LETTER OF TRANSMITTAL

SHP
312 Plum Street, Suite 700
Cincinnati, OH 45202

Phone: 513-381-2112
Fax: 513-381-5121
eMail: kbarolovicht@shp.com

TO:	Marcus Pickworth	FROM:	Kate Bartolovich
COMPANY:	Shook Construction 2000 W. Dorothy Lane Moraine, OH 45439	RE:	Dayton Regional STEM New Elementary School (K-5)
DATE:	10/22/2024	COMM NO.:	2024026.01

We are Sending You the Following Items ◉ Attached ○ Under a Separate Cover VIA _____

☐ Copy of Letter ☐ Prints ☐ Specifications
☒ Shop Drawings ☐ Change Order ☐ Pay Application
☐ Plans ☐ Samples ☐ Other..

COPIES		DIV. NO.	DESCRIPTION
1			237416.13-22 Packaged, Large-Capacity, Rooftop Air Conditioning Units (PD, SD, DD & Elite Air revision sketch) **RTU-CR1 PAGE 7** **RTU-CR2 PAGE 66** **RTU-CR3 PAGE 36** **RTU-GYM PAGE 111** **RTU-OFFICE PAGE 123**

THESE ARE TRANSMITTED as checked below

☐ For Approval ☐ Reviewed as Submitted ☐ Resubmit _____ copies for approval
☐ For Your Use ☒ Reviewed as Noted ☐ Submit _____ copies for approval
☐ For Review & Comments ☐ Returned for Corrections ☐ Return _____ corrected prints

REMARKS

"Reviewed as Noted"

IF ENCLOSURES ARE NOT AS NOTED, PLEASE NOTIFY SIGNEE

COPIED TO

SIGNED K Bart

Kate Bartolovich
SHP - Construction Admin

Built-in cover page

22-0:Packaged, Large-capacity, Rooftop Air-Conditioning Units - Product Data, Shop Drawings, Delegated Design Submittal

Status	**Open** Submitted
Spec section	237416.13 Packaged, Large-capacity, Rooftop Air-conditioning units
Manager	**Caitlin Erbacher** (Shook Construction)
Responsible contractor	**Caitlin Erbacher** (Shook Construction)
Reviewers step 01	**Kate Bartolovich** (SHP) **Brock Rossel** (SHP)

☐ Reviewed ☑ Reviewed as Noted	Fabrication/Installation may be undertaken. Reviewed does not authorize changes to the Contract Sum or Contract Time.
☐ Revise and Resubmit ☐ Rejected	Fabrication and/or Installation MAY NOT be undertaken. In resubmitting limit corrections to items marked.

Reviewed neither extends nor alters any contractual obligations of the Architect or Contractor.

SHP
312 Plum Street Suite 700
Cincinnati, OH 45202

By: Kunal Shah Date: 10/22/2024

1) RTU-CR-3 - 600 MBH gas input load is less than the scheduled 800 MBH on the drawings.

2) RTU-CR-2 - 600 MBH gas input load is more than the scheduled 500 MBH on the drawings.

3) RTU-Office - 200 MBH gas input load is less than the scheduled 240 MBH on the drawings.

4) Notes 1,2, and 3 have been coordinated with Plumbing engineers and no gas pipe size change is required. Mechanical Contractor to coordinate with Plumbing Contractor.

5) RTU-Office is approximately 987 lbs heavier than the basis of design. It is heavy enough to require the joists in that area to be upsized. The CM to confirm structural modifications prior to ordering. Coordinate exact details with Structural engineer ASAP.

6) Electrical MCA and MOCP are different from the basis of design. MC to coordinate circuit breaker changes with EC ASAP.

STARCO, Inc.

Submittal Review

PO BOX 170160 • DAYTON OH 45417-0160 • PHONE 937/461-2422 • FAX 937/461-2922

STARCO, INC. JOB No. 202426
SUBMITTAL NUMBER: 5A
Project: Dayton STEM School
PROJECT I.D.
PRODUCT DESCRIPTION: Packaged, Large-Capacity, Rooftop Air Conditioning Units Product Data Shop Drawings Delegated Design Submittal
SPEC SECTION: 23 74 16.13
SPEC PAGE: All
SPEC PARAGRAPH: All
DATE: 10-8-24
Reviewed By: Jonathan Stumpf

Starco Inc. certifies the specifications have been read, complied with and has been checked by Jonathan Stumpf

Dayton Regional STEM K-5
2850 Donation Circle
Kettering, OH 45240

Packaged Rooftop Units
Specification: 237416.13

Submission Date: 9.9.2024

SHP
312 Plum St, Suite 700
Cincinnati, OH 45202

Engineering Account Executive:
Brett Graham
bgraham@elitaire.com
859-380-4782

Starco, Inc.
1147 S. Broadway St.
Dayton, OH 45417

Contractor Account Executive
Mike Kirchens
mkirchens@elitaire.com
937-776-7304

ElitAire Responsibility Matrix

Equipment	Startup Services	Labor Warranty	VFDs	Disconnects
RTU-CR1	YES	NO	YES	YES
RTU-CR2	YES	NO	YES	YES
RTU-CR3	YES	NO	YES	YES

Important Information

Equipment	Clarifications & Exclusions
RTUs	**General** Painted galvanized steel casing with 2,500 hr. salt spray rating 2” double wall with R-13 foam injected insulation **Electrical** Factory installed disconnect 5kVA SCCR 115V convenience outlet **(field powered)** **Energy Recovery (RTU-CR1, RTU-CR2, RTU-CR3)** Total enthalpy energy recovery wheel Stainless steel drain pan Bypass damper for economizer Modulating wheel for frost control 2” MERV-8 exhaust and outdoor air filters **(2 sets each)** Direct drive exhaust fan Factory installed VFD with shaft grounding ring Outside airflow monitoring station **DX Cooling** Variable speed inverter driven compressor 2” MERV-8 and 2” MERV-13 supply air filters **(2 sets)** Stainless steel drain pan

Condenser
Variable speed condenser fans

Indirect Fired Gas Heat
Stainless steel heat exchanger
Fully modulating control

Supply Fan
Direct drive fan
Factory installed VFD and motor shaft grounding
Multi-zone VAV duct static pressure control **(RTU-CR1, RTU-CR2, RTU-CR3)**

Controls
Factory installed DDC unit controller
BACnet integration card

Roof Curb
14” welded, insulated
Wind-rated
Vibration isolation rails RTU-CR2 and RTU-CR3

Start-up and Warranty
Factory start-up and owner training
2-year complete unit parts warranty
5-year compressor parts warranty
5-year energy recover wheel parts warranty
25-year heat natural gas heat exchanger warranty

Exclusions
Rigging and installation supervision
Seismic Calculations

valent

Printed Date: 09/09/2024
Job: Dayton Regional STEM K-5
Mark: RTU-CR1
Model: VXE-212-52C-17.5K-J-G2

VXE-212-52C-17.5K-J-G2

Unit Performance

4900 CFM @ Economizer

Design Conditions

Elevation (ft)	Summer DB (F)	Summer WB (F)	Winter DB (F)	Supply (CFM)	Outdoor Air (CFM)	Recirc Air (CFM)	Exhaust Air (CFM)
1,237	89.0	72.0	4.0	7,000	2,500	4,500	2,500

Unit Specifications

Qty	Weight (lb)	Cooling Type	Heating Type	Unit Installation	Unit ETL Listing	Furnace ETL Listing
1	4,459 (+/- 5%)	Packaged DX	Indirect Gas	Outdoor	UL\cUL 1995/ 60335-2-40	ANSI Z83.8 / CSA 2.6

Configuration

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

ASHRAE 90.1-2022 Compliance

	ASHRAE 90.1 Min. Efficiency	Calculated Efficiency	Compliance
EER	10.8	11.2	✓
IEER	14.0	18.5	✓
Enthalpy Recovery Ratio (%)	50	82.1	✓

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	89.0	72.0	77.2	64.3	75.0	62.3/50	86.7	70.4	73,125.0
Winter	4.0	2.1	59.9	48.2	72.0	55.6/35	15.0	14.6	150,930.0

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	199.2	162.2	Inverter Scroll	75.8 / 63.0	52.9 / 52.9	-	-

Heating Specifications

Type	Gas Type	Input (MBH)	Output (MBH)	Temperature Rise		Turndown	Performance	
				Min (F)	Max (F)		EAT (F)	LAT (F)
Indirect Gas	Natural	300.0	243.0	3.0	32.0	12:1	67.7	99.8

Motor Specifications

Motor	Qty	Operating Power (hp)	Size (hp)	Enclosure	Efficiency	RPM
Supply	1	8.58	10	ODP	PE	1770
Exhaust	1	1.16	3	ODP	PE	1165

Electrical Specifications

Power Supply	Rating (V/C/P)	MCA (A)	MOP (A)	FLA (A)	Fan Power (W/CFM)*
Unit	460/60/3	58.3	80.0	51.3	1.038

*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	Std
Energy Recovery Device - Polymer Wheel w/ Silica Gel Desiccant	Std
Controls	
Unit Controls - Full Control	Std
Internally Mounted Control Center with 24 VAC control transformer(s) and control circuiting fusing	Std
BMS Protocol - BACNetMSTP	X
BMS Monitoring Points	
Supply Fan Control - Duct Static Pressure By Factory	X
Exhaust Fan Control - 0-10VDC By Others	X
Economizer Control - Temp./Enthalpy	X
Exhaust Fan Only Power	
Web-Based User Interface	Std
Energy Wheel Economizer Control - Modulating Wheel, OA Temp Setpoint w/VFD Wheel	X
Energy Wheel Rotation Sensor	Std
Damper Control - Constant Position-Adj. Setpoint	X
Unoccupied Recirc Mode	
Control Accessories	
Remote Display	
Dirty Filter Sensor(s) - All	X
Airflow Monitor - Outdoor Air	X
Room Thermostat	
Phase/Brownout Protection	Std
Economizer Fault Detection Diagnostics	

Accessories	
Frost Control ModulatingWheel - Modulating Wheel	X
Outdoor Air Damper - Low Leakage	X
Return Air Damper - Low Leakage	X
Roof Curb	
Supply Air Filters - 2" Merv 8 And 2" Merv 13, 6-16x20x2, 12-20x20x2	X
Service Outlet - Shipped loose and powered by others	X
Piping Vestibule	
Service Lights	
Condensate Overflow Switch	X
Spare Filters	
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, 4-16x25x2	Std
Outdoor Air Filters - 2" Merv 8, 4-16x25x2	Std
Furnace Control - 12:1 Modulating	X
Spare Energy Wheel Belt	X
Spare Energy Wheel Segments	
Energy Wheel Bypass Damper	X
Power Venting	Std
Hail Guards	
Warranty Options	
Unit Warranty - 2.5 Yrs. (1 Yr. Extended)	X
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
Outdoor Air Damper supplied is low leakage, motorized VCD-23 (leakage rate of 3 CFM/ft^2 @ 1 in. wg), Class 1A
Return Air Damper supplied is low leakage, motorized VCD-23 (leakage rate of 3 CFM/ft^2 @ 1 in. wg), Class 1A

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
7,000	1.95	5.05	2009	8.58	1	10	1	Plenum	Direct

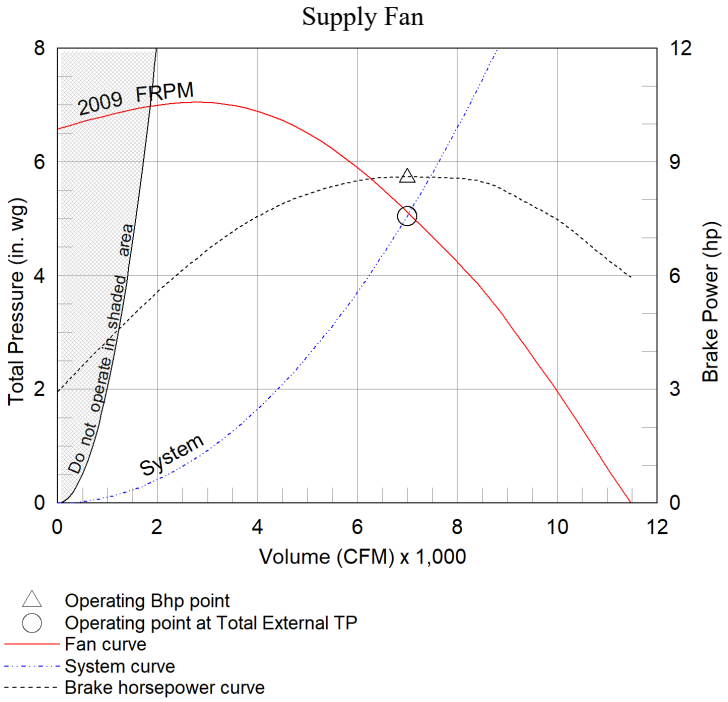
Pressure Drop (in. wg)

Weatherhood	Filter	Damper	Cooling	Heating	External	Energy Wheel	Total
0.03	0.446	0.09	0.446	0.917	1.95	0.52	5.05

Sound Performance in Accordance with AMCA

Sound Power by Octave Band								Lwa	dBA	Sones
62.5	125	250	500	1000	2000	4000	8000			
92	87	99	87	84	77	77	75	92	81	36

*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	2,500	1	1.775	1069	1.16	1	3	1	Plenum	Direct
Economizer	4,900	1	1.849	1341	2.57	1	3	1	Plenum	Direct

Pressure Drop (in. wg)

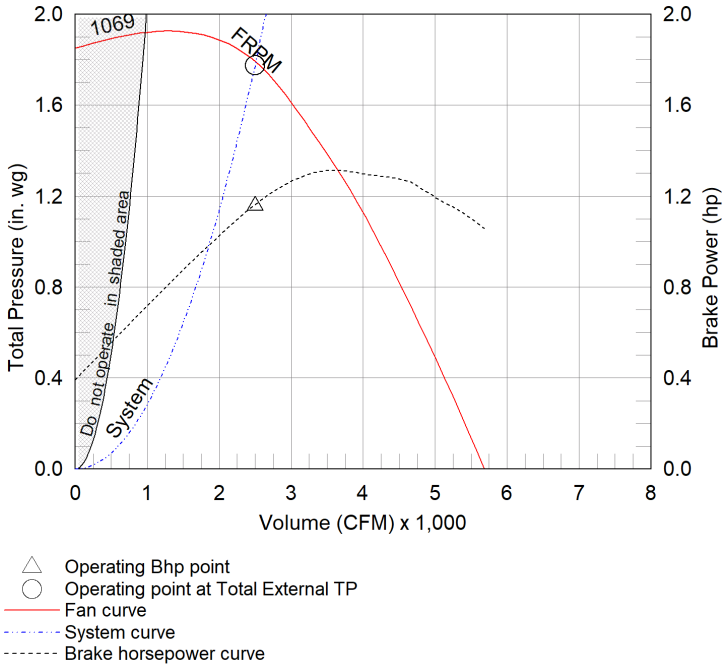
Mode	Weatherhood	Filter	Damper	Cooling	Heating	External	Energy Wheel	Total
Normal	0.02	-	0.026	-	-	1	0.55	1.775
Economizer	0.06	-	-	-	-	1	0.58	1.849

Sound Performance in Accordance with AMCA

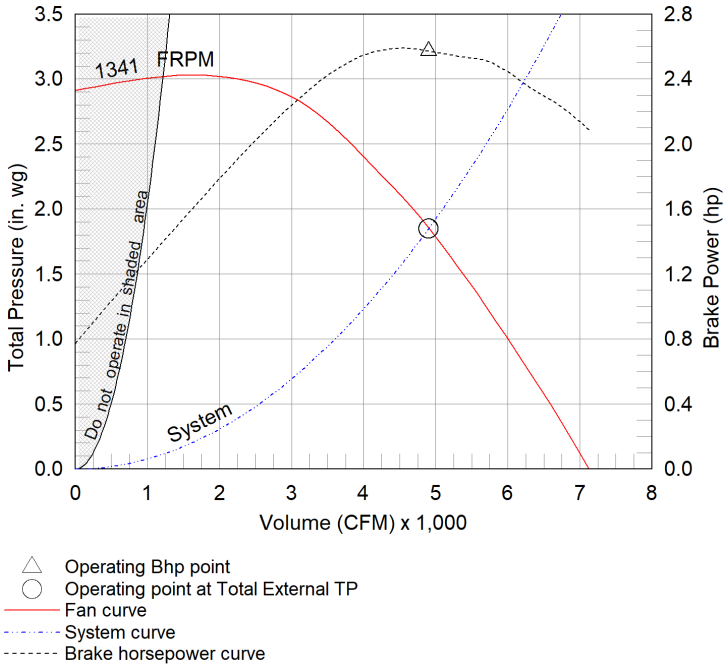
Mode	Sound Power by Octave Band								Lwa	dBA	Sones
	62.5	125	250	500	1000	2000	4000	8000			
Normal	91	78	72	65	60	58	56	63	71	60	13
Economizer	92	79	73	66	59	58	55	59	72	60	13

