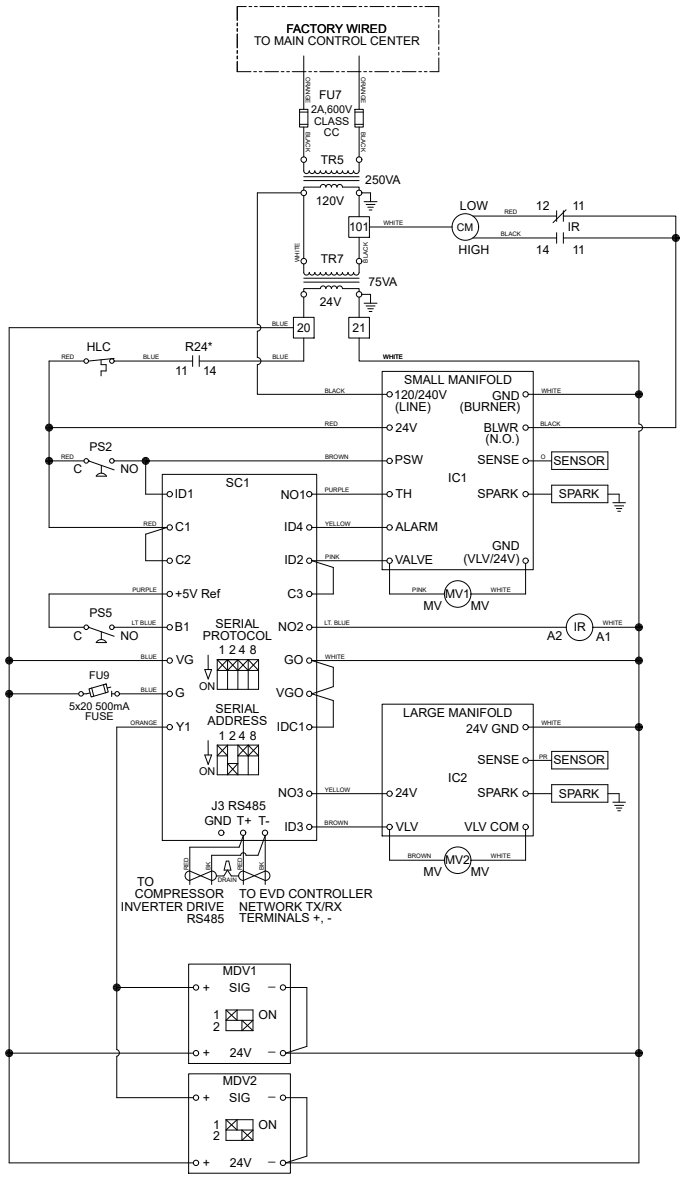
BK	BLACK	BL	BLUE	BR	BROWN
GY	GRAY	LT BL	LIGHT BLUE	O	ORANGE
PK	PINK	PR	PURPLE	R	RED
W	WHITE	Y	YELLOW		

LEGEND

A2L#	A2L REFRIGERANT LEAK SENSOR
DT1	DISCHARGE LINE TEMP CKT A
EXV	ELECTRONIC EXPANSION VALVE
R7	CKT A INTERLOCK RELAY
R20	A2L SUPPLY FAN AND DAMPER RELAY
R21	A2L AIR TUNNEL SECTION ALARM RELAY
R22	BUILDING FIRE ALARM RELAY
R23	A2L COMPRESSOR SECTION ALARM RELAY
R24	A2L ALARM IG LOCKOUT RELAY
	RELAY LOCATED ON IG FURNACE CONTROL CENTER BOARD
SP1	SUCTION PRESSURE TRANSDUCER CKT A
ST1	SUCTION LINE TEMP CKT A
VFD	VARIABLE FREQUENCY DRIVE

Wiring Template: L31 DOC NUMBER: 2810033 REV: 13

INDIRECT GAS WIRING DIAGRAM
FURNACE 1 - HTD MODULATING



valent
AIR MANAGEMENT SYSTEMS

Wiring Diagram Code:

V4N51P1RX0052GS23

CAUTION

UNIT SHALL BE GROUNDED IN ACCORDANCE WITH N.E.C.
POWER MUST BE OFF WHILE SERVICING.

NOTES

USE COPPER CONDUCTORS ONLY
60° C FOR TERMINALS RATED LESS THAN 100 AMPS.
75° C FOR TERMINALS RATED 100 AMPS OR MORE.

FIELD CONTROL WIRING RESISTANCE SHOULD NOT EXCEED 0.75 OHM.

FIELD WIRED – – – – –
FACTORY SUPPLIED AND WIRED ————

NOTE: 1
MODBUS COMMUNICATION WIRING. DAISY CHAIN TO ALL MODBUS DEVICES.

WIRE COLOR CODE

BK	BLACK	BL	BLUE	BR	BROWN
GY	GRAY	LT BL	LIGHT BLUE	O	ORANGE
PK	PINK	PR	PURPLE	R	RED
W	WHITE	Y	YELLOW		

LEGEND

CM	COMBUSTION BLOWER MOTOR
FU#	FUSE(S)
HLC	HIGH TEMPERATURE LIMIT CONTROL
IC1	IGNITION CONTROL - SMALL MANIFOLD
IC2	IGNITION CONTROL - LARGE MANIFOLD
IR	INDUCTION RELAY
MDV1	MODULATING VALVE - SMALL MANIFOLD
MDV2	MODULATING VALVE - LARGE MANIFOLD
MV1	MAIN GAS VALVE - SMALL MANIFOLD
MV2	MAIN GAS VALVE - LARGE MANIFOLD
PS2	COMBUSTION AIR PROVING SWITCH
PS5	HIGH SPEED PRESSURE SWITCH
R24	A2L ALARM IG LOCKOUT RELAY
	REFERENCE MAIN UNIT CONTROL CENTER DIAGRAM FOR RELAY COIL WIRING
SC1	STAGE CONTROLLER
TR#	TRANSFORMER(S)

Wiring Template: S23 DOC NUMBER: 2810033 REV: 13

Valent Network Interface v10.001 Modbus/BACnet Points List

Variable	Description	BACnet Object	ModBus Object	Read or Write	Text or Unit of M		Included
					Active	Inactive	
Space_Temp_Analog_Input	Space Temperature	AI-1	30002	R	°F		X
Supply_Temp_Analog_Input	Supply Temperature	AI-2	30004	R	°F		X
Outside_Air_Temp_Analog_Input	Outside Air Temperature	AI-3	30006	R	°F		X
Mixed_Temp_Analog_Input	Mixed Temperature	AI-4	30008	R	°F		
Cold_Coil_1_Temp_Analog_Input	Cold Coil 1 Temperature	AI-5	30010	R	°F		X
Return_Temp_Analog_Input	Return Temperature	AI-7	30014	R	°F		
Exhaust_Temp_Analog_Input	Exhaust Temperature	AI-8	30016	R	°F		
Space_RH_Analog_Input	Space % Relative Humidity	AI-9	30018	R	%		
Outside_RH_Analog_Input	Outside % Relative Humidity	AI-10	30020	R	%		
Return_RH_Analog_Input	Return % Relative Humidity	AI-11	30022	R	%		
Return_Duct_Static_Pressure_Analog_Input	Return Duct Static Pressure	AI-12	30024	R	"wc		
Space_Static_Pressure_Analog_Input	Space Static Pressure	AI-13	30026	R	"wc		
Supply_Duct_Static_Pressure_Analog_Input	Supply Duct Static Pressure	AI-14	30028	R	"wc		
Space_CO2_1_Analog_Input	Space 1 CO2 ppm	AI-15	30030	R	ppm		
Return_CO2_Analog_Input	Return CO2 ppm	AI-17	30034	R	ppm		
Circuit_A_Discharge_Temp_Analog_Input	Circuit A Discharge Temperature	AI-20	30040	R	°F		X
Circuit_A_Suction_Temp_Analog_Input	Circuit A Suction Temperature	AI-21	30042	R	°F		X
Circuit_B_Discharge_Temp_Analog_Input	Circuit B Discharge Temperature	AI-22	30044	R	°F		X
Circuit_B_Suction_Temp_Analog_Input	Circuit B Suction Temperature	AI-23	30046	R	°F		X
Circuit_A_Discharge_Pressure_Analog_Input	Circuit A Discharge Pressure	AI-28	30056	R	psig		X
Circuit_A_Suction_Pressure_Analog_Input	Circuit A Suction Pressure	AI-29	30058	R	psig		X
Circuit_B_Discharge_Pressure_Analog_Input	Circuit B Discharge Pressure	AI-30	30060	R	psig		X
Circuit_B_Suction_Pressure_Analog_Input	Circuit B Suction Pressure	AI-31	30062	R	psig		X
Aux_In_Customer_1	Customer defined auxiliary input	AI-36	30072	R	selectable		
Aux_In_Customer_2	Customer defined auxiliary input	AI-37	30074	R	selectable		
Aux_In_Customer_3	Customer defined auxiliary input	AI-38	30076	R	selectable		
Aux_In_Customer_4	Customer defined auxiliary input	AI-39	30078	R	selectable		
Aux_In_Customer_5	Customer defined auxiliary input	AI-40	30080	R	selectable		
Aux_In_Customer_6	Customer defined auxiliary input	AI-41	30082	R	selectable		
Aux_In_Customer_7	Customer defined auxiliary input	AI-42	30084	R	selectable		
Aux_In_Customer_8	Customer defined auxiliary input	AI-43	30086	R	selectable		
Aux_In_Customer_9	Customer defined auxiliary input	AI-44	30088	R	selectable		
Aux_In_Customer_10	Customer defined auxiliary input	AI-45	30090	R	selectable		
Temperature_Setpoint	Main Temperature Set point Supply, Space, or Return target temperature	AV-1	40002	RW	°F		X
Temperature_Heat_Cool_Deadband	Heat/Cool Spt Deadband when Room or Return control is active Clg Spt = Deadband /2 + Temp Spt Htg Spt = Deadband /2 - Temp Spt	AV-2	40004	RW	Delta in °F		X
Temperature_Setpoint_Unoccupied	Main Temperature Set point Supply, Space, or Return target temperature	AV-3	40006	RW	°F		
Temperature_Heat_Cool_Deadband_Unoccupied	Heat/Cool Spt Deadband when Room or Return control is active Clg Spt = Deadband /2 + Temp Spt Htg Spt = Deadband /2 - Temp Spt	AV-4	40008	RW	Delta in °F		
Cooling_Coil_Setpoint_Min	Cooling Coil Leaving Air Setpoint	AV-5	40010	RW	°F		X
Cooling_Coil_Setpoint_Max	Maximum Coil Leaving Setpoint	AV-6	40012	RW	°F		X
Dehumidification_Setpoint	Dehumidification Setpoint %RH for Space or Return control	AV-7	40014	RW	%		
Outside_Dewpoint_Setpoint	Outside Dewpoint Dehumidification Trigger	AV-8	40016	RW	°F		X
Indoor_Dewpoint_Setpoint	Indoor Dewpoint Dehumidification Trigger	AV-9	40018	RW	°F		
Unocc_Indoor_Dewpoint_Setpoint	Unoccupied Indoor Dewpoint Dehumidification Trigger	AV-10	40020	RW	°F		
Unoccupied_Dehumidification_Setpoint	Unoccupied Dehumidification %RH Setpoint	AV-11	40022	RW	°F		
Economizer_Temp_Enable_Setpoint	Economizer Ambient Temp Enable Setpoint Allow Econ when OAT is less than Setpoint	AV-12	40024	RW	°F		X
Economizer_Enthalpy_Enable_Setpoint	Economizer Enthalpy Enable Setpoint Allow Econ when OA Enthalpy is less than Setpoint	AV-13	40026	RW	btu/lb		
Cooling_Lockout_Setpoint	Cooling Ambient Lockout Setpoint	AV-17	40034	RW	°F		X
Heating_Lockout_Setpoint	Heating Ambient Lockout Setpoint	AV-18	40036	RW	°F		X
Preheat_Lockout_Setpoint	Preheat Ambient Lockout Setpoint	AV-19	40038	RW	°F		
Economizer_Lockout_Setpoint	Economizer Ambient Lockout Setpoint	AV-20	40040	RW	°F		X
Return_Duct_Static_Pressure_Setpoint	Return Duct Static Pressure Setpoint	AV-21	40042	R	"wc		
Space_Static_Pressure_Setpoint	Space Static Pressure Setpoint	AV-22	40044	RW	"wc		
Supply_Duct_Static_Pressure_Setpoint	Supply Duct Static Pressure Setpoint	AV-23	40046	RW	"wc		
Space_CO2_Setpoint	Space_CO2_Setpoint	AV-24	40048	RW	ppm		
Outside_Air_Damper_Minimum_Setpoint_Occ	Outside Air Damper Minimum Setpoint	AV-24	40050	RW	%		
Outside_RH_from_BMS	Outside RH from BMS Used when source selection is set to BMS	AV-26	40052	RW	%		X
Outside_Temp_from_BMS	Outside Temp from BMS Used when source selection is set to BMS	AV-27	40054	RW	°F		X
Return_RH_from_BMS	Return RH from BMS Used when source selection is set to BMS	AV-28	40056	RW	%		X
Return_Temp_from_BMS	Return Temp from BMS Used when source selection is set to BMS	AV-29	40058	RW	°F		X