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

Exhaust Fan



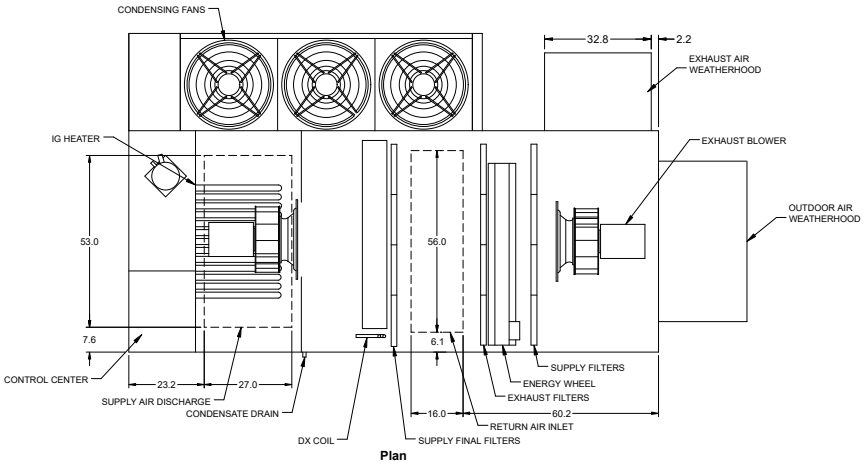
Exhaust Fan - Economizer



Radiated Sound

Position A

Dimensional Overview



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	84	88	90	85	85	81	80	79	95	90
B	79	81	88	78	77	75	74	71	90	84
C	81	78	80	74	72	69	64	61	85	78
D	74	79	79	73	70	66	64	61	83	77
E	79	87	87	84	81	77	76	73	92	87
Total	88	91	94	88	87	84	82	80	98	93

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)	
17.5	75.8	63.0	52.9	52.9	199.2	162.2	N/A	N/A	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)
DR38S05H14-52x56-LH	14	5	346	0.446	R-454B	1,032	20.2	49.1

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	27.9	0	NA	-

A2L Installation Requirement - UL 60335-2-40		
Largest Circuit Charge	Minimum Circulation Airflow	Minimum Total Conditioned Room Area
36.2lb / 16.42kg	981 CFM	543 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
Refrigerant low pressure switch (auto reset)
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	300.0	243.0	3.0	32.0	12:1	67.7	99.8

Unit Details
ANSI standard Z83.8 and CSA 2.6
High Thermal efficiency
Direct spark ignition
3/4" Gas Connection
At least 6 in. wg of natural gas pressure (14 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)	89.0	Dry Bulb (F)	77.2
Wet Bulb (F)	72.0	Wet Bulb (F)	64.3
Specific Humidity (gr/lb)	97	Specific Humidity (gr/lb)	73
Enthalpy (BTU/lb)	36.5	Enthalpy (BTU/lb)	30.0
Exhaust Air		**Return Air**	
Dry Bulb (F)	86.7	Dry Bulb (F)	75.0
Wet Bulb (F)	70.4	Rel. Humidity (%)	50
Specific Humidity (gr/lb)	90	Specific Humidity (gr/lb)	68
Enthalpy (BTU/lb)	34.9	Enthalpy (BTU/lb)	28.6

ENERGY WHEEL

Mixed Air Conditions

Dry-bulb (F)	Wet-bulb (F)	Specific Humidity (gr/lb)	Enthalpy (BTU/lb)
75.8	63.0	70	29.1

Design Air Flow Conditions

OA Volume (CFM)	ASHRAE 90.1 OA Enthalpy Recovery Ratio	EA Volume (CFM)	EA Wheel Effectiveness
2,500	82.1	2,500	80.5

Outdoor Air Cooling Reduction

OA Load w/o Energy Recovery		OA Load with Energy Recovery		Equipment Reduction (tons)
(BTU/h)	(tons)	(BTU/h)	(tons)	
169,875.0	14.16	96,750.0	8.06	6.09

Summer Conditions

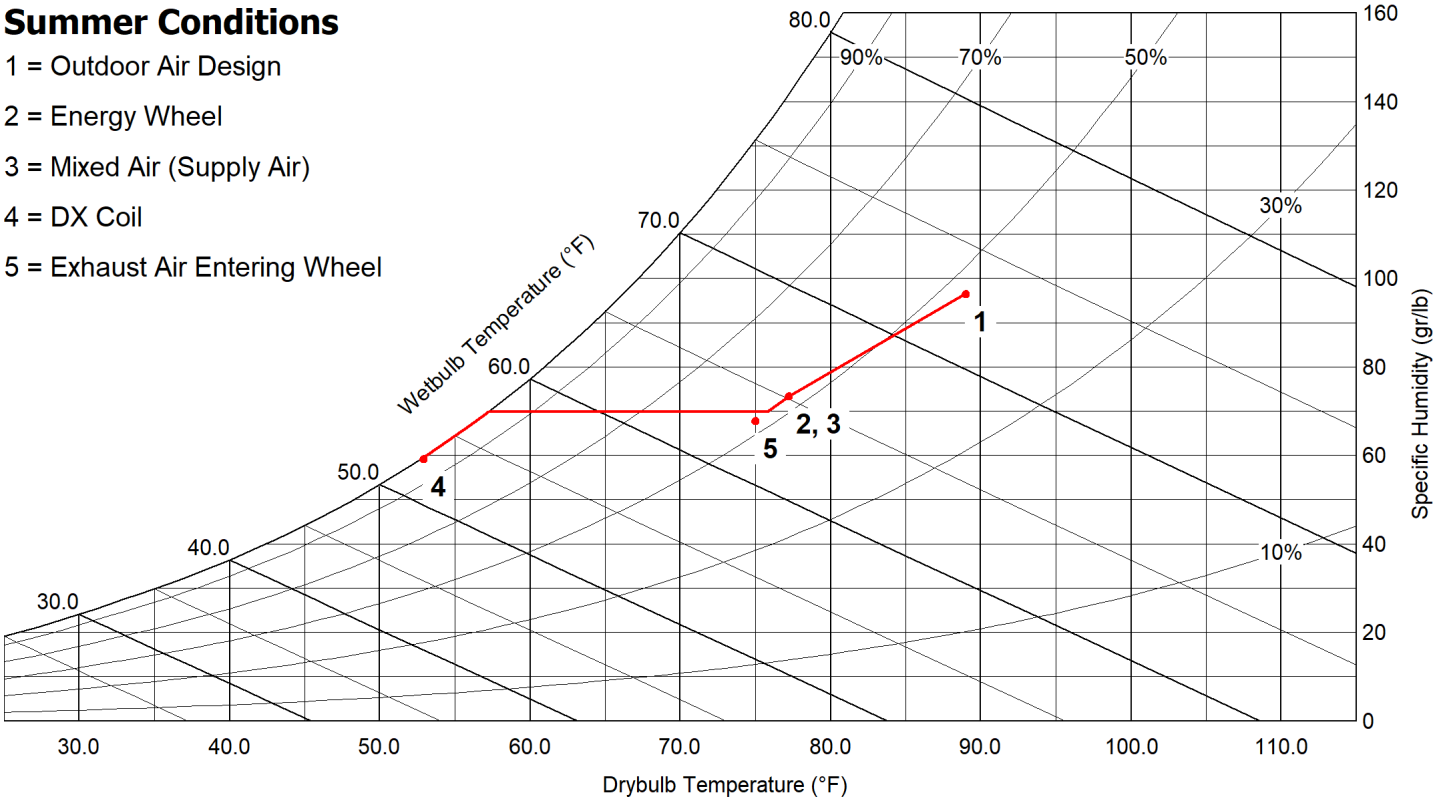
1 = Outdoor Air Design

2 = Energy Wheel

3 = Mixed Air (Supply Air)

4 = DX Coil

5 = Exhaust Air Entering Wheel



Energy Recovery Winter Performance w/out Preheater

Outdoor Air		Supply Air	
Dry Bulb (F)	4.0	Dry Bulb (F)	59.9
Wet Bulb (F)	2.1	Wet Bulb (F)	48.2
Specific Humidity (gr/lb)	4	Specific Humidity (gr/lb)	34
Enthalpy (BTU/lb)	1.5	Enthalpy (BTU/lb)	19.6
Exhaust Air		**Return Air**	
Dry Bulb (F)	15.0	Dry Bulb (F)	72.0
Wet Bulb (F)	14.6	Rel. Humidity (%)	35
Specific Humidity (gr/lb)	12	Specific Humidity (gr/lb)	43
Enthalpy (BTU/lb)	5.4	Enthalpy (BTU/lb)	23.9

ENERGY WHEEL

Mixed Air Conditions

Dry-bulb (F)	Wet-bulb (F)	Specific Humidity (gr/lb)	Enthalpy (BTU/lb)
75.8	63.0	70	29.1

Design Air Flow Conditions

OA Volume (CFM)	ASHRAE 90.1 OA Enthalpy Recovery Ratio	EA Volume (CFM)	EA Wheel Effectiveness
2,500	80.9	2,500	82.3

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 (%)
183,600.0	32,670.0	150,930.0	83.5

Winter Conditions

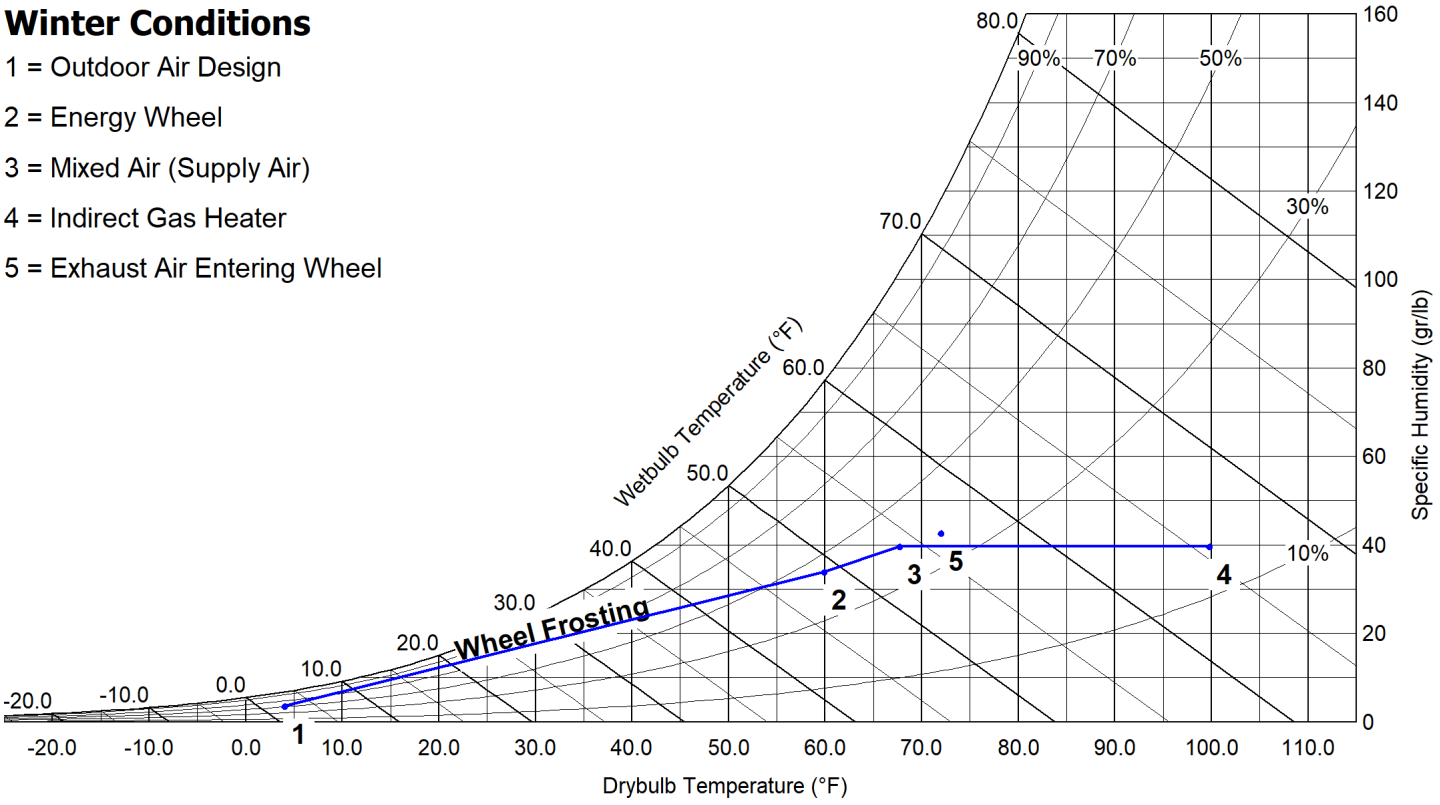
1 = Outdoor Air Design

2 = Energy Wheel

3 = Mixed Air (Supply Air)

4 = Indirect Gas Heater

5 = 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	
2,513	2652	2652	5.7	1.02	0.56	0.56	0

Thermal Effectiveness Ratings							
Enthalpy Recovery		Sensible Effectiveness		Latent Effectiveness		Total Effectiveness	
Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
82.1	80.9	83.1	83.5	78.5	78.8	80.5	82.3

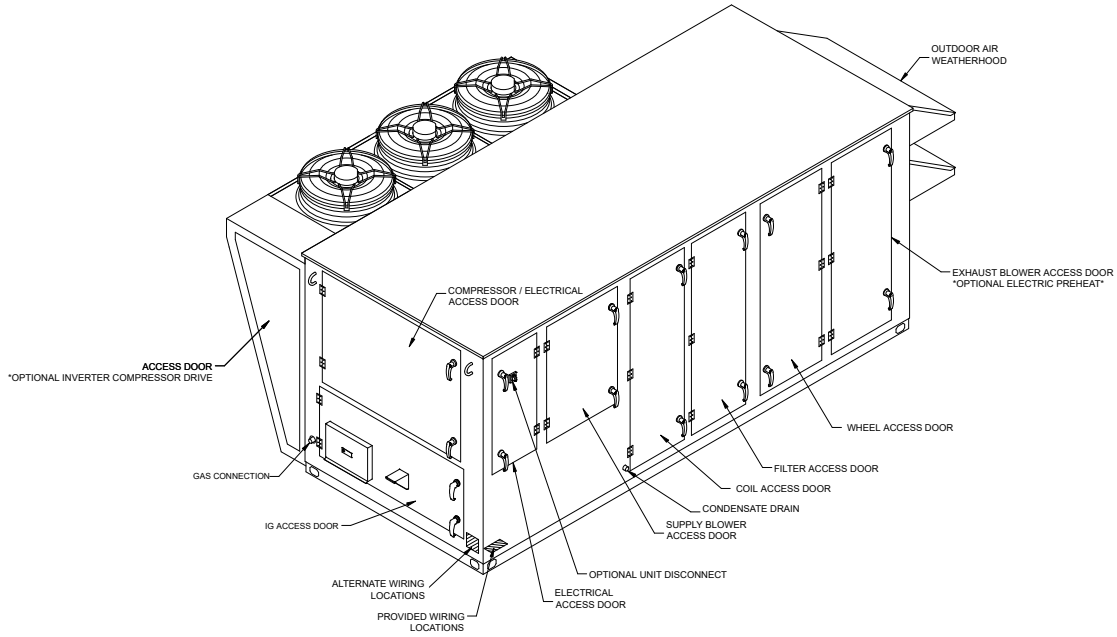
Note(s)

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.

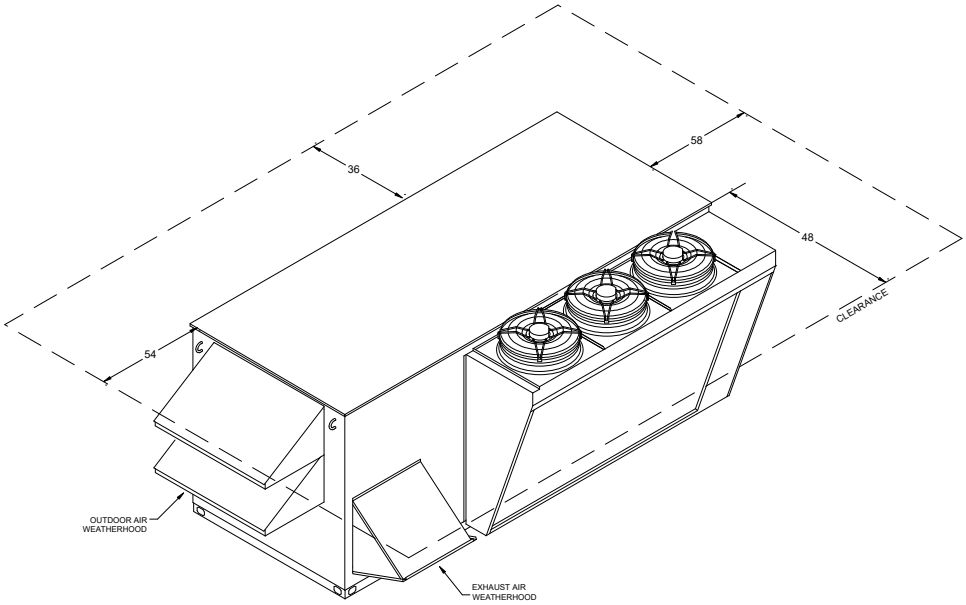
Isometric Drawings

Component Layout



Back Right Isometric

Service Clearances

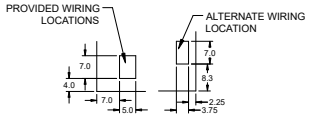


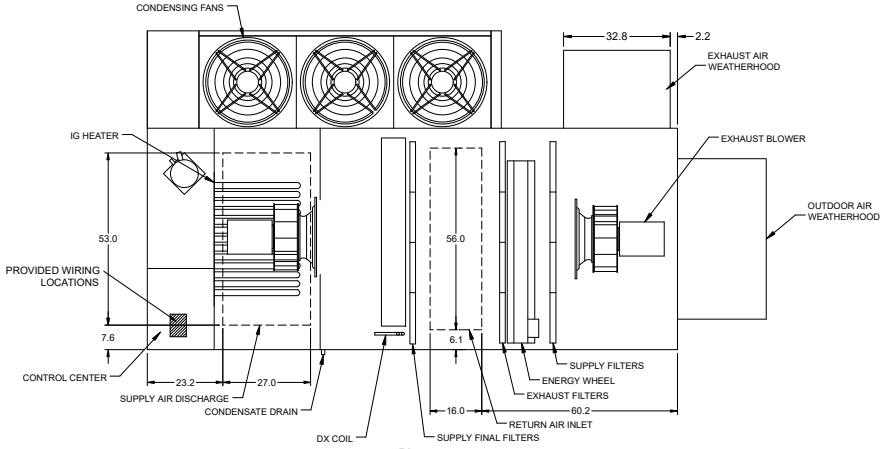
Front Left Isometric

Overview Drawings

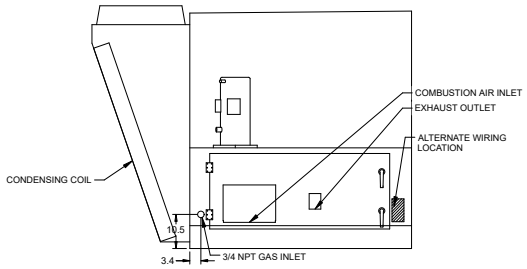
Dimensional Overview

Electrical Connections

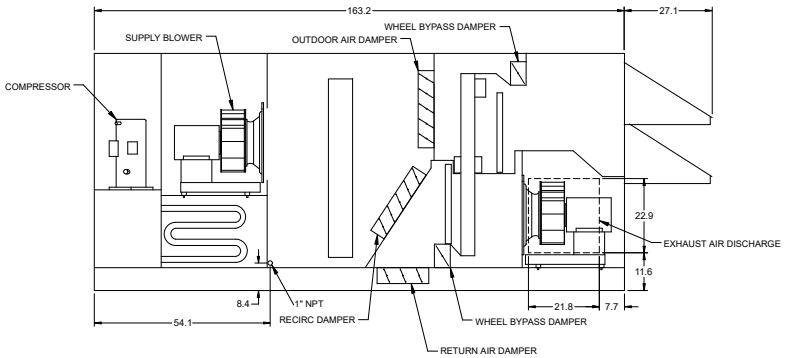




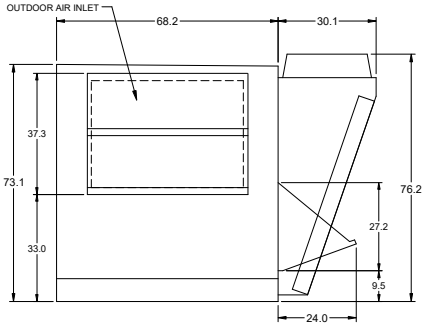
Plan



Left End

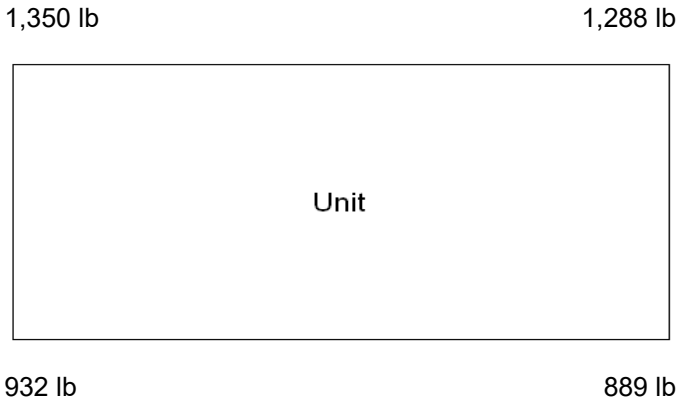


Elevation



Right End

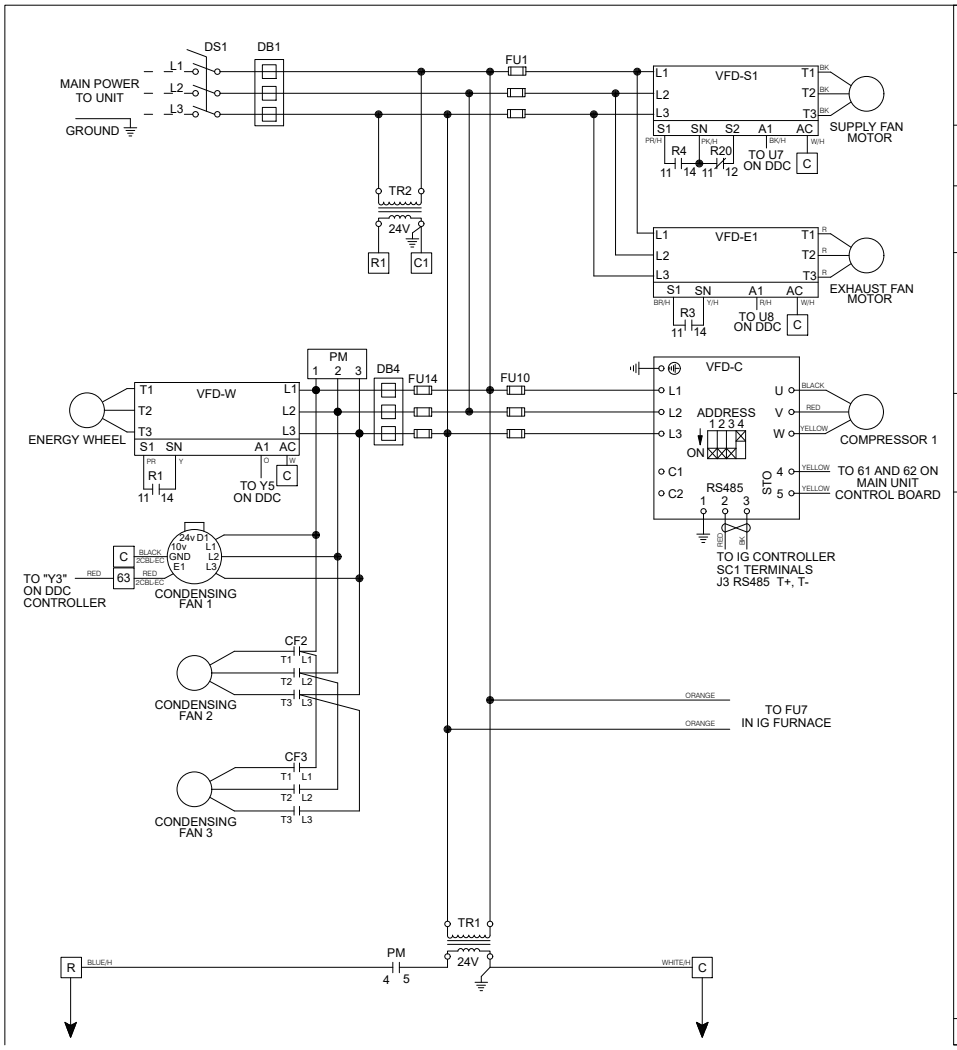
Unit Corner Weights



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:

V23Q2B1DM52H24X01HE22H0030BH31

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

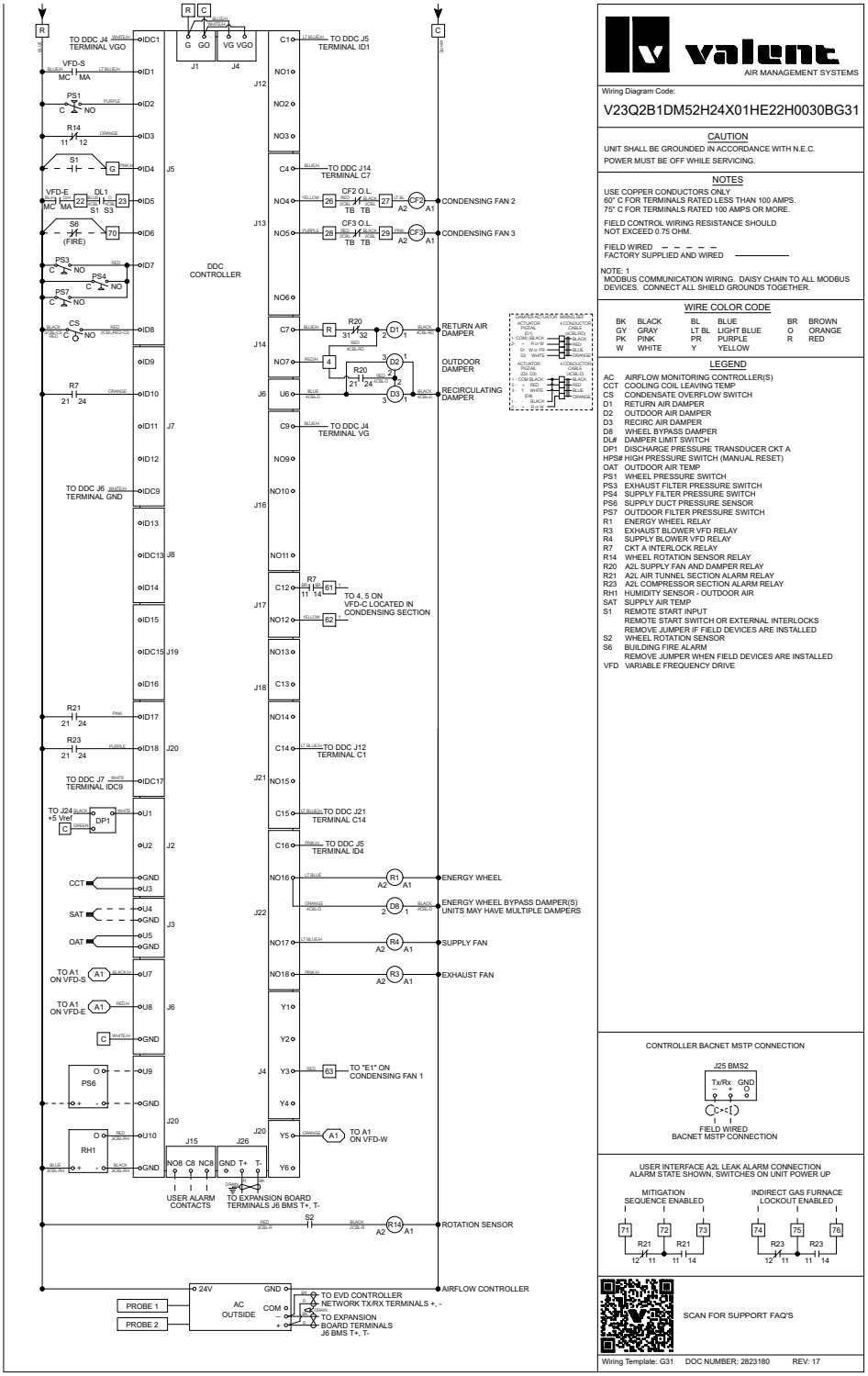
BK	BLACK	BL	BLUE	BR	BROWN
GY	GRAY	LT BL	LIGHT BLUE	O	ORANGE
PK	PINK	PR	PURPLE	R	RED
W	WHITE	Y	YELLOW		

LEGEND

DB#	POWER DISTRIBUTION BLOCK
DS	DISCONNECT SWITCH
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: 2823180 REV: 17

Wiring Diagram 2



valent
AIR MANAGEMENT SYSTEMS

Wiring Diagram Code:

V23Q2B1DM52H24X01HE22H0030BG31

CAUTION

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

POWER MUST BE OFF WHILE SERVICING.

NOTES

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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. CONNECT ALL SHIELD GROUNDS TOGETHER.

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

AC	AIRFLOW MONITORING CONTROLLER(S)
CCT	COOLING COIL LEAVING TEMP
CS	CONDENSATE OVERFLOW SWITCH
D1	RETURN AIR DAMPER
D2	OUTDOOR AIR DAMPER
D3	RECIRC AIR DAMPER
D8	WHEEL BYPASS DAMPER
DL#	DAMPER LIMIT SWITCH
DP1	DISCHARGE PRESSURE TRANSDUCER 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
PS6	SUPPLY DUCT PRESSURE SENSOR
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
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 REMOVE JUMPER WHEN FIELD DEVICES ARE INSTALLED
VFD	VARIABLE FREQUENCY DRIVE

CONTROLLER BACNET MSTP CONNECTION

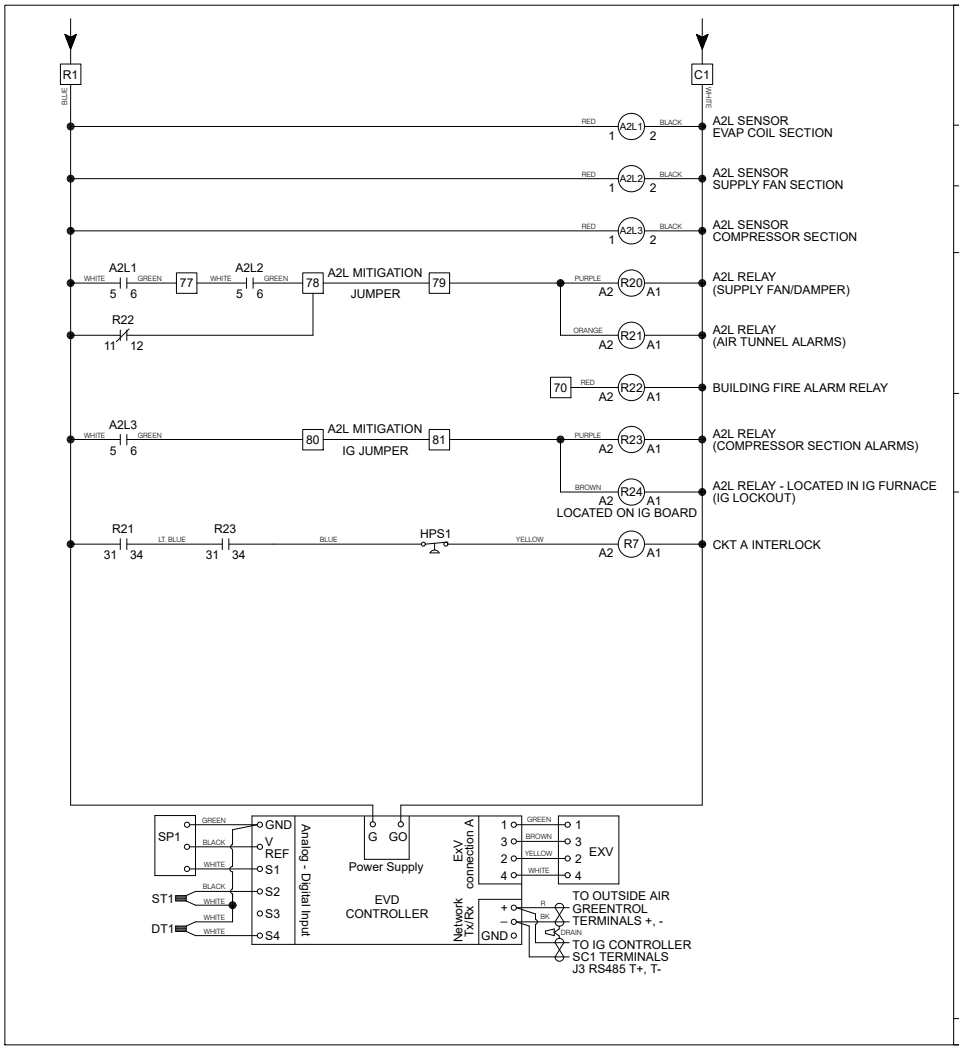
FIELD WIRED
BACNET MSTP CONNECTION

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

SCAN FOR SUPPORT FAQ'S

Wiring Template: G31 DOC NUMBER: 2823180 REV: 17

Wiring Diagram 3



AIR MANAGEMENT SYSTEMS

Wiring Diagram Code:

V23Q2B1DM52H24X01HE22H0030BL31

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

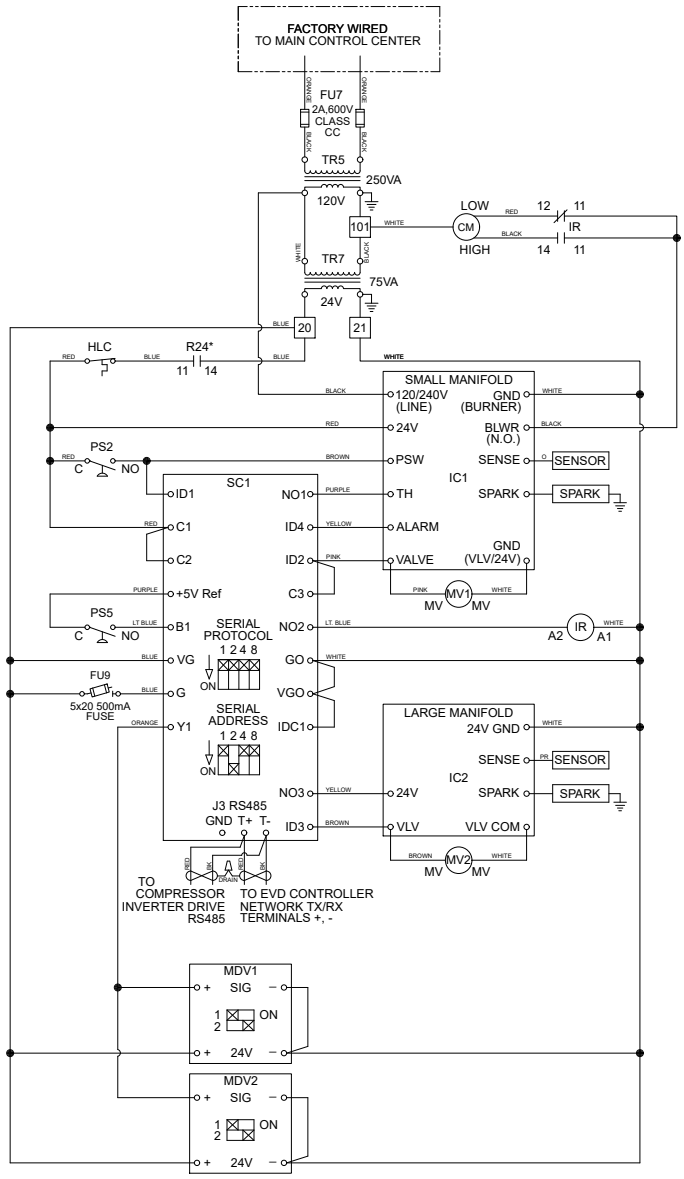
BK	BLACK	BL	BLUE	BR	BROWN
GY	GRAY	LT BL	LIGHT BLUE	O	ORANGE
PK	PINK	PR	PURPLE	R	RED
W	WHITE	Y	YELLOW		

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: 2823180 REV: 17

INDIRECT GAS WIRING DIAGRAM
FURNACE 1 - HTD MODULATING



AIR MANAGEMENT SYSTEMS

Wiring Diagram Code:

V6N51P1RX0053GS23

CAUTION

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

NOTES

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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		

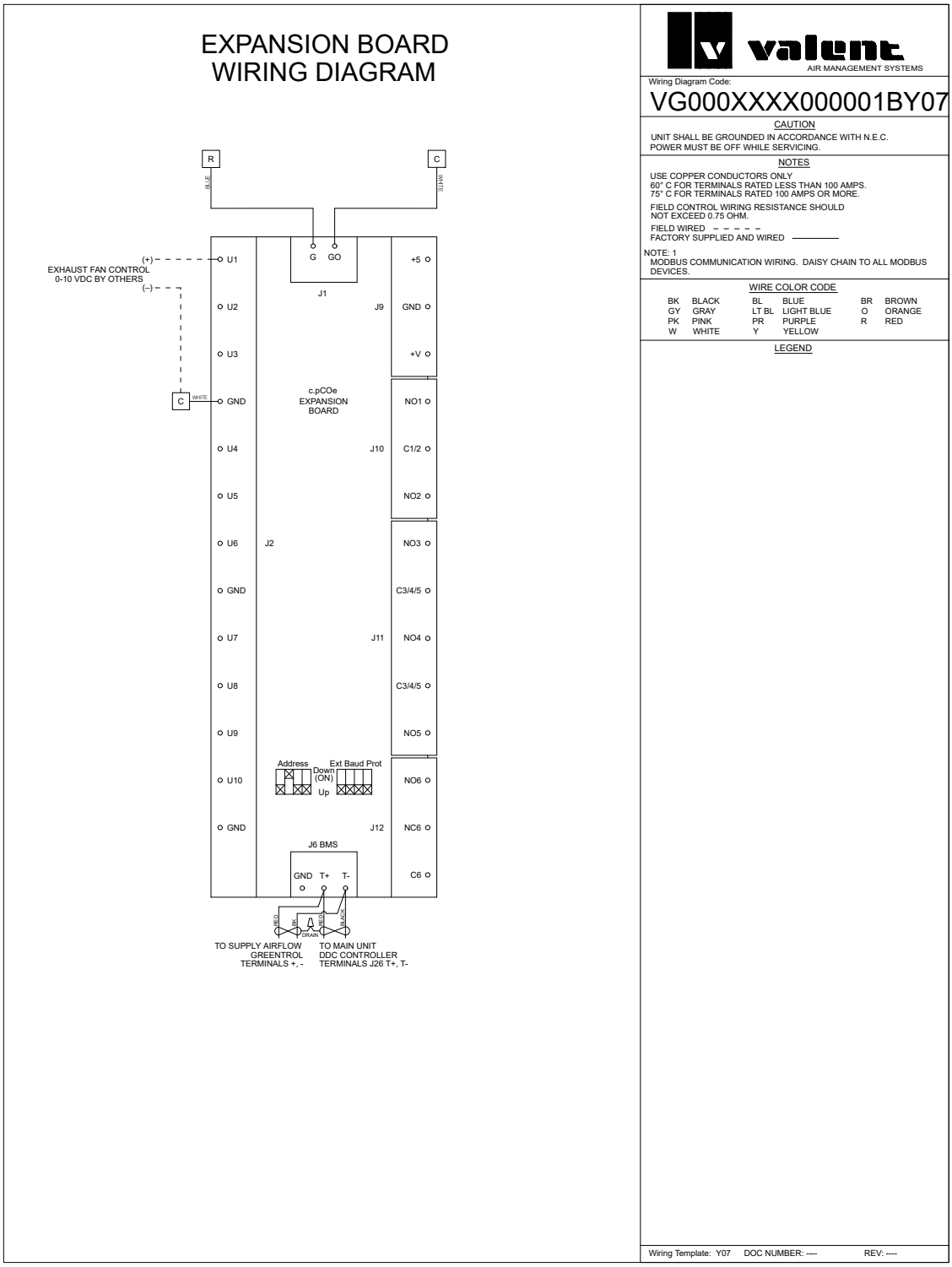
LEGEND

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 RELAY LOCATED IN MAIN CONTROL CENTER
SC1	STAGE CONTROLLER
TR#	TRANSFORMER(S)

Wiring Template: S23 DOC NUMBER: 2823180 REV: 17

GENERATE TABLE START

Monitoring Points Wiring Diagram



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_Temp_Analog_Input	Space Temperature	AI-1	30002	R	°F		
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	%		X
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		
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		
Economizer_Enthalpy_Enable_Setpoint	Economizer Enthalpy Enable Setpoint Allow Econ when OA Enthalpy is less than Setpoint	AV-13	40026	RW	btu/lb		X
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		X
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	%		X
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	%		X
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		X
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	%		X
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	

System Word Table (IV-10)	
Bit	System_Word
0	Heat Wheel Enable
1	Preheat Enable
2	Reversing Valve (Cooling (0)/Heating(1))
3	
4	
5	
6	Supply Temp Low Limit Alarm
7	Supply Temp High Limit Alarm
8	Supply High Duct Static Alarm.Active
9	Supply Fan 1 Alarm
10	Exhaust Fan 1 Alarm
11	Drain Pan Alarm
12	Freeze Stat Alarm
13	Filter Alarm
14	Space High Static Alarm
15	Return Low Static Alarm
16	Shutdown Input Alarm
17	Energy Recovery Wheel High Diff Pressure
18	Energy Recovery Wheel Rotation Alarm
19	
20	Heat Pump Heating Lock Out Alarm
21	Permanent Memory - Too Many Writes
22	BMS Offline Alarm
23	
24	
25	
26	
27	
28	Heat-Cool Only - Dehumidification Request Active
29	Heat-Cool Only - Heating Request Active
30	Heat-Cool Only - Coil Setpoint Alarm Active
31	Heat-Cool Only - Supply Setpoint Alarm Active

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

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

Refrigeration Circuit Word Table (IV-7)	
Bit	Ref_Ckt_PressTemp_Alarm_Word
0	Circuit A Discharge Pressure Sensor Alarm
1	Circuit A Discharge Temp Sensor Alarm
2	Circuit A Suction Pressure Sensor Alarm
3	Circuit A Suction Temp Sensor Alarm
4	Circuit B Discharge Pressure Sensor Alarm
5	Circuit B Discharge Temp Sensor Alarm
6	Circuit B Suction Pressure Sensor Alarm
7	Circuit B Suction Temp Sensor Alarm
8	Circuit A High Pressure Switch Alarm
9	Circuit A Low Pressure Switch Alarm
10	Circuit B High Pressure Switch Alarm
11	Circuit B Low Pressure Switch Alarm
12	Circuit A High Sat Discharge Temp Alarm
13	Circuit B High Sat Discharge Temp Alarm
14	
15	
16	
17	
18	
19	
20	
21	
22	
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24	
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26	
27	
28	
29	
30	
31	

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

Device Offline Word Table (IV-8)	
Bit	Device_Offline_Word - Ext
0	Space TStat 1 Offline
1	Space TStat 2 Offline
2	Space TStat 3 Offline
3	Space TStat 4 Offline
4	VFD Offline Supply Fan
5	
6	
7	
8	Expansion Board 1 Alarm
9	Expansion Board 2 Alarm
10	Expansion Board 3 Alarm
11	Expansion Board 4 Alarm
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	Master Unit Offline Alarm
28	Slave Unit 1 Offline Alarm
29	Slave Unit 2 Offline Alarm
30	Slave Unit 3 Offline Alarm
31	Slave Unit 4 Offline Alarm

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

Alarm Table (Latest Alarm IV-5)					
0	No Active Alarms	63	Supply Air Temperature - Low Limit Shutdown	117	High SDT Lockout - Circuit A
1	Supply Fan 1 Run - Status Not Proven	64	Heat Wheel Rotation - Not Detected	118	High SDT Lockout - Circuit B
2	Freeze Protection - Thermostat Tripped	65	Slave Unit 1 Offline -	121	Inverter 1 Alarm -
3	High Supply Duct - Static Pressure	66	Slave Unit 2 Offline -	123	Inverter 1 Lockout - Cycle Power to Unit
4	Low Return Duct - Static Pressure	67	Slave Unit 3 Offline -	125	High SDT Lockout - Circuit A
5	Outside Air Temp - Sensor Value Not Valid	68	Slave Unit 4 Offline -	126	Inverter 1 Foldback - Input Current
6	Supply Air Temperature - Sensor Value Not Valid	69	Master Unit Offline -	127	Inverter 1 Foldback - Inverter Temp
7	Cold Coil 1 Temp - Sensor Value Not Valid	70	Heat Pump Defrost - Mode is Active	131	Inverter 1 Comms Lost - Compressor Offline
9	Exhaust Air Temp - Sensor Value Not Valid	71	Multi Devices per Ch - Contact Tech Support	133	Space Thermostat 1 - Sensor Offline
10	Mixed Air Temperature - Sensor Value Not Valid	74	Shutdown Contact - In Alarm Position	134	Space Thermostat 2 - Sensor Offline
11	Return Air Temperature - Sensor Value Not Valid	75	Comp Maint Alarm - Run Hours Spt Reached	135	Space Thermostat 3 - Sensor Offline
12	Space Temperature - Sensor Value Not Valid	76	Supply Air Temperature - High Limit Shutdown	136	Space Thermostat 4 - Sensor Offline
13	Return Air RH - Sensor Value Not Valid	77	Space High Static Pres - Shutdown	137	IG Furnace 1. No flame - after 3 tries
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	79	BMS Offline - Watchdog is FALSE	139	IG Furnace 1 combust - fan high pressure sw
16	Low Pressure Switch - Circuit A	80	Clg Coil Setpt Input - Value is not valid	140	IG Furnace 1 Ignition - controller alarm
17	Low Pressure Switch - Circuit B	81	Sup Air Setpt Input - Value is not valid	141	IG Furnace 1 pressure - switch fault alarm
20	High Pressure Switch - Circuit A	82	BACnet License - Not Installed	142	High SDT Lockout - Circuit B
21	High Pressure Switch - Circuit B	83	Low Suction SH ExV A - EVD 1 Alarm	143	IG Furnace 1 - Max retrys
24	Damper End Switch Fail - Dampers are not open	84	Low Suction SH ExV B - EVD 1 Alarm	144	IG Furnace 1 - High Limit Trip
25	Exhaust Fan 1 Run - Status Not Proven	85	LOP A EVD 1 - Low Operating Pressure	145	IG Furnace - pCOe 1 Offline
26	Filters are Dirty - Replace Filters	87	MOP A EVD 1 - Max Operating Pressure	146	IG Furnace 1 IC fault - Check Furnace Wiring
27	Cond Drain Pan Full - Check Drain	89	EEV A EVD 1 - Motor Alarm	147	IG Furnace 2 No flame - after 3 tries
28	Exp Board 1 Status - Board is Offline	91	LowSuct A EVD 1 - Refrigerant Temp	148	IG Furnace 2 Large - no flame after 3 tries
29	Exp Board 2 Status - Board is Offline	93	High Condensing Temp - EVD 1	149	IG Furnace 2 combust - fan high pressure sw
31	Exp Board 4 Status - Board is Offline	94	Sens S1 EVD 1 - Sensor Value Not Valid	150	IG Furnace 2 Ignition - controller alarm
32	Non-Volatile Memory Er - Contact Tech Support	95	Sens S2 EVD 1 - Sensor Value Not Valid	151	IG Furnace 2 pressure - switch fault alarm
33	Space 1 CO2 - Sensor Value Not Valid	96	Sens S3 EVD 1 - Sensor Value Not Valid	152	IG Furnace 2 combust - fan proving alarm
34	Space Static Pressure - Sensor Value Not Valid	97	Sens S4 EVD 1 - Sensor Value Not Valid	153	IG Furnace 2 - Max retrys
35	Supply Duct Stat Press - Sensor Value Not Valid	98	EVD 1 EEPROM Damaged - Call Tech Support	154	IG Furnace 2 - High Limit Trip
36	Return Duct Stat Press - Sensor Value Not Valid	99	Incomplete Closing - EVD 1	155	IG Furnace - pCOe 2 Offline
37	Sup Fan AFMS - Sensor Value Not Valid	101	Emergency Closing - EVD 1	156	IG Furnace 2 IC fault - Check Furnace Wiring
38	Exh Fan AFMS - Sensor Value Not Valid	101	EVD 1 Battery -	157	Outside Air Greentrol - Offline or Flow Error
39	Outside Damper AFMS - Sensor Value Not Valid	102	FW Incompatibility - EVD 1	158	Exhaust Air Greentrol - Offline or Flow Error
40	Space Setpt Adj Slider - Sensor Value Not Valid	106	EVD 1 Config Error -	159	Supply Air Greentrol - Offline or Flow Error
42	Return CO2 - Sensor Value Not Valid	105	High Discharge Temp - First Inverter	170	OA Damper Fault - Not Econ and should be
42	Discharge Press Ckt A - Sensor Value Not Valid	106	Low Discharge Pressure - First Inverter	171	OA Damper Fault - Econ and shouldn't be
43	Discharge Press Ckt A - Sensor Value Not Valid	106	Low Discharge Pressure - First Inverter	171	OA Damper Fault - Econ and shouldn't be
44	Discharge Press Ckt B - Sensor Value Not Valid	107	High Suction Pressure - First Inverter	172	OAD Fault - Damper not Modulating
47	Suction Press Ckt A - Sensor Value Not Valid	108	Low Suction Pressure - First Inverter	173	OAD Fault - Excess Outdoor Air
48	Suction Press Ckt B - Sensor Value Not Valid	109	High Current - First Inverter	174	IG Furnace 1 - Combustion Fan Alarm
51	Discharge Temp Ckt A - Sensor Value Not Valid	110	High Pressure Ratio - First Inverte	175	IG Furnace 2 - Combustion Fan Alarm
52	Discharge Temp Ckt B - Sensor Value Not Valid	111	Low Pressure Ratio - First Inverter	176	Supply Fan - VFD Offline
55	Suction Temp Ckt A - Sensor Value Not Valid	112	Low Delta P - First Inverter	177	OA Damper Fault - Not Econ and should be
56	Suction Temp Ckt B - Sensor Value Not Valid	113	High Discharge Press - First Inverter	178	Return Fan - VFD Offline
59	Ckt A High Saturated - Discharge Temperature	114	Compressor Staging - Order Skipped	179	Energy Recovery - VFD Offline
60	Ckt B High Saturated - Discharge Temperature	115	Heat Pump Heating - Locked Out	180	Embedded EVD Error
.		116	EVD 1 Error - Unexpected Position	181	SF VFD Alarm - Check VFD

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.
- Return/Exhaust air damper actuator is 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.
- Return air damper is spring return close.