Valent Network Interface v8 Modbus/BACnet Points List

Variable	Description	BACnet Object	ModBus Object	Read or Write	Text or Unit of M		Included
					Active	Inactive	
Space_1_CO2_from_BMS	Space 1 CO2 from BMS Used when source selection is set to BMS	AV-30	40060	RW	ppm		X
Return_CO2_from_BMS	Return CO2 from BMS Used when source selection is set to BMS	AV-32	40062	RW	ppm		X
Space_RH_from_BMS	Space RH from BMS Used when source selection is set to BMS	AV-33	40066	RW	%		X
Space_Static_from_BMS	Space Static from BMS Used when source selection is set to BMS	AV-34	40068	RW	"wc		X
Space_Temp_from_BMS	Space Temp from BMS Used when source selection is set to BMS	AV-35	40070	RW	°F		X
SF_Control_Signal_BMS	BMS to control signal for supply fan speed	AV-36	40072	RW	%		X
EF_Control_Signal_BMS	BMS to control signal for exhaust fan speed	AV-37	40074	RW	%		X
OAD_Control_Signal_BMS	Allows the BMS to control OAD position	AV-38	40076	RW	%		
Aux_BMS_Analog_Output_1	BMS Commanded auxilary analog output	AV-39	40078	RW	selectable		X
Unit_Status_Mode	Unit Status Mode - See Table	AV-40	30092	R	Real		X
Supply_Temperature_Calculated_Setpoint	Active Supply Temperature Setpoint	AV-41	30094	R	°F		X
Cooling_1_Ramp_Capacity	Cooling Ramp 1 Status Value	AV-42	30096	R	%		X
Defrost_Ramp	Defrost Ramp	AV-44	30100	R	%		
Economizer_Ramp	Economizer Ramp	AV-45	30102	R	%		X
Head_Pressure_Control_Ramp_1_Ramp	Head Pressure Control Ramp 1	AV-46	30104	R	%		X
Head_Pressure_Control_Ramp_2_Ramp	Head Pressure Control Ramp 2	AV-47	30106	R	%		
HP_Ramp_Capacity	Heat Pump Heating Ramp	AV-50	30112	R	%		
Heating_Capacity	Heating Ramp	AV-51	30114	R	%		X
Case_Heat_Control_Ramp	Case Heat Ramp	AV-52	30116	R	%		
Hot_Gas_Reheat_Ramp	Hot Gas Reheat Ramp	AV-53	30118	R	%		
Outside_Dewpoint	Outside Dewpoint	AV-54	30120	R	°F		X
Outside_Enthalpy	Outside Enthalpy	AV-55	30122	R	btu/lb		X
Return_Dewpoint	Return Dewpoint	AV-56	30124	R	°F		
Return_Enthalpy	Return Enthalpy	AV-57	30126	R	btu/lb		
Space_Dewpoint	Space Dewpoint	AV-58	30128	R	°F		
Space_Enthalpy	Space Enthalpy	AV-59	30130	R	btu/lb		
Circuit_A_Superheat	Circuit A Superheat	AV-60	30132	R	°F		X
Circuit_B_Superheat	Circuit B Superheat	AV-61	30134	R	°F		X
Total_Exhaust_Fan_CFM_BMS	Total Exhaust Fan CFM	AV-64	30140	R	CFM		X
Total_Supply_Fan_CFM_BMS	Total Supply Fan CFM	AV-65	30142	R	CFM		X
OAD_CFM_BMS	OAD CFM	AV-66	30144	R	CFM		
Active_Temperature_Setpoint	Active_Temperature_Setpoint	AV-67	30146	R	°F		X
Chilled_Water_1_Valve_Analog_Output	Chilled Water 1 Valve Analog Output	AV-68	30148	R	%		
Electric_Heater_1_Analog_Output	Electric Heater 1 Analog Output	AV-70	30152	R	%		
Energy_Recovery_Analog_Output	Energy Recovery Analog Output	AV-72	30156	R	%		X
Exhaust_Fan_Speed_Analog_Output	Exhaust Fan Speed Analog Output	AV-73	30158	R	%		X
Hot_Water_Valve_1_Analog_Output	Hot Water Valve 1 Analog Output	AV-74	30160	R	%		
Mod_Gas_Furnace_1_Analog_Output	Mod Gas Furnace 1 Analog Output	AV-76	30164	R	%		X
Outside_Air_Damper_Analog_Output	Outside Air Damper Analog Output	AV-78	30168	R	%		
Supply_Fan_Speed_Analog_Output	Supply Fan Speed Analog Output	AV-79	30170	R	%		X
Modulating_Compressor_Analog_Output_BMS	First Modulating Compressor Analog Output - BMS	AV-80	30172	R	%		X
Circuit_A_Sat_Discharge_Temperature	Circuit A Saturated Discharge Temperature	AV-82	30176	R	°F		X
Circuit_B_Sat_Discharge_Temperature	Circuit B Saturated Discharge Temperature	AV-83	30178	R	°F		X
Circuit_A_Sat_Suction_Temperature	Circuit A Saturated Suciton Temperature	AV-86	30184	R	°F		X
Circuit_B_Sat_Suction_Temperature	Circuit B Saturated Suciton Temperature	AV-87	30186	R	°F		X
Coil_Temperature_Calculated_Setpoint	Calculated Coil Leaving Set point	AV-90	30192	R	°F		X
Unoccupied_Cooling_Setpoint	Active Cooling Setpoint - Unoccupied	AV-91	30194	R	°F		
Unoccupied_Heating_Setpoint	Active Heating Setpoint - Unoccupied	AV-92	30196	R	°F		
Temperature_Reset_Mode	Occupied Reset Type Setpoint 1-No Reset(Supply Temp Control) 2-Space 3-Return 4-Outside	IV-1	40080	RW	Integer		X
Temperature_Reset_Mode_Unoccupied	Unoccupied Reset Type Setpoint 1-No Reset(Supply Temp Control) 2-Space 3-Return 4-Outside	IV-2	40082	RW	Integer		
Active_Temperature_Reset_Mode	Active Occupied Reset Type Setpoint 1-No Reset(Supply Temp Control) 2-Space 3-Return 4-Outside	IV-3	30198	R	Integer		X
Active_Temperature_Reset_Mode_Unocc	Active Unoccupied Reset Type Setpoint 1-No Reset(Supply Temp Control) 2-Space 3-Return 4-Outside	IV-4	30200	R	Integer		
LatestAlm	Most recent alarm - See Alarm Table	IV-5	30202	R	Integer		X
Device_Enable_DO_Word	Device Enable DO Word - See Table	IV-6	30206	R	Bit Pack		X
Ref_Ckt_PressTemp_Alarm_Word	Refrigeration Circuit Word - See Table	IV-7	30210	R	Bit Pack		X
Device_Offline_Word	Device Offline Word - See Table	IV-8	30214	R	Bit Pack		X
Device_Alarm_Word	Device Alarm Word - See Table	IV-9	30218	R	Bit Pack		X
System_Word	System Word - See Table	IV-10	30222	R	Bit Pack		X
Unit_Status_Word	Unit Status Word - See Table	IV-11	30226	R	Bit Pack		X
Exhaust_Fan_1_Status_Digital_Input	Exhaust Fan Status	BI-1	10009	R	Active	Inactive	X
Supply_Fan_1_Status_Digital_Input	Supply Fan Status	B-2	10010	R	Active	Inactive	X