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 (Unit Off): Unit remains off when in unoccupied mode.

- Supply fan OFF
- Exhaust fan OFF
- Tempering OFF
- Outdoor air damper closed.
- Return damper closed.
- Recirculation damper open.

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.

Duct Static Pressure Sensor: The supply blower is modulated based upon the signal from a duct static pressure sensor (factory provided and wired, field mounted and tubing by others). The controller will modulate the supply fan based upon a comparison of the duct static pressure set point (adj.) to the actual duct static pressure level reported from the sensor. (**Mechanical high static protection cutoffs must be**

installed by others to protect the system and equipment from over-pressurization. The manufacturer does not assume responsibility for this.)

OUTDOOR AIR AND RE-CIRCULATED (RECIRC) AIR DAMPER CONTROL: The outdoor and recirculated air dampers are factory mounted and wired. Outside air damper and recirculation damper will be inverse positions of each other. Example, when the outside air damper is set to 35% opening, the recirculation damper will be at 65% opening. The modulating actuator will be controlled to dictate position by the following sequence.

Constant Position-Adj. Setpoint: The outdoor air damper will be set to a constant minimum position (adj.) and upon a field provided contact closure the outdoor air damper will open up to the maximum position (adj.). Both positions will be set by the controller.

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

0-10V VDC Signal by Others: The exhaust blower is modulated based upon a 0-10 VDC signal (field provided and wired) wired directly into the VFD. This would operate separately from the controller sequences.(Mechanical high static protection cutoffs must be installed by others to protect the system and equipment form over-pressurization. The manufacturer does not assume responsibility for this.)

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

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.

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 (Winter Ramp): The controller will enable the outdoor air and recirc. air dampers to modulate in order to help the unit keep up with heating demand in the event of the unit operating outside design conditions. (This can be enabled 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.

Refrigerant Leak Detected In Air Tunnel: If a refrigerant leak is detected in the air tunnel, the supply fan will operate at minimum airflow requirement, recirculation damper to be fully open, outside air damper will be closed, powered exhaust fan will operate based configured sequence, energy recovery wheel will be off, and compressors are disabled to reduce leakage rate. This operation is required in order to move stagnant refrigerant from within the unit, duct, and space ensuring proper dilution of the refrigerant. This operation is required even if the unit is called to be off. After leak detection is cleared, the unit will go back to normal operation. Exception to this operation is when the unit is receiving an active fire alarm signal at the unit controller. If unit controller is receiving a fire alarm input, the unit will not operate the leak mitigation supply fan sequence.

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 first modulate the energy wheel speed and then modulate the outdoor air and recirculated air dampers to maintain the supply air temperature set point. If the outdoor air damper modulates to the maximum 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.

Temp./Enthalpy: The economizer will be locked out when: the outdoor air is < 40 F DB (adj.) or > 75 F DB (adj.) or > 55 F dew point (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.

ENERGY WHEEL BYPASS DAMPERS

By Factory: The unit will be provided with energy wheel bypass dampers for both the outdoor air and return airstreams. During normal operation, the dampers will remain closed to allow full operation of the energy wheel. During economizer sequences, the bypass dampers will be open to alleviate pressure drop through the wheel, while allowing more outdoor air to be used for economizer cooling.

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.

Pressure Sensor Alarm: The controller sends an alarm in the case of a failed pressure sensor.

Humidity Sensor Alarm: The controller sends an alarm in the case of a failed humidity 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.

Airflow Monitoring: The outdoor airflow monitoring device is installed as a stand alone option in the control center. It includes a heated thermistor that is used to measure feet per minute in the housing. This feet per minute is converted to CFM in the factory supplied airflow readout device.

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.

Airflow Monitoring: The outdoor airflow monitoring device is installed as a standalone option in the control center. It includes a heated thermistor that is used to measure feet per minute in the housing. This feet per minute is converted to CFM in the factory supplied airflow readout device.

Damper End Switch: Damper end switched will be provided to ensure the supply and exhaust fans do not enable until the dampers are proven open.

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 30 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.

VXE-312-74D-50K-O-G2

Unit Performance

9800 cfm @ Economizer

Design Conditions

Elevation (ft)	Summer DB (F)	Summer WB (F)	Winter DB (F)	Supply (CFM)	Outdoor Air (CFM)	Recirc Air (CFM)	Exhaust Air (CFM)
1,237	89.0	72.0	4.0	14,000	6,600	7,400	6,600

Unit Specifications

Qty	Weight (lb)	Cooling Type	Heating Type	Unit Installation	Unit ETL Listing	Furnace ETL Listing
1	8,782 (+/- 5%)	Packaged DX	Indirect Gas	Outdoor	UL\cUL 1995/ 60335-2-40	ANSI Z83.8 / CSA 2.6

Configuration

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

ASHRAE 90.1-2022 Compliance

	ASHRAE 90.1 Min. Efficiency	Calculated Efficiency	Compliance
EER	9.8	9.8	✓
IEER	13.0	15.1	✓
Enthalpy Recovery Ratio (%)	50	74.7	✓

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	89.0	72.0	78.2	65.0	75.0	62.3/50	85.7	69.8	175,230.0
Winter	4.0	2.1	54.4	44.8	72.0	55.6/35	20.0	19.4	359,251.0

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	556.1	388.3	Inverter Scroll	76.5 / 63.6	49.1 / 49.1	-	-

Heating Specifications

Type	Gas Type	Input (MBH)	Output (MBH)	Temperature Rise		Turndown	Performance	
				Min (F)	Max (F)		EAT (F)	LAT (F)
Indirect Gas	Natural	600.0 800	486.0 648	2.0	32.0	16:1	63.7	95.8

Motor Specifications

Motor	Qty	Operating Power (hp)	Size (hp)	Enclosure	Efficiency	RPM
Supply	2	7.88	10	ODP	PE	1770
Exhaust	2	1.44	5	ODP	PE	1750

Electrical Specifications

Power Supply	Rating (V/C/P)	MCA (A)	MOP (A)	FLA (A)	Fan Power (W/CFM)*
Unit	460/60/3	139.7	150.0	132.7	0.993

*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	Std
Energy Recovery Device - Polymer Wheel w/ Silica Gel Desiccant	Std
Controls	
Unit Controls - Full Control	Std
Internally Mounted Control Center with 24 VAC control transformer(s) and control circuiting fusing	Std
BMS Protocol - BACNetMSTP	X
BMS Monitoring Points	
Supply Fan Control - Duct Static Pressure By Factory	X
Exhaust Fan Control - 0-10VDC By Others	X
Economizer Control - Temp./Enthalpy	X
Exhaust Fan Only Power	
Web-Based User Interface	Std
Energy Wheel Economizer Control - Modulating Wheel, OA Temp Setpoint w/VFD Wheel	X
Energy Wheel Rotation Sensor	Std
Damper Control - Constant Position-Adj. Setpoint	X
Unoccupied Recirc Mode	
Control Accessories	
Remote Display	
Dirty Filter Sensor(s) - All	X
Airflow Monitor - Outdoor Air	X
Room Thermostat	
Phase/Brownout Protection	Std
Economizer Fault Detection Diagnostics	

Accessories	
Frost Control ModulatingWheel - Modulating Wheel	X
Outdoor Air Damper - Low Leakage	X
Return Air Damper	
Roof Curb	
Supply Air Filters - 2" Merv 8 And 2" Merv 13, 16-16x24x2, 8-20x24x2	X
Service Outlet - Shipped loose and powered by others	X
Piping Vestibule	
Service Lights	
Condensate Overflow Switch	X
Spare Filters - Both, 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, 4-20x24x2, 4-24x24x2	Std
Outdoor Air Filters - 2" Merv 8, 4-20x24x2, 4-24x24x2	Std
Furnace Control - 16:1 Modulating	X
Spare Energy Wheel Belt	X
Spare Energy Wheel Segments	
Energy Wheel Bypass Damper	X
Power Venting	Std
Hail Guards	
Warranty Options	
Unit Warranty - 2.5 Yrs. (1 Yr. Extended)	X
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
Outdoor Air Damper supplied is low leakage, motorized VCD-23 (leakage rate of 3 CFM/ft^2 @ 1 in. wg), Class 1A

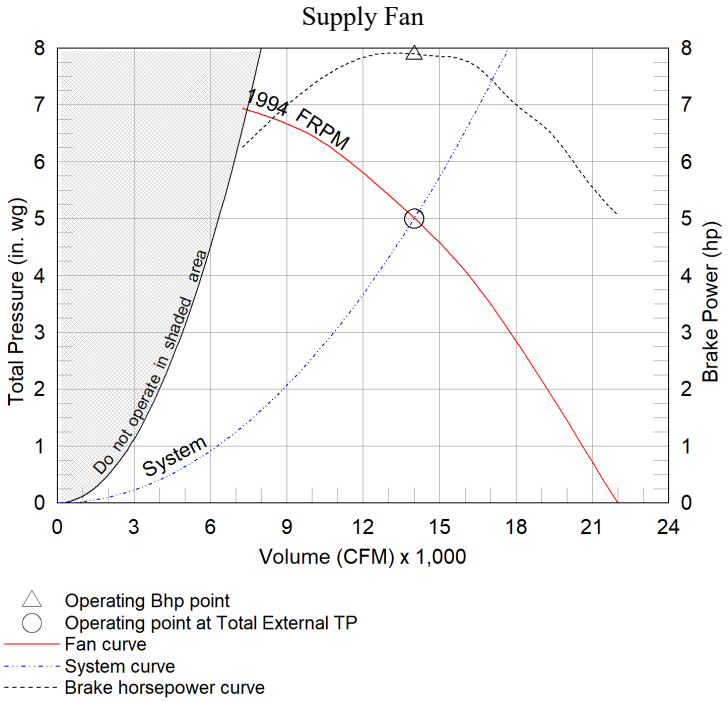
Supply Fan Charts And Performance

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
14,000	1.75	5.002	1994	7.88	2	10	2	Plenum	Direct

Pressure Drop (in. wg)							
Weatherhood	Filter	Damper	Cooling	Heating	External	Energy Wheel	Total
0.07	0.658	0.17	0.679	0.744	1.75	0.72	5.002

Sound Performance in Accordance with AMCA										
Sound Power by Octave Band								Lwa	dBA	Sones
62.5	125	250	500	1000	2000	4000	8000			
91	94	101	92	89	83	83	79	96	85	44

*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	6,600	1	1.653	1620	1.44	2	5	2	Plenum	Direct
Economizer	9,800	1	1.891	2122	2.98	2	5	2	Plenum	Direct

Pressure Drop (in. wg)

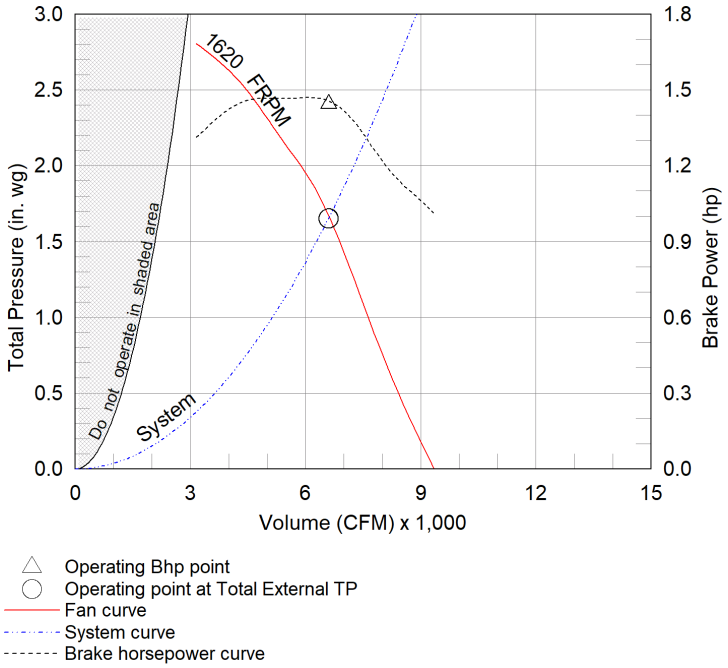
Mode	Weatherhood	Filter	Damper	Cooling	Heating	External	Energy Wheel	Total
Normal	0.03	-	-	-	-	1	0.63	1.653
Economizer	0.06	-	-	-	-	1	0.83	1.891

Sound Performance in Accordance with AMCA

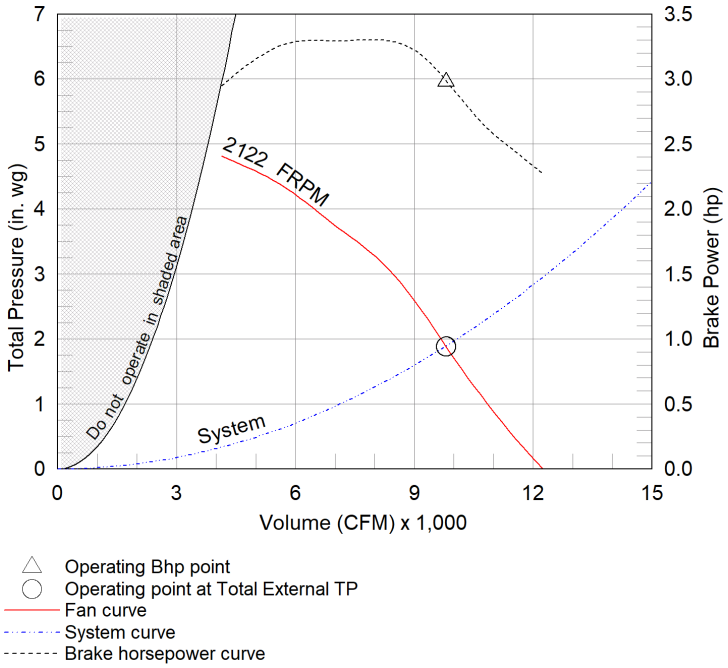
Mode	Sound Power by Octave Band								Lwa	dBA	Sones
	62.5	125	250	500	1000	2000	4000	8000			
Normal	76	78	77	72	68	67	69	63	76	65	14
Economizer	75	73	79	73	67	65	66	61	76	64	13

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

Exhaust Fan



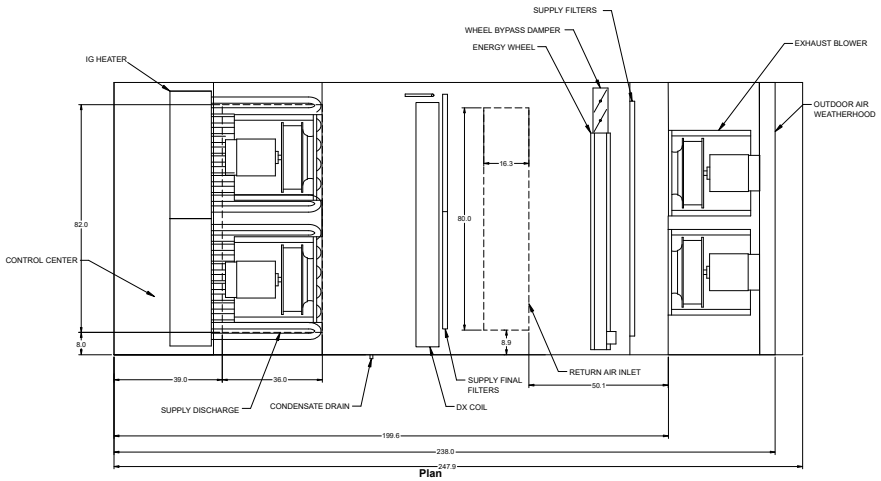
Exhaust Fan - Economizer



Radiated Sound

Position A

Dimensional Overview



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	89	88	90	87	87	79	74	71	95	90
B	92	88	93	91	93	87	80	77	99	96
C	90	89	92	87	86	80	75	71	96	91
D	83	80	80	77	72	65	59	53	86	76
E	95	95	87	84	85	79	72	68	99	89
Total	98	97	97	94	95	89	83	79	104	98

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)	
50.0	76.5	63.6	49.1	49.1	556.1	388.3	N/A	N/A	89.0

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)
DX12C06S12-56.25x86.5-RH	12	6	414	0.679	R-454B	1,584	33.8	42.8

Compressor Details					
Lead Compressor Type	Compressor Qty	Compressor RLA/MRC (A)		Compressor LRA (A)	
		Comp. #1	Comp. #2	Comp. #1	Comp. #2
Inverter Scroll	4	27.9	13.5	NA	123

A2L Installation Requirement - UL 60335-2-40		
Largest Circuit Charge	Minimum Circulation Airflow	Minimum Total Conditioned Room Area
43.9lb / 19.91kg	1,189 CFM	658 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
Crankcase heater on staged compressor
Electronic expansion valve on lead circuit, thermostatic expansion valve on staged circuit
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
Refrigerant low pressure switch (auto reset)
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	600.0	486.0	2.0	32.0	16:1	63.7	95.8