Valent Network Interface v8 Modbus/BACnet Points List

Variable	Description	BACnet Object	ModBus Object	Read or Write	Text or Unit of M		Included
					Active	Inactive	
BMS_Watchdog	BMS Watchdog command Used to determine BMS comm status Must heartbeat within the watch dog timeout delay to detect comm status	BV-1	2	RW	Active	Inactive	X
System_Enable	Master system enable/disable point	BV-2	3	RW	Enable	Disable	X
BMS_Occupancy_Command	Occupancy Command	BV-3	4	RW	Unoccupied	Occupied	X
Reset_All_Alarms	Alarm Reset Command	BV-4	5	RW	Reset	Normal	X
Exhaust_Only_Mode_BMS_Cmd	Emergancy Exhaust Mode Command	BV-5	6	RW	Enable	Disable	
Pressurization_Only_Mode_BMS_Cmd	Emergancy Pressurization Mode Command	BV-6	7	RW	Enable	Disable	
Outside_RH_Source_BMS	Outside RH Source Selection	BV-7	8	RW	BMS	Local	X
Outside_Temp_Source_BMS	Outside Temp Source Selection	BV-8	9	RW	BMS	Local	X
Return_RH_Source_BMS	Return RH Source Selection	BV-9	10	RW	BMS	Local	X
Return_Temp_Source_BMS	Return Temp Source Selection	BV-10	11	RW	BMS	Local	X
Space_1_CO2_Source_BMS	Space 1 CO2 Source Selection	BV-11	12	RW	BMS	Local	X
Space_2_CO2_Source_BMS	Space 2 CO2 Source Selection	BV-12	13	RW	BMS	Local	X
Return_CO2_Source_BMS	Return CO2 Source Selection	BV-13	14	RW	BMS	Local	X
Space_RH_Source_BMS	Space RH Source Selection	BV-14	15	RW	BMS	Local	X
Space_Static_Source_BMS	Space Static Source Selection	BV-15	16	RW	BMS	Local	
Space_Temp_Source_BMS	Space Temp Source Selection	BV-16	17	RW	BMS	Local	X
SF_Control_Source_BMS	Allows the BMS to control supply fan speed	BV-17	18	RW	BMS	Local	X
EF_Control_Source_BMS	Allows the BMS to control exhaust fan speed	BV-18	19	RW	BMS	Local	X
OAD_Control_Source_BMS	Allows the BMS to control OAD position	BV-19	20	RW	BMS	Local	
Aux_BMS_Digital_Output_1	BMS Commanded auxilary digital output	BV-20	21	RW	Active	Inactive	
Aux_BMS_Digital_Output_2	BMS Commanded auxilary digital output	BV-21	22	RW	Active	Inactive	
Occupied	Occupancy	BV-22	10002	R	Occupied	Unoccupied	X
Global_Alarm	General alarm point Optionally set to indicate any alarm is active, or a shutdown alarm is active	BV-23	10003	R	Alarm	Normal	X
BMS_Watchdog_Active	Status of the BMS watchdog heartbeat	BV-24	10004	R	Active	Inactive	X
OAD_Feedback_Error_Not_Economizing.Active	Feedback indicates OAD is not opening during economizer	BV-25	10005	R	Alarm	Normal	
OAD_Feedback_Error_Economizing.Active	Feedback indicates OAD is open	BV-26	10006	R	Alarm	Normal	
OAD_Feedback_Error_OAD_Not_Modulating.Active	Feedback indicates the OAD is not modulating	BV-27	10007	R	Alarm	Normal	
OAD_Feedback_Error_Excess_OA.Active	Feedback indicates the OAD is not closing	BV-28	10008	R	Alarm	Normal	
Supply_Fan_1_Alarm.Active	Supply Fan Alarm Active	BV-29	10011	R	Alarm	Normal	X
Exhaust_Fan_1_Alarm.Active	Exhaust Fan Alarm Active	BV-30	10012	R	Alarm	Normal	X
Drain_Pan_Alarm.Active	Condensate Drain Pan Alarm Active	BV-31	10013	R	Alarm	Normal	X
Fire_Safety_Shutdown_Alarm.Active	Fire Safety Shutdown Alarm Active	BV-32	10014	R	Alarm	Normal	X
Refrigerant_Leak_Compressor_Alarm.Active	Refrigerant Leak Compressor Alarm Active	BV-33	10015	R	Alarm	Normal	X
Refrigerant_Leak_Airstream_Alarm.Active	Refrigerant Leak Airstream Alarm Active	BV-34	10015	R	Alarm	Normal	X

System_Word (IV-11/AV-102 & AV-103)		
IV-10 Bit	AV-102 Bit	Bit Description
0	0	Heat Wheel Enable
1	1	Preheat Enable
2	2	Reversing Valve (Cooling (0)/Heating(1))
3	3	
4	4	OA Damper End Switch Alarm
5	5	EA Damper End Switch Alarm
6	6	Supply Temp Low Limit Alarm
7	7	Supply Temp High Limit Alarm
8	8	Supply High Duct Static Alarm
9	9	Supply Fan 1 Alarm
10	10	Exhaust Fan 1 Alarm
11	11	Drain Pan Alarm
12	12	Freeze Stat Alarm
13	13	Filter Alarm
14	14	Space High Static Alarm
15	15	Return Low Static Alarm
IV-10 Bit	AV-103 Bit	Bit Description
16	16	Shutdown Input Alarm
17	17	Energy Recovery Wheel High Diff Pressure
18	18	Energy Recovery Wheel Rotation Alarm
19	19	
20	20	Heat Pump Heating Lock Out Alarm
21	21	BMS Frequent Writes - Reduce Num of Writes
22	22	BMS Offline Alarm
23	23	
24	24	
25	25	
26	26	
27	27	
28	28	Heat-Cool Only - Dehumidification Request Active
29	29	Heat-Cool Only - Heating Request Active
30	30	Heat-Cool Only - Coil Setpoint Alarm Active
31	31	Heat-Cool Only - Supply Setpoint Alarm Active

Unit Status Word Table (IV-11/AV-104 & AV-105)		
IV-11 Bit	AV-104 Bit	Bit Description
0	0	Standby
1	1	Occupied Start
2	2	Unoccupied Start
3	3	Opening Dampers
4	4	Dampers Open
5	5	Fan Start Delay
6	6	Exhaust Fan On
7	7	Supply Fan On
8	8	System On
9	9	Soft Shutdown
10	10	System Disabled
11	11	Remote Off
12	12	System Shutdown Alarm
13	13	Supply Fan Only
14	14	Exhaust Fan Only
15	15	Purge Mode (Supply and Exhaust Only)
IV-11 Bit	AV-105 Bit	Bit Description
16	16	Case Heat Active
17	17	Fans Only
18	18	Economizing
19	19	Energy Recovery Active
20	20	Cooling
21	21	Heating
22	22	Dehumidifying
23	23	Hot Gas Reheat Active
24	24	HGRH Purging
25	25	Dehum w/Heat
26	26	Energy Recovery Defrost Active
27	27	Heat Pump Defrost Active
28	28	Morning Warm Up/Cool Down Active
29	29	Winter Ramp Active
30	30	
31	31	Overrides Active

Device Enable DO Word Table (IV-6/AV-94 & AV-95)		
IV-6 Bit	AV-94 Bit	Bit Description
0	0	Compressor 1 Start
1	1	Compressor 2 Start
2	2	Compressor 3 Start
3	3	Compressor 4 Start
4	4	
5	5	
6	6	
7	7	
8	8	Condenser Fan Ramp 1 Stage 1 Start
9	9	Condenser Fan Ramp 1 Stage 2 Start
10	10	Condenser Fan Ramp 1 Stage 3 Start
11	11	
12	12	Condenser Fan Ramp 2 Stage 1 Start
13	13	Condenser Fan Ramp 2 Stage 2 Start
14	14	Condenser Fan Ramp 2 Stage 3 Start
15	15	
IV-6 Bit	AV-95 Bit	Bit Description
16	16	Furnace 1 Start (External Furnace Controller Only)
17	17	Furnace 2 Start (External Furnace Controller Only)
18	18	
19	19	
20	20	Supply Fan Start
21	21	Exhaust Fan Start
22	22	
23	23	
24	24	
25	25	
26	26	
27	27	
28	28	
29	29	
30	30	
31	31	

Ref Ckt Press temp Alarm Word Table (IV-7/AV-96 & AV-97)		
IV-7 Bit	AV-96 Bit	Bit Description
0	0	Circuit A Discharge Pressure Sensor Alarm
1	1	Circuit A Discharge Temp Sensor Alarm
2	2	Circuit A Suction Pressure Sensor Alarm
3	3	Circuit A Suction Temp Sensor Alarm
4	4	Circuit B Discharge Pressure Sensor Alarm
5	5	Circuit B Discharge Temp Sensor Alarm
6	6	Circuit B Suction Pressure Sensor Alarm
7	7	Circuit B Suction Temp Sensor Alarm
8	8	Circuit A High Pressure Switch Alarm
9	9	Circuit A Low Refrigerant Pressure Alarm
10	10	Circuit B High Pressure Switch Alarm
11	11	Circuit B Low Refrigerant Pressure Alarm
12	12	Circuit A High Sat Discharge Temp Alarm
13	13	Circuit B High Sat Discharge Temp Alarm
14	14	
15	15	
IV-7 Bit	AV-97 Bit	Bit Description
16	16	
17	17	
18	18	
19	19	
20	20	
21	21	
22	22	
23	23	
24	24	
25	25	
26	26	
27	27	
28	28	
29	29	
30	30	
31	31	

Device Offline Word Table (IV-8/AV-98 & AV-99)		
IV-8 Bit	**AV-98 Bit**	**Bit Description**
0	0	Cold Coil Temperature Sensor Alarm
1	1	
2	2	Mixed Temperature Sensor Alarm
3	3	Supply Duct Static Pressure Sensor Alarm
4	4	Supply Fan AFMS Alarm
5	5	Supply Air Temp Sensor Alarm
6	6	Exhaust Fan AFMS Alarm
7	7	Exhaust Temperature Sensor Alarm
8	8	Outside Air Temp Sensor Alarm
9	9	Outside RH Sensor Alarm
10	10	OAD AMD Alarm
11	11	Greentrol OAD AFMS Alarm
12	12	Return CO2 Sensor Alarm
13	13	Return Duct Static Pressure Sensor Alarm
14	14	Return Temperature Sensor Alarm
15	15	Return RH Sensor Alarm
IV-8 Bit	**AV-99 Bit**	**Bit Description**
16	16	Space CO2 Sensor Alarm
17	17	Space RH Sensor Alarm
18	18	Space Static Pressure Sensor Alarm
19	19	Space Temperature Sensor Alarm
20	20	IG Furnace Alarm
21	21	
22	22	Inverter Scroll 1 Alarm
23	23	
24	24	EVD Valve A Alarm
25	25	
26	26	SF VFD Alarm
27	27	EF VFD Alarm
28	28	
29	29	
30	30	
31	31	

Device Alarm Word Table (IV-9/AV-100 & AV-101)		
IV-9 Bit	**AV-100 Bit**	**Bit Description**
0	0	Space TStat 1 Offline
1	1	Space TStat 2 Offline
2	2	Space TStat 3 Offline
3	3	Space TStat 4 Offline
4	4	VFD Offline Supply Fan
5	5	VFD Offline Exhaust Fan
6	6	
7	7	
8	8	Expansion Board 1 Alarm
9	9	Expansion Board 2 Alarm
10	10	Expansion Board 3 Alarm
11	11	Expansion Board 4 Alarm
12	12	
13	13	
14	14	
15	15	
IV-9 Bit	**AV-101 Bit**	**Bit Description**
16	16	
17	17	
18	18	
19	19	
20	20	
21	21	
22	22	
23	23	
24	24	
25	25	
26	26	
27	27	Primary Unit Offline Alarm
28	28	Secondary Unit 1 Offline Alarm
29	29	Secondary Unit 2 Offline Alarm
30	30	Secondary Unit 3 Offline Alarm
31	31	Secondary Unit 4 Offline Alarm