Unit Details
ANSI standard Z83.8 and CSA 2.6
High Thermal efficiency
Direct spark ignition
3/4" Gas Connection
At least 6 in. wg of natural gas pressure (14 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)	89.0	Dry Bulb (F)	78.2
Wet Bulb (F)	72.0	Wet Bulb (F)	65.0
Specific Humidity (gr/lb)	97	Specific Humidity (gr/lb)	76
Enthalpy (BTU/lb)	36.5	Enthalpy (BTU/lb)	30.6
Exhaust Air		**Return Air**	
Dry Bulb (F)	85.7	Dry Bulb (F)	75.0
Wet Bulb (F)	69.8	Rel. Humidity (%)	50
Specific Humidity (gr/lb)	88	Specific Humidity (gr/lb)	68
Enthalpy (BTU/lb)	34.4	Enthalpy (BTU/lb)	28.6

ENERGY WHEEL

Mixed Air Conditions

Dry-bulb (F)	Wet-bulb (F)	Specific Humidity (gr/lb)	Enthalpy (BTU/lb)
76.5	63.6	72	29.5

Design Air Flow Conditions

OA Volume (CFM)	ASHRAE 90.1 OA Enthalpy Recovery Ratio	EA Volume (CFM)	EA Wheel Effectiveness
6,600	74.7	6,600	73.1

Outdoor Air Cooling Reduction

OA Load w/o Energy Recovery		OA Load with Energy Recovery		Equipment Reduction (tons)
(BTU/h)	(tons)	(BTU/h)	(tons)	
234,630.0	19.55	59,400.0	4.95	14.60

Summer Conditions

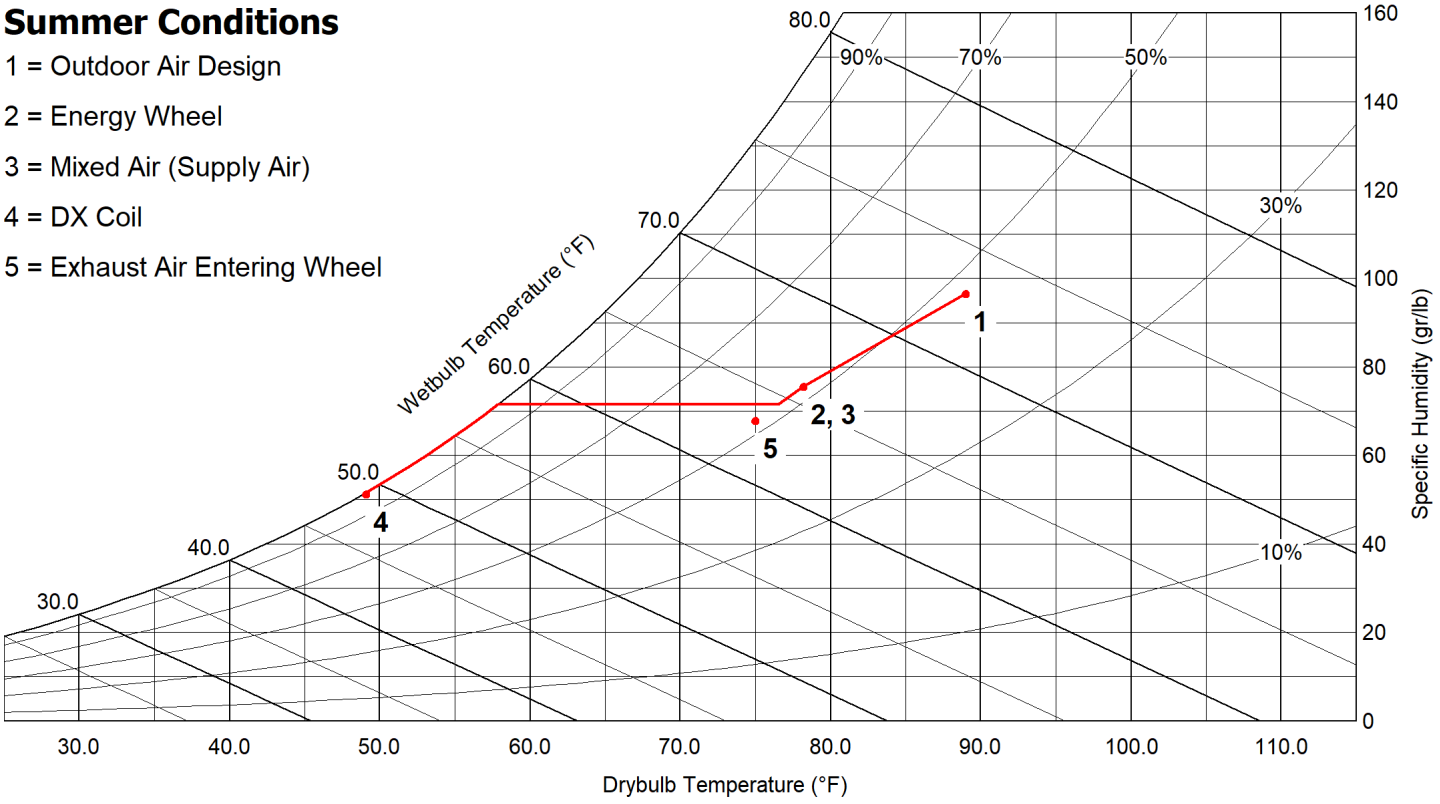
1 = Outdoor Air Design

2 = Energy Wheel

3 = Mixed Air (Supply Air)

4 = DX Coil

5 = Exhaust Air Entering Wheel



Energy Recovery Winter Performance w/out Preheater

Outdoor Air		Supply Air	
Dry Bulb (F)	4.0	Dry Bulb (F)	54.4
Wet Bulb (F)	2.1	Wet Bulb (F)	44.8
Specific Humidity (gr/lb)	4	Specific Humidity (gr/lb)	31
Enthalpy (BTU/lb)	1.5	Enthalpy (BTU/lb)	17.8
Exhaust Air		**Return Air**	
Dry Bulb (F)	20.0	Dry Bulb (F)	72.0
Wet Bulb (F)	19.4	Rel. Humidity (%)	35
Specific Humidity (gr/lb)	15	Specific Humidity (gr/lb)	43
Enthalpy (BTU/lb)	7.0	Enthalpy (BTU/lb)	23.9

ENERGY WHEEL

Mixed Air Conditions

Dry-bulb (F)	Wet-bulb (F)	Specific Humidity (gr/lb)	Enthalpy (BTU/lb)
76.5	63.6	72	29.5

Design Air Flow Conditions

OA Volume (CFM)	ASHRAE 90.1 OA Enthalpy Recovery Ratio	EA Volume (CFM)	EA Wheel Effectiveness
6,600	72.7	6,600	74.9

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 (%)
484,704.0	125,453.0	359,251.0	76.2

Winter Conditions

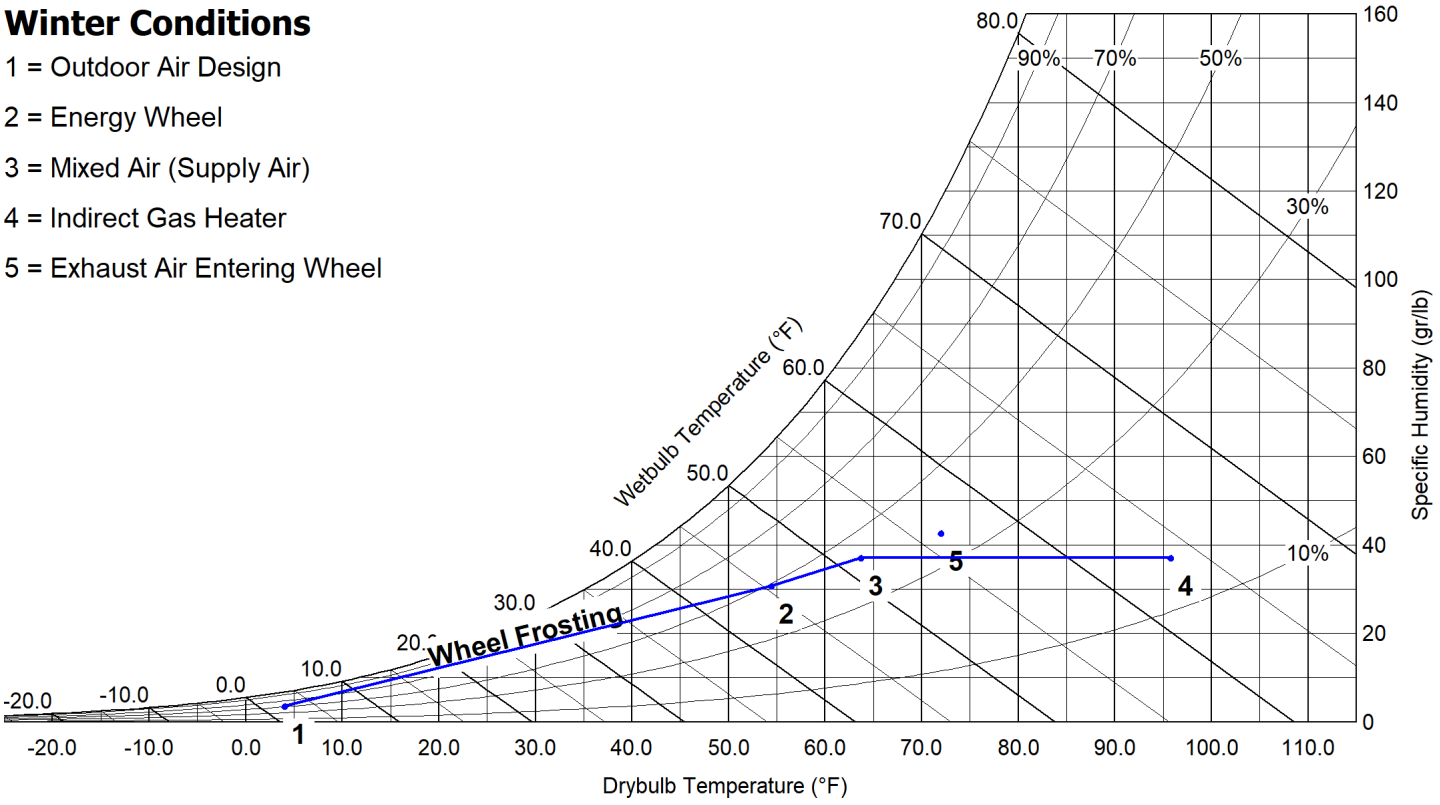
1 = Outdoor Air Design

2 = Energy Wheel

3 = Mixed Air (Supply Air)

4 = Indirect Gas Heater

5 = 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	
6,633	6867	6867	3.9	1.02	0.53	0.52	0

Thermal Effectiveness Ratings							
Enthalpy Recovery		Sensible Effectiveness		Latent Effectiveness		Total Effectiveness	
Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
74.7	72.7	76	76.2	70.9	71.4	73.1	74.9

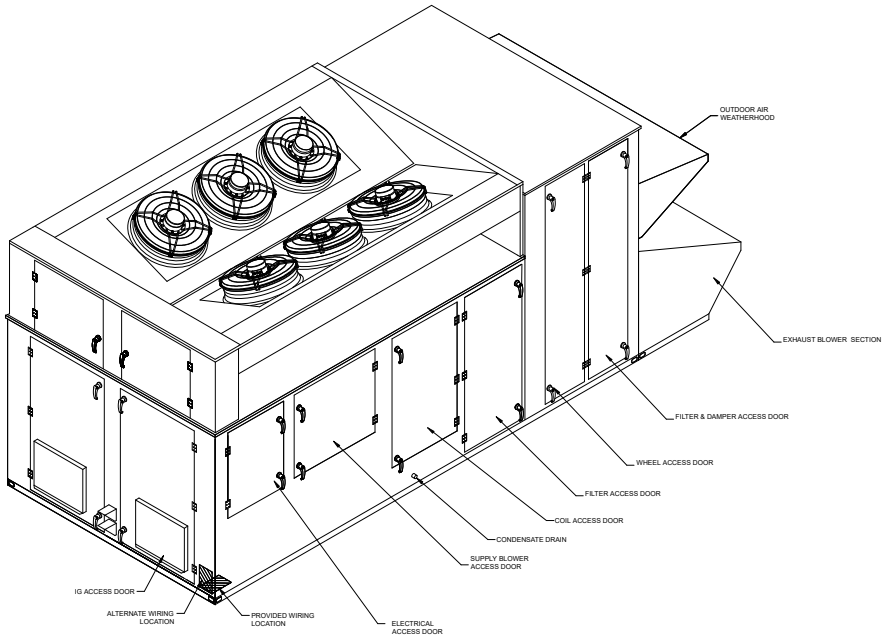
Note(s)

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.

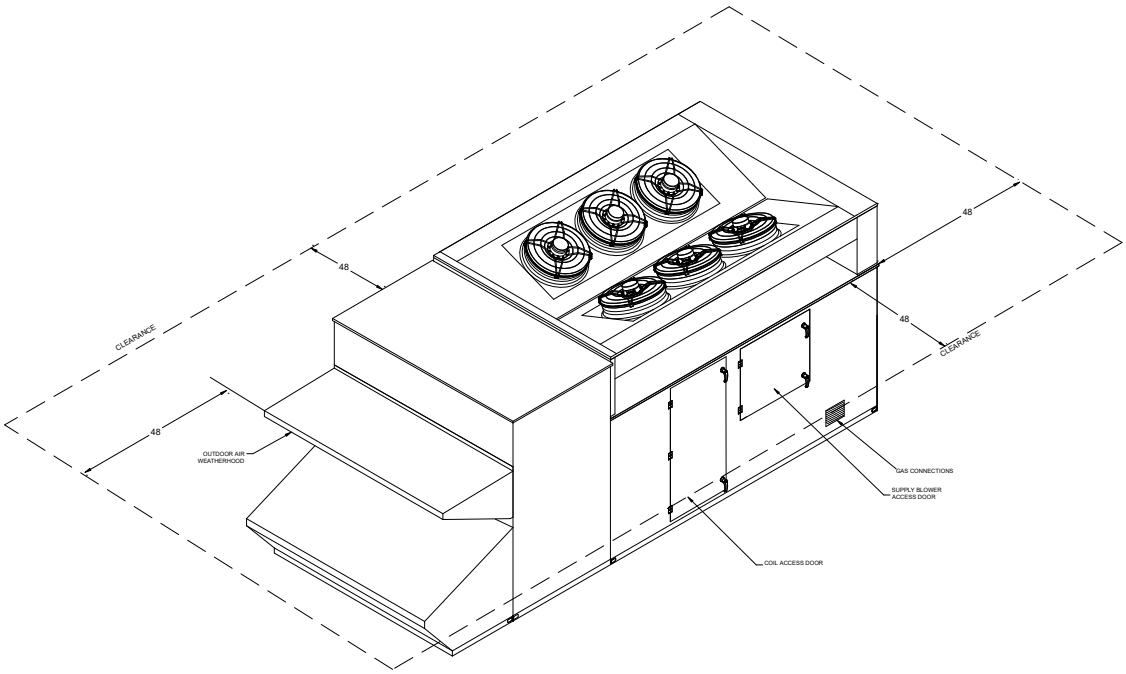
Isometric Drawings

Component Layout



Back Right Isometric

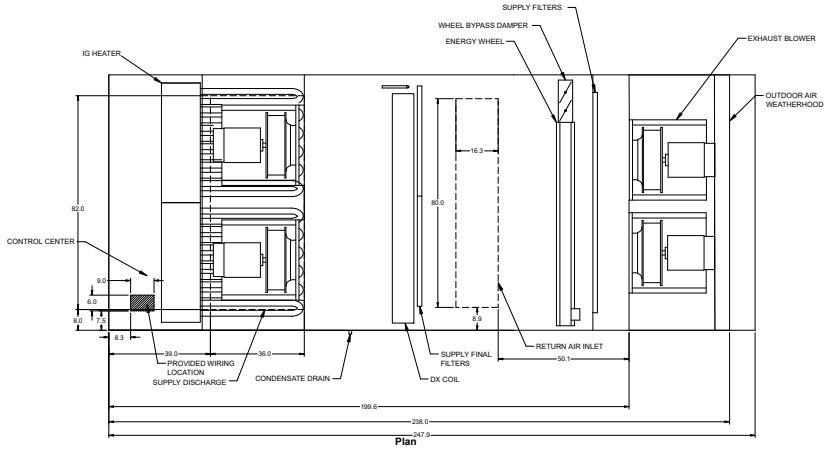
Service Clearances



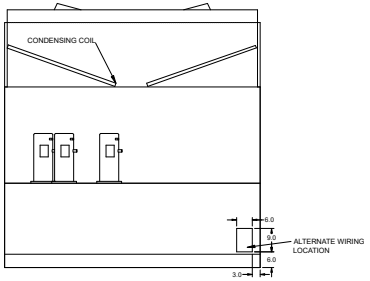
Front Left Isometric

Overview Drawings

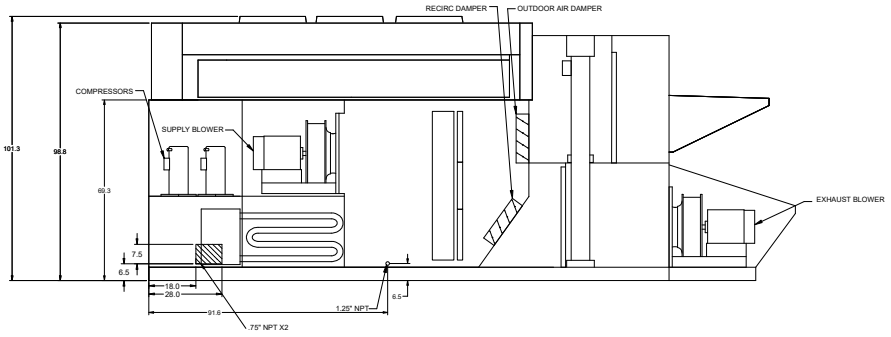
Dimensional Overview



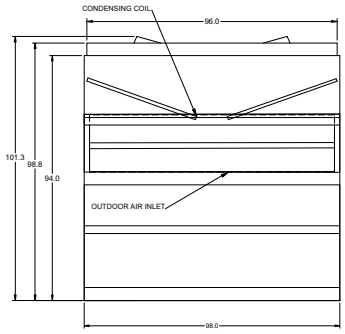
Plan



Left End

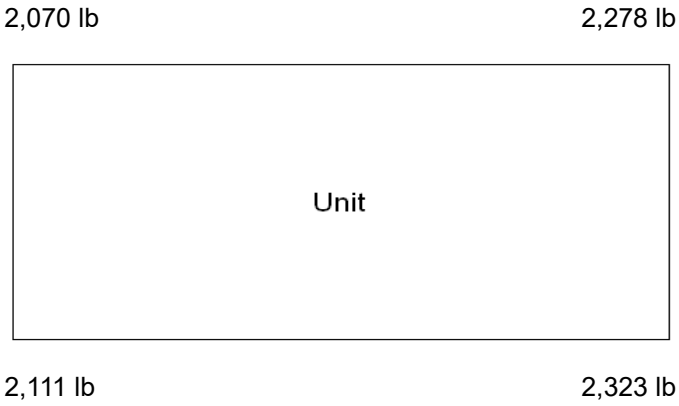


Elevation



Right End

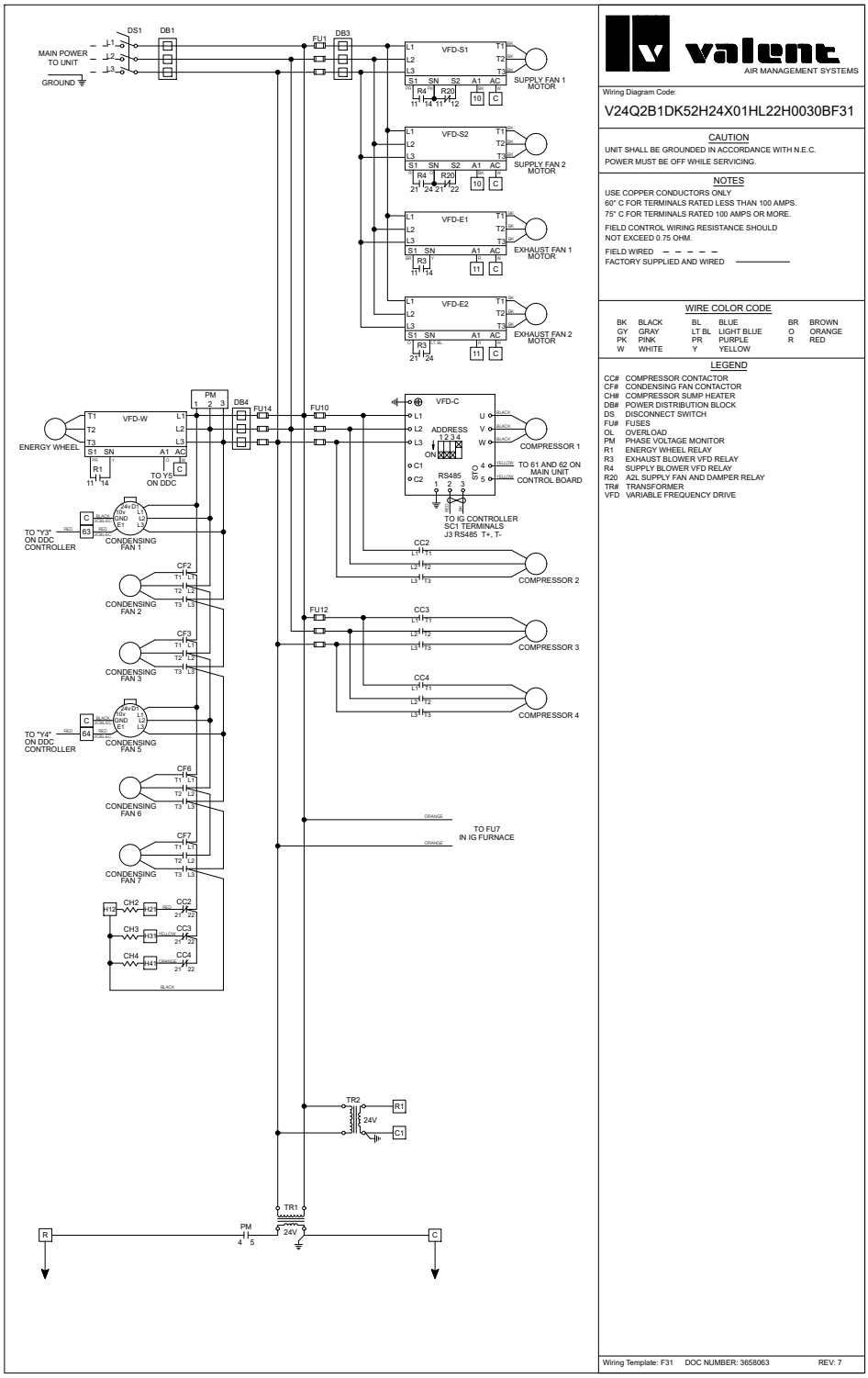
Unit Corner Weights



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



AIR MANAGEMENT SYSTEMS

Wiring Diagram Code:

V24Q2B1DK52H24X01HL22H0030BF31

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

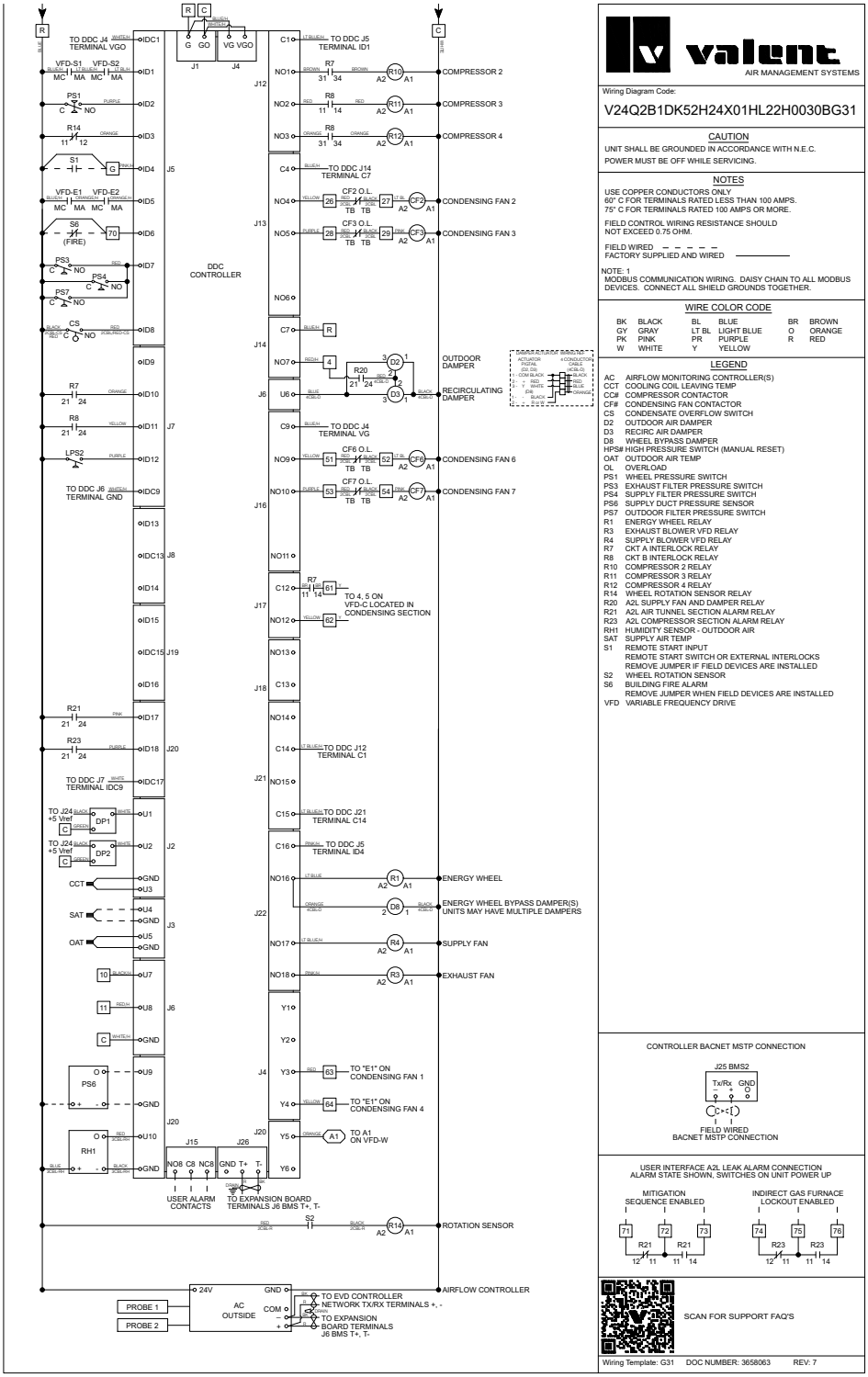
BK	BLACK	BL	BLUE	BR	BROWN
GY	GRAY	LT BL	LIGHT BLUE	O	ORANGE
PK	PINK	PR	PURPLE	R	RED
W	WHITE	Y	YELLOW		

LEGEND

CC#	COMPRESSOR CONTACTOR
CF#	CONDENSING FAN CONTACTOR
CH#	COMPRESSOR SUMP HEATER
DB#	POWER DISTRIBUTION BLOCK
DS	DISCONNECT SWITCH
FU#	FUSES
OL	OVERLOAD
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: F31 DOC NUMBER: 3658063 REV: 7

Wiring Diagram 2



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AIR MANAGEMENT SYSTEMS

Wiring Diagram Code:

V24Q2B1DK52H24X01HL22H0030BG31

CAUTION

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

NOTES

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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. CONNECT ALL SHIELD GROUNDS TOGETHER.

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

AC	AIRFLOW MONITORING CONTROLLER(S)
CCT	COOLING COIL LEAVING TEMP
CC#	COMPRESSOR CONTACTOR
CF#	CONDENSING FAN CONTACTOR
CS	CONDENSATE OVERFLOW SWITCH
D2	OUTDOOR AIR DAMPER
D3	RECIRC AIR DAMPER
D8	WHEEL BYPASS DAMPER
HPS#	HIGH PRESSURE SWITCH (MANUAL RESET)
OAT	OUTDOOR AIR TEMP
OL	OVERLOAD
PS1	WHEEL PRESSURE SWITCH
PS3	EXHAUST FILTER PRESSURE SWITCH
PS4	SUPPLY FILTER PRESSURE SWITCH
PS6	SUPPLY DUCT PRESSURE SENSOR
PS7	OUTDOOR FILTER PRESSURE SWITCH
R1	ENERGY WHEEL RELAY
R3	EXHAUST BLOWER VFD RELAY
R4	SUPPLY BLOWER VFD RELAY
R7	CKT A INTERLOCK RELAY
R8	CKT B INTERLOCK RELAY
R10	COMPRESSOR 2 RELAY
R11	COMPRESSOR 3 RELAY
R12	COMPRESSOR 4 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
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 REMOVE JUMPER WHEN FIELD DEVICES ARE INSTALLED
VFD	VARIABLE FREQUENCY DRIVE

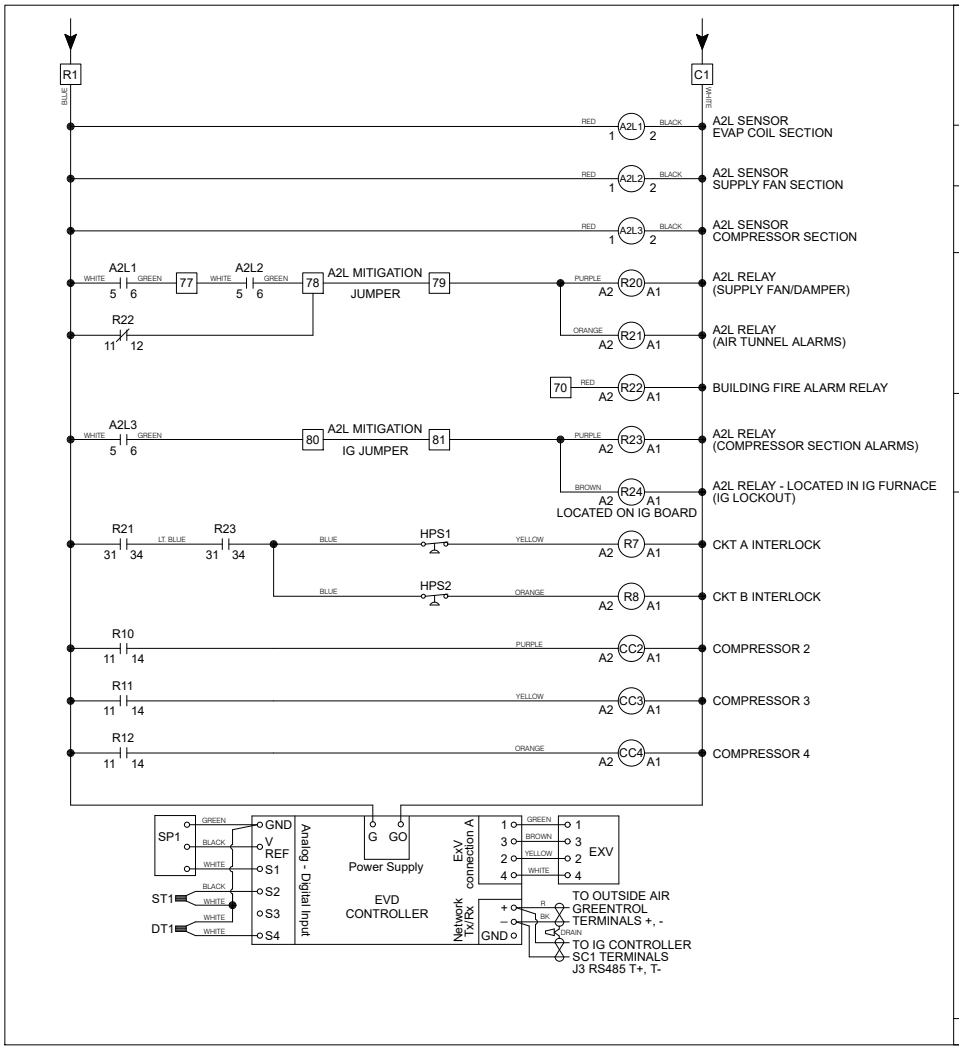
CONTROLLER BACNET MSTP CONNECTION

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

SCAN FOR SUPPORT FAQ'S

Wiring Template: G31 DOC NUMBER: 3658063 REV: 7

Wiring Diagram 3



AIR MANAGEMENT SYSTEMS

Wiring Diagram Code:

V24Q2B1DK52H24X01HL22H0030BL31

CAUTION

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

NOTES

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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