UNIT STATUS MODE (AV-40)			
0	Standby	20	Economizing
1	Unoccupied Start	21	Cooling
2	Occupied Start	22	Heating
3	Opening Dampers	23	Dehumidifying
5	Dampers Open	24	
6	Fan Start Delay	25	HGRH Purging
7	Exhaust Fan Start	26	Energy Recovery Defrost Active
8	Supply Fan Start	27	A2L Refrigerant Leak Alarm
9	Startup Delay	28	A2L Refrigerant Leak Alarm Fan Only Mode
10	System On	29	Dehumifying w/Heat
11	Soft Shutdown	30	Overrides
12	System Disabled	31	Expansion Offline
13	Remote Off	32	
14	System Shutdown Alarm	33	Energy Recovery Active
15	Pressurization Only	34	Hot Gas Reheat Active
16	Exhaust Only	35	Morning Sequence Active
17	Fans Only Purge	36	Heat Pump Defrost
18	Case Heat Active	37	Winter Ramp Active
19	Fans Only		

Alarm Table (IV-5/AV-93)					
0	Supply Fan 1 Run - Status Not Proven	64	Heat Wheel Rotation - Not Detected	122	First Inverter Alarm - Serious
1	Freeze Protection - Thermostat Tripped	65	Secondary Unit Offline - Unit 1	123	First Inverter Alarm - Irreversible
2	High Supply Duct - Static Pressure	66	Secondary Unit Offline - Unit 2	124	First Inverter PEC - Invalid Data Set
3	Low Return Duct - Static Pressure	67	Secondary Unit Offline - Unit 3	125	First Inverter STO - Safe Torque Off Open
4	Outside Air Temp - Sensor Value Not Valid	68	Secondary Unit Offline - Unit 4	126	First Inverter Offline - Modbus Comms Lost
5	Supply Air Temperature - Sensor Value Not Valid	69	Primary Unit Offline -	133	Space Thermostat 1 - Sensor Offline
6	Cold Coil 1 Temp - Sensor Value Not Valid	71	Multi Devices per Ch - Contact Tech Support	134	Space Thermostat 2 - Sensor Offline
7	Cold Coil 2 Temp - Sensor Value Not Valid	74	Shutdown Contact - In Alarm Position	135	Space Thermostat 3 - Sensor Offline
9	Exhaust Air Temp - Sensor Value Not Valid	75	Comp Maint Alarm - Run Hours Spt Reached	136	Space Thermostat 4 - Sensor Offline
10	Mixed Air Temperature - Sensor Value Not Valid	76	Supply Air Temperature - High Limit Shutdown	137	IG Furnace 1 - No flame after 3 tries
11	Return Air Temperature - Sensor Value Not Valid	77	Space High Static Pres - Shutdown	138	IG Furnace 1 - Large - No flame after 3 tries
12	Space Temperature - Sensor Value Not Valid	78	Internal Board Temp - Exceeds -40F or 158F	139	IG Furnace 1 Combust - Fan High Pressure Sw
13	Return Air RH - Sensor Value Not Valid	79	BMS Offline - Watchdog is FALSE	140	IG Furnace 1 Ignition - Controller Alarm
14	Space RH - Sensor Value Not Valid	78	Internal Board Temp - Exceeds -40F or 158F	138	IG Furnace 1 Large - no flame after 3 tries
15	Outside RH - Sensor Value Not Valid	80	Clg Coil Setpt Input - Value is not valid	141	IG Furnace 1 Pressure - Switch Fault Alarm
16	Low Pressure Switch - Circuit A	81	Sup Air Setpt Input - Value is not valid	142	IG Furnace 1 Combust - Fan Proving Alarm
17	Low Pressure Switch - Circuit B	82	BACnet License - Not Installed	143	IG Furnace 1 - Max Retries
20	High Pressure Switch - Circuit A	83	Low Suction SH ExV A - EVD 1 Alarm	144	IG Furnace 1 - High Limit Trip
21	High Pressure Switch - Circuit B	85	LOP A EVD 1 - Low Operating Pressure	145	IG Furnace - pCOe 1 Offline
24	Damper End Switch Fail - Dampers are not open	87	MOP A EVD 1 - Max Operating Pressure	146	IG Furnace 1 IC Fault - Check Furnace Wiring
25	Exhaust Fan 1 Run - Status Not Proven	89	EEV A EVD 1 - Motor Alarm	147	IG Furnace 2 - No flame after 3 tries
26	Filters are Dirty - Replace Filters	91	LowSuct A EVD 1 - Refrigerant Temp	148	IG Furnace 2 - Large - No flame after 3 tries
27	Cond Drain Pan Full - Check Drain	93	High Condensing Temp - EVD 1	149	IG Furnace 2 Combust - Fan High Pressure Sw
28	Exp Board 1 Status - Board is Offline	94	Sens S1 EVD 1 - Sensor Value Not Valid	150	IG Furnace 2 Ignition - Controller Alarm
29	Exp Board 2 Status - Board is Offline	95	Sens S2 EVD 1 - Sensor Value Not Valid	151	IG Furnace 2 Pressure - Switch Fault Alarm
30	Exp Board 3 Status - Board is Offline	96	Sens S3 EVD 1 - Sensor Value Not Valid	152	IG Furnace 2 Combust - Fan Proving Alarm
31	Exp Board 4 Status - Board is Offline	97	Sens S4 EVD 1 - Sensor Value Not Valid	153	IG Furnace 2 - Max Retries
32	BMS Frequent Writes - Reduce Num of Writes	98	EVD 1 EEPROM Damaged - Call Tech Support	154	IG Furnace 2 - High Limit Trip
33	Space 1 CO2 - Sensor Value Not Valid	99	Incomplete Closing - EVD 1	155	IG Furnace - pCOe 2 Offline
34	Space Static Pressure - Sensor Value Not Valid	100	Emergency Closing - EVD 1	156	IG Furnace 2 IC fault - Check Furnace Wiring
35	Supply Duct Stat Press - Sensor Value Not Valid	101	EVD 1 Battery	157	Outside Air Greentrol - Offline or Flow Error
36	Return Duct Stat Press - Sensor Value Not Valid	102	FW Incompatibility - EVD 1	158	Exhaust Air Greentrol - Offline or Flow Error
37	Sup Fan AFMS - Sensor Value Not Valid	103	EVD 1 Config Error	159	Supply Air Greentrol - Offline or Flow Error
38	Exh Fan 1 AFMS - Sensor Value Not Valid	104	EVD 1 Comm - EVD 1 is Offline	169	ER Wheel High - Differential Pressure
39	Outside Damper AFMS - Sensor Value Not Valid	105	High Discharge Temp - First Inv Envelope	170	OA Damper Fault - Not Econ and should be
40	Space Setpt Adj Slider - Sensor Value Not Valid	106	Low Discharge Pressure - First Inv Envelope	171	OA Damper Fault - Econ and shouldn't be
41	Space 2 CO2 - Sensor Value Not Valid	107	High Suction Pressure - First Inv Envelope	172	OAD Fault - Damper not Modulating
42	Return CO2 - Sensor Value Not Valid	108	Low Suction Pressure - First Inv Envelope	173	OAD Fault - Excess Outdoor Air
43	Discharge Press Ckt A - Sensor Value Not Valid	109	High Current - First Inv Envelope	174	IG Furnace 1 - Combustion Fan Alarm
44	Discharge Press Ckt B - Sensor Value Not Valid	110	High Pressure Ratio - First Inv Envelope	175	IG Furnace 2 - Combustion Fan Alarm
47	Suction Press Ckt A - Sensor Value Not Valid	111	Low Pressure Ratio - First Inv Envelope	176	Supply Fan - VFD Offline
48	Suction Press Ckt B - Sensor Value Not Valid	112	Low Delta P - First Inv Envelope	177	Exhasut Fan - VFD Offline
51	Discharge Temp Ckt A - Sensor Value Not Valid	113	High Discharge Press - First Inv Envelope	180	Embedded EVD Error
52	Discharge Temp Ckt B - Sensor Value Not Valid	114	Compressor Staging - Order Skipped	181	SF VFD Alarm - Check VFD
55	Suction Temp Ckt A - Sensor Value Not Valid	115	Heat Pump Heating - Locked Out	182	EF VFD Alarm - Check VFD
56	Suction Temp Ckt B - Sensor Value Not Valid	116	EVD 1 Error - Unexpected Position	186	Compressor Refrig Leak - Furnace Locked Out
59	Ckt A High Saturated - Discharge Temperature	117	High SDT Lockout - Circuit A	187	Airstream Refrig Leak - SF Mitigation Sequence
60	Ckt B High Saturated - Discharge Temperature	118	High SDT Lockout - Circuit B	188	Fire Shutdown Alarm - Building Fire Alarm
63		121	First Inverter Alarm - Resettable	189	EA Damper End Switch - Damper is not open

VXE-112

Factory Controller Sequence of Operation

FACTORY CONTROLLER: Controller shall be provided with required sensors and programming for rooftop unit. Controller shall be factory programmed, mounted and tested. Controller shall have a LCD readout for changing set points and monitoring unit operation.

UNIT START COMMAND (Unit will be enabled to start once a jumper is placed between R to G):

- Factory mounted and wired outdoor air and recirculated air damper actuators are powered.
- Exhaust fan starts after a (adj.) delay.
- Supply fan starts after a (adj.) delay.
- Tempering options and energy wheel option to function as described below.

UNIT STOP COMMAND (OR DE-ENERGIZED):

- Supply fan, exhaust fan, energy wheel and tempering options de-energized.
- Outdoor air damper actuator is spring return close, and the recirculated air damper actuator is spring open.

OCCUPIED/UNOCCUPIED MODES: Shall be based on a 7-day time clock internal to the controller. The schedule shall be set by the end user. When a user initiates an override input, the controller will switch from unoccupied to occupied mode. The controller will return to the scheduled occupied/unoccupied mode after the override time has expired. If internal time clock is disabled, a remote contact or a BMS can control the occupied/unoccupied mode.

Occupied Mode:

- Damper control per below.
- Energy wheel control per below.
- Exhaust fan ON.
- Supply fan ON.
- Heating per below.
- Cooling per below.

Unoccupied mode (Cycle on Room Temp): The unit will cycle to maintain unoccupied room set points if there is a call for unoccupied heating, cooling or dehumidification.

- Supply fan OFF
- Exhaust fan OFF
- Recirculation air damper open.
- Outdoor air damper closed.
- On a call for heating (room temp set point – differential) supply fan cycles ON, and the heating increases the room temperature. Unit cycles off when room temperature reaches the unoccupied set point (adj.).
- On a call for cooling (room temp set point + differential) supply fan cycles ON, and the cooling decreases the room temperature. Unit cycles off when room temperature reaches the unoccupied set point (adj.)

MORNING WARMUP/COOL DOWN: Prior to occupancy, the unit will run using the warmup or cool down sequence until the occupied set point is achieved. The heating or cooling mode must not be locked out and the space temperature is below or above set point by the unoccupied hysteresis (adj.) (This Sequence must be field configured.)

SUPPLY BLOWER SEQUENCE: The supply blower is provided with a factory mounted variable frequency drive. The supply blower speed will be controlled with the following sequence. Minimum supply fan turndown is 50% of the design maximum operation.

Constant Volume-Adj. Setpoint: The supply blower will operate at a constant speed set point (adj.) during operation.

EXHAUST BLOWER SEQUENCE: The exhaust blower will operate at a constant speed set point (adj.) during operation.

Constant Volume-Adj. Setpoint: The exhaust blower will operate at a constant speed set point (adj.) during operation.

COOLING SEQUENCE: The cooling is controlled to maintain the supply temperature set point. The mechanical cooling will be locked out when the outside air is < 55 F (adj.).

Packaged DX Cooling (Inverter Scroll): The controller will provide a modulating signal for cooling. From 0-100%, the inverter scroll will be controlled to maintain discharge temperature. The electronic expansion valve will modulate to maintain 8 of superheat.

Modulating Hot Gas Reheat Sequence: During dehumidification the modulating HGRH is controlled to maintain the supply temperature set point.

Modulating Head Pressure Control: Lead condenser fan will have an EC motor and will modulate to maintain a head pressure set point.

DEHUMIDIFICATION CONTROL SEQUENCE: Dehumidification to be enabled and once enabled the cooling coil will be controlled based on the following sequences. The mechanical cooling will be locked out when the outside air is < 55 F (adj.)

Cold Coil Set Point Control: When in dehumidification mode the controller will control the cooling to maintain a constant cold coil set point. The active set point will be set to local control (55 F, adj.) from the factory and can be field adjusted locally or by the BMS.

Dehumidification Enable: Dehumidification mode to be enabled based on the outside air dew point condition. When the outside air dew point is greater than the desired set point (adj.), the unit will operate in dehumidification mode.

REHEAT SEQUENCE: While the unit is in dehumidification mode the outdoor air will be reheated via Modulating Hot Gas Reheat for space neutral applications.

Modulating Hot Gas Reheat: The controller will modulate the hot gas reheat reheat valve with a 0-10 V signal to maintain the supply temperature set point (adj.).

HEATING SEQUENCE: The heating is controlled to maintain the supply temperature set point. The heating will be locked out when the outside air is > 80 F (adj.).

Indirect Gas Furnace: The controller will modulate the indirect gas furnace to maintain the supply temperature set point (adj.).

TEMPERATURE CONTROL SEQUENCE: The unit will maintain the supply air discharge setpoint per the following. Adjustable locally or by BMS.

Room Reset: The controller will reset the supply air temperature set point to maintain the room temperature set point (adj.).

Supply Discharge Temperature Control: The supply setpoint will be a constant temperature setpoint from the controller (adj.). Adjustable locally or by BMS.

BUILDING FREEZE PROTECTION: If the supply air temperature drops below 35 F (adj.) for 300s (adj.), the controller will de-energize the unit and activate the alarm output.

TEMPERATURE PROTECTION: The controller will enable the supply fan to modulate down to help the unit keep up with heating demand in the event of wheel failure or the unit operating outside design conditions. (This can be enabled under the manufacturer menu in the controller)

UNIT LEAK DETECTION AND MITIGATION: The unit will be equipped with refrigerant leak detection sensors. These sensors along with the following sequence of operation are required per UL60335-2-40.

Dry alarm contacts available to allow the building (by others) to perform external mitigation actions when necessary. These by other external actions include opening of zone dampers in the ductwork, disabling duct mounted electric resistance heaters, and/or enabling additional mechanical ventilation if required per ASHRAE 15.

Refrigerant Leak Detected In Compressor Compartment: If a refrigerant leak is detected in the compressor compartment and the unit is configured with an indirect gas furnace, the furnace will be disabled while leak detection is active. After leak detection is cleared, the unit will go back to normal operation.

ENERGY WHEEL FROST CONTROL: Frost control for the energy wheel is enabled when frost is present on the wheel; based on the outside air temperature and the pressure drop across the wheel. If the outdoor air temperature is below 5 F adj. and the differential pressure across the wheel is about 1.5", adj. frost control will enable.

Wheel VFD (Modulate Wheel): When frosting is occurring, the VFD modulates the wheel down to a slow rotational speed to defrost wheel. Once either the pressure drop decreases below the pressure switch set point, or the outdoor air temperature increases about the temperature set point, the unit will resume normal operation.

ECONOMIZER SEQUENCE: When the application requires cooling, and the outdoor air conditions are suitable for free cooling, the controller will modulate the energy wheel speed to maintain the discharge temperature set point. If the energy wheel speed modulates to the economizer set point and the supply air temperature is not met, the controller will increase the call for cooling to meet the supply air temperature and could engage mechanical cooling.

Temperature: The economizer will be locked out when: the outside air temperature is outside of the set point ranges set within the controller (adj.), the unit is operating in dehumidification mode, or there is a call for heating.

ENERGY WHEEL SEQUENCE

Modulate Wheel: When economizer mode is enabled and there is a signal for cooling, the wheel VFD modulates wheel speed to maintain the supply air temperature set point.

ALARMS INDICATION: The controller will display alarms and have one digital output for remote indication of an alarm condition. Possible alarms include:

Building Management System: The controller will send all alarms to the BMS.

Dirty Filter Alarm: A digital signal is sent to the controller indicating an increased pressure drop across the outdoor, exhaust, or supply air filters (Must be adjusted in field during start up). The controller will then provide a dirty filter alarm.

Dirty Wheel Alarm: The controller monitors pressure across the wheel and sends an alarm in the case of an increased pressure drop.

Wheel Rotation Alarm: The controller monitors wheel rotation, if the wheel does not rotate for a set period of time (adj.) an alarm will generate.

Supply and Exhaust Air Alarm: The controller monitors the proving switch on each blower and sends an alarm in the case of either blower proving switch not engaging.

DX Alarm: The controller monitors the refrigerant pressure. In the case of low refrigerant pressure the compressors will shut down until refrigerant pressure returns to normal values and the controller will send an alarm. In the case of high refrigerant pressure the compressors will shut down, requiring a manual reset and the controller will send a alarm.

Temperature Sensor Alarm: The controller sends an alarm in the case of a failed air temperature sensor.

ACCESSORIES: The following accessories will be included with the unit to expand the functionality or usability of the controller.

BMS Interfacing: A BMS port or serial card is provided with the controller for field interfacing with a building management system. Each card is sent out with the default parameters, and the controls contractor must change the appropriate addresses to match the BMS settings.

Phase and Brownout Protection: Factory mounted and wired component which monitors the main power coming into the unit. If a phase drops out, or if the incoming voltage exceeds the acceptable range, the component will turn off the unit to help protect the electrical systems.

Condensate Overflow Unit Shutdown: Factory mounted condensate overflow switch wired to the unit controller. The controller monitors the condensate overflow switch. If the water level in the drain pan reaches a certain level, the unit will shutdown and send an alarm.

Warranty Statement for Dedicated Outdoor Air Systems (DOAS)

Unit Warranty

Valent warrants the equipment to be free from defects in material and workmanship for a period of 18 months from ship date. Initial startup must be completed within six months of the shipment date, and a startup report must be submitted to Valent.

Energy Wheel Warranty

The energy recovery wheel is warranted to be free from defects in material and workmanship for a period of 5 years from the shipment date. This warranty applies to all parts and components in the energy recovery cassettes with the exception of the motor.

Heat Exchanger Extended Warranty

Valent warrants the stainless steel heat exchanger to be free from defects in material and workmanship for a period of 25 years from the shipment date.

Compressor Extended Warranty

Valent warrants the refrigerant compressor(s) to be free from defects in material and workmanship for a period of 5.5 years from the shipment date.

Warranty Notes

Any component which proves defective during the warranty period will be repaired or replaced at Valent's sole option when returned to our factory, transportation prepaid. All warranties do not include labor costs associated with troubleshooting, removal, or installation. Valent will not be liable for any consequential, punitive, or incidental damages resulting from use, repair, or operation of any Valent product. These warranties are exclusive and are in lieu of all other warranties, whether written, oral, or implied, including the warranty of merchantability and the warranty of fitness for a particular purpose. No person (including any agent or salesperson) has authority to expand Seller's obligation beyond the terms of this warranty, or to state that the performance of the product is other than that published by Seller.

As a result of our commitment to continuous improvement, Valent reserves the right to change specifications without notice.

GKD Roof Curb

Model: GKD-45.9/142.9-G24

Curb Height (in.)	Curb Length (in.)	Curb Width (in.)	Material	Finish Type	Duct Adapter	Curb Weight (lb)
24	142.9	45.9	Galvanized	Galvanized	Yes	333

Standard Construction Features:
All dimensions shown are actual and in units of in.'s
If unit is selected with side or end discharge/return, there will not be bottom connections supplied with the curb.
14 gauge galvanized steel (perimeter channels).
14 gauge galvanized steel (interior channels).
Ships knocked down for field assembly.
Curb insulation to be provided by others.

Curb Detail