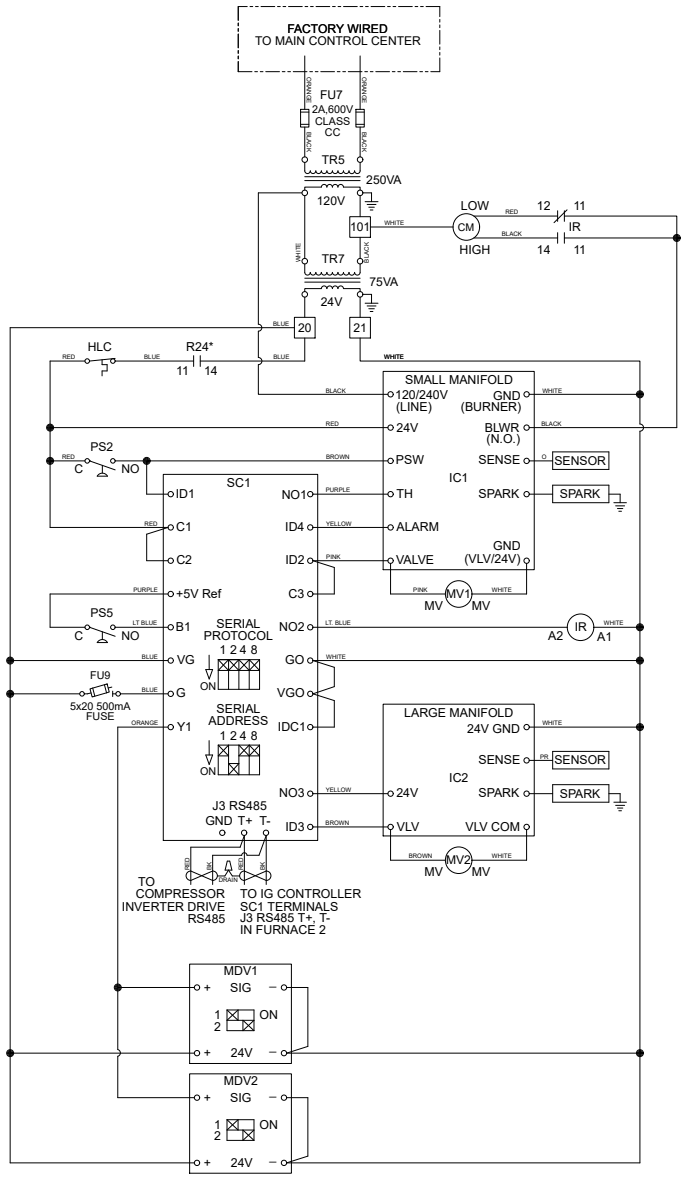
BK	BLACK	BL	BLUE	BR	BROWN
GY	GRAY	LT BL	LIGHT BLUE	O	ORANGE
PK	PINK	PR	PURPLE	R	RED
W	WHITE	Y	YELLOW		

LEGEND

A2L#	A2L REFRIGERANT LEAK SENSOR
CC#	COMPRESSOR CONTACTOR
EXV	ELECTRONIC EXPANSION VALVE
R7	CKT A INTERLOCK RELAY
R8	CKT B INTERLOCK RELAY
R10	COMPRESSOR 2 RELAY
R11	COMPRESSOR 3 RELAY
R12	COMPRESSOR 4 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: 3658063 REV: 7

INDIRECT GAS WIRING DIAGRAM
FURNACE 1 - HTD MODULATING



valent
AIR MANAGEMENT SYSTEMS

Wiring Diagram Code:

V6N52P1RX0251GS23

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

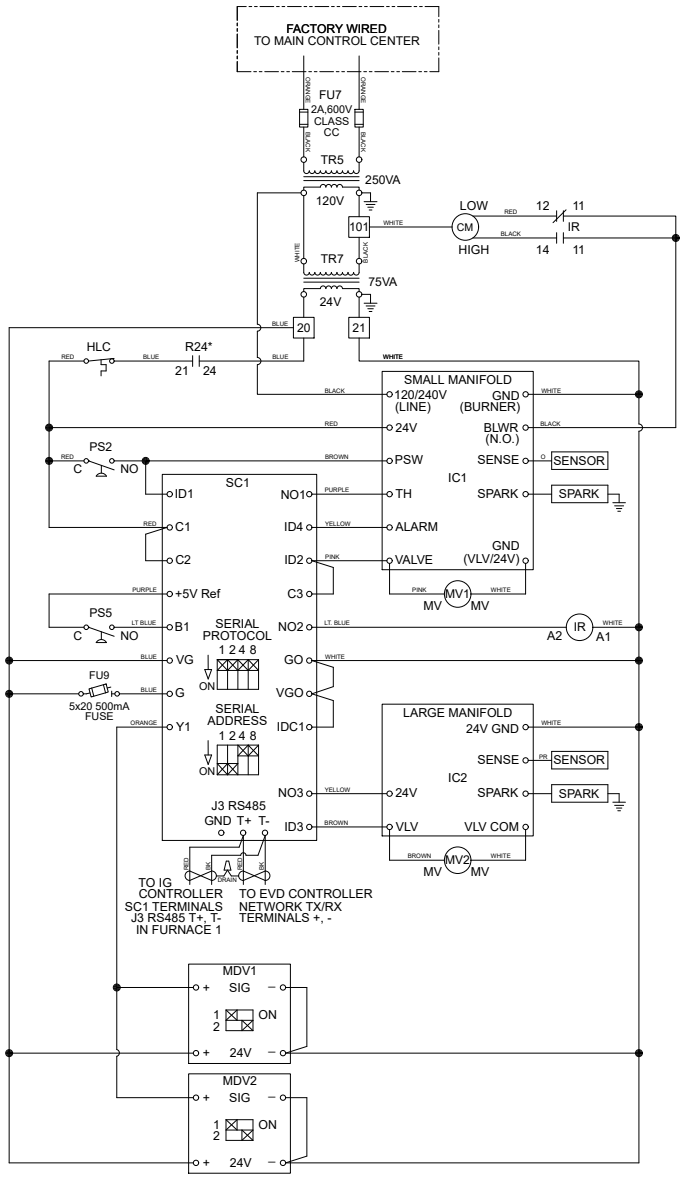
BK	BLACK	BL	BLUE	BR	BROWN
GY	GRAY	LT BL	LIGHT BLUE	O	ORANGE
PK	PINK	PR	PURPLE	R	RED
W	WHITE	Y	YELLOW		

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 RELAY LOCATED IN MAIN CONTROL CENTER
SC1	STAGE CONTROLLER
TR#	TRANSFORMER(S)

Wiring Template: S23 DOC NUMBER: 3658063 REV: 7

INDIRECT GAS WIRING DIAGRAM
FURNACE 2 - HTD MODULATING



valent
AIR MANAGEMENT SYSTEMS

Wiring Diagram Code:

V6N54P1RX0255GS23

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

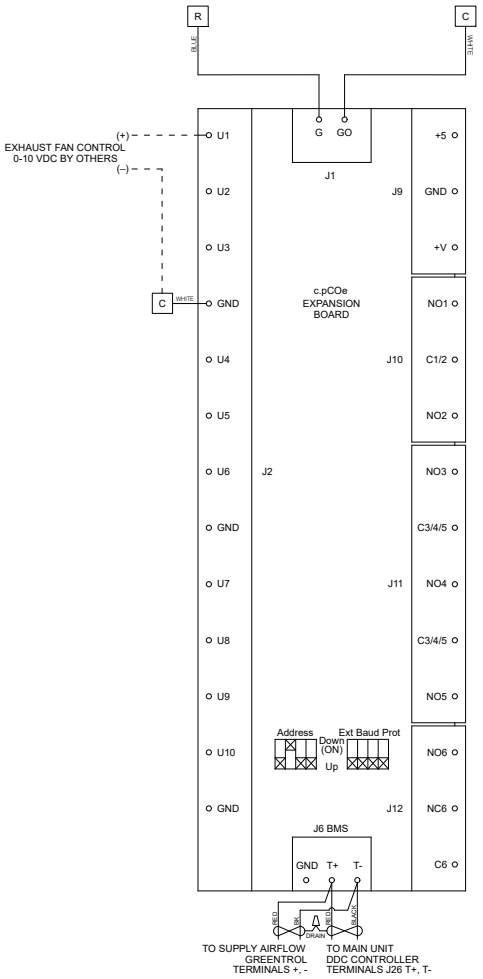
CM	COMBUSTION BLOWER MOTOR
FU#	FUSE(S)
HLC	HIGH TEMPERATURE LIMIT CONTROL
IC1	IGNITION CONTROL - SMALL MANIFOLD
IC2	IGNITION CONTROL - LARGE MANIFOLD
IR	INDUCTION RELAY
MDV1	MODULATING VALVE - SMALL MANIFOLD
MDV2	MODULATING VALVE - LARGE MANIFOLD
MV1	MAIN GAS VALVE - SMALL MANIFOLD
MV2	MAIN GAS VALVE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

Wiring Template: S23 DOC NUMBER: 3658063 REV: 7

GENERATE TABLE START

Monitoring Points Wiring Diagram

EXPANSION BOARD
WIRING DIAGRAM



valent
AIR MANAGEMENT SYSTEMS

Wiring Diagram Code:

VG000XXXX000001BY07

CAUTION

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

NOTES

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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

Wiring Template: Y07 DOC NUMBER: ---- REV: ----

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_Temp_Analog_Input	Space Temperature	AI-1	30002	R	°F		
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	%		X
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		
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		
Economizer_Enthalpy_Enable_Setpoint	Economizer Enthalpy Enable Setpoint Allow Econ when OA Enthalpy is less than Setpoint	AV-13	40026	RW	btu/lb		X
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		X
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	%		X
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	%		X
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		X
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	%		X
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	

System Word Table (IV-10)	
Bit	System_Word
0	Heat Wheel Enable
1	Preheat Enable
2	Reversing Valve (Cooling (0)/Heating(1))
3	
4	
5	
6	Supply Temp Low Limit Alarm
7	Supply Temp High Limit Alarm
8	Supply High Duct Static Alarm.Active
9	Supply Fan 1 Alarm
10	Exhaust Fan 1 Alarm
11	Drain Pan Alarm
12	Freeze Stat Alarm
13	Filter Alarm
14	Space High Static Alarm
15	Return Low Static Alarm
16	Shutdown Input Alarm
17	Energy Recovery Wheel High Diff Pressure
18	Energy Recovery Wheel Rotation Alarm
19	
20	Heat Pump Heating Lock Out Alarm
21	Permanent Memory - Too Many Writes
22	BMS Offline Alarm
23	
24	
25	
26	
27	
28	Heat-Cool Only - Dehumidification Request Active
29	Heat-Cool Only - Heating Request Active
30	Heat-Cool Only - Coil Setpoint Alarm Active
31	Heat-Cool Only - Supply Setpoint Alarm Active

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

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

Refrigeration Circuit Word Table (IV-7)	
Bit	Ref_Ckt_PressTemp_Alarm_Word
0	Circuit A Discharge Pressure Sensor Alarm
1	Circuit A Discharge Temp Sensor Alarm
2	Circuit A Suction Pressure Sensor Alarm
3	Circuit A Suction Temp Sensor Alarm
4	Circuit B Discharge Pressure Sensor Alarm
5	Circuit B Discharge Temp Sensor Alarm
6	Circuit B Suction Pressure Sensor Alarm
7	Circuit B Suction Temp Sensor Alarm
8	Circuit A High Pressure Switch Alarm
9	Circuit A Low Pressure Switch Alarm
10	Circuit B High Pressure Switch Alarm
11	Circuit B Low Pressure Switch Alarm
12	Circuit A High Sat Discharge Temp Alarm
13	Circuit B High Sat Discharge Temp Alarm
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
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31	

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

Device Offline Word Table (IV-8)	
Bit	**Device_Offline_Word - Ext**
0	Space TStat 1 Offline
1	Space TStat 2 Offline
2	Space TStat 3 Offline
3	Space TStat 4 Offline
4	VFD Offline Supply Fan
5	
6	
7	
8	Expansion Board 1 Alarm
9	Expansion Board 2 Alarm
10	Expansion Board 3 Alarm
11	Expansion Board 4 Alarm
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	Master Unit Offline Alarm
28	Slave Unit 1 Offline Alarm
29	Slave Unit 2 Offline Alarm
30	Slave Unit 3 Offline Alarm
31	Slave Unit 4 Offline Alarm

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

Alarm Table (Latest Alarm IV-5)					
0	No Active Alarms	63	Supply Air Temperature - Low Limit Shutdown	117	High SDT Lockout - Circuit A
1	Supply Fan 1 Run - Status Not Proven	64	Heat Wheel Rotation - Not Detected	118	High SDT Lockout - Circuit B
2	Freeze Protection - Thermostat Tripped	65	Slave Unit 1 Offline -	121	Inverter 1 Alarm -
3	High Supply Duct - Static Pressure	66	Slave Unit 2 Offline -	123	Inverter 1 Lockout - Cycle Power to Unit
4	Low Return Duct - Static Pressure	67	Slave Unit 3 Offline -	125	High SDT Lockout - Circuit A
5	Outside Air Temp - Sensor Value Not Valid	68	Slave Unit 4 Offline -	126	Inverter 1 Foldback - Input Current
6	Supply Air Temperature - Sensor Value Not Valid	69	Master Unit Offline -	127	Inverter 1 Foldback - Inverter Temp
7	Cold Coil 1 Temp - Sensor Value Not Valid	70	Heat Pump Defrost - Mode is Active	131	Inverter 1 Comms Lost - Compressor Offline
9	Exhaust Air Temp - Sensor Value Not Valid	71	Multi Devices per Ch - Contact Tech Support	133	Space Thermostat 1 - Sensor Offline
10	Mixed Air Temperature - Sensor Value Not Valid	74	Shutdown Contact - In Alarm Position	134	Space Thermostat 2 - Sensor Offline
11	Return Air Temperature - Sensor Value Not Valid	75	Comp Maint Alarm - Run Hours Spt Reached	135	Space Thermostat 3 - Sensor Offline
12	Space Temperature - Sensor Value Not Valid	76	Supply Air Temperature - High Limit Shutdown	136	Space Thermostat 4 - Sensor Offline
13	Return Air RH - Sensor Value Not Valid	77	Space High Static Pres - Shutdown	137	IG Furnace 1. No flame - after 3 tries
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	79	BMS Offline - Watchdog is FALSE	139	IG Furnace 1 combust - fan high pressure sw
16	Low Pressure Switch - Circuit A	80	Clg Coil Setpt Input - Value is not valid	140	IG Furnace 1 Ignition - controller alarm
17	Low Pressure Switch - Circuit B	81	Sup Air Setpt Input - Value is not valid	141	IG Furnace 1 pressure - switch fault alarm
20	High Pressure Switch - Circuit A	82	BACnet License - Not Installed	142	High SDT Lockout - Circuit B
21	High Pressure Switch - Circuit B	83	Low Suction SH ExV A - EVD 1 Alarm	143	IG Furnace 1 - Max retrys
24	Damper End Switch Fail - Dampers are not open	84	Low Suction SH ExV B - EVD 1 Alarm	144	IG Furnace 1 - High Limit Trip
25	Exhaust Fan 1 Run - Status Not Proven	85	LOP A EVD 1 - Low Operating Pressure	145	IG Furnace - pCOe 1 Offline
26	Filters are Dirty - Replace Filters	87	MOP A EVD 1 - Max Operating Pressure	146	IG Furnace 1 IC fault - Check Furnace Wiring
27	Cond Drain Pan Full - Check Drain	89	EEV A EVD 1 - Motor Alarm	147	IG Furnace 2 No flame - after 3 tries
28	Exp Board 1 Status - Board is Offline	91	LowSuct A EVD 1 - Refrigerant Temp	148	IG Furnace 2 Large - no flame after 3 tries
29	Exp Board 2 Status - Board is Offline	93	High Condensing Temp - EVD 1	149	IG Furnace 2 combust - fan high pressure sw
31	Exp Board 4 Status - Board is Offline	94	Sens S1 EVD 1 - Sensor Value Not Valid	150	IG Furnace 2 Ignition - controller alarm
32	Non-Volatile Memory Er - Contact Tech Support	95	Sens S2 EVD 1 - Sensor Value Not Valid	151	IG Furnace 2 pressure - switch fault alarm
33	Space 1 CO2 - Sensor Value Not Valid	96	Sens S3 EVD 1 - Sensor Value Not Valid	152	IG Furnace 2 combust - fan proving alarm
34	Space Static Pressure - Sensor Value Not Valid	97	Sens S4 EVD 1 - Sensor Value Not Valid	153	IG Furnace 2 - Max retrys
35	Supply Duct Stat Press - Sensor Value Not Valid	98	EVD 1 EEPROM Damaged - Call Tech Support	154	IG Furnace 2 - High Limit Trip
36	Return Duct Stat Press - Sensor Value Not Valid	99	Incomplete Closing - EVD 1	155	IG Furnace - pCOe 2 Offline
37	Sup Fan AFMS - Sensor Value Not Valid	101	Emergency Closing - EVD 1	156	IG Furnace 2 IC fault - Check Furnace Wiring
38	Exh Fan AFMS - Sensor Value Not Valid	101	EVD 1 Battery -	157	Outside Air Greentrol - Offline or Flow Error
39	Outside Damper AFMS - Sensor Value Not Valid	102	FW Incompatibility - EVD 1	158	Exhaust Air Greentrol - Offline or Flow Error
40	Space Setpt Adj Slider - Sensor Value Not Valid	106	EVD 1 Config Error -	159	Supply Air Greentrol - Offline or Flow Error
42	Return CO2 - Sensor Value Not Valid	105	High Discharge Temp - First Inverter	170	OA Damper Fault - Not Econ and should be
42	Discharge Press Ckt A - Sensor Value Not Valid	106	Low Discharge Pressure - First Inverter	171	OA Damper Fault - Econ and shouldn't be
43	Discharge Press Ckt A - Sensor Value Not Valid	106	Low Discharge Pressure - First Inverter	171	OA Damper Fault - Econ and shouldn't be
44	Discharge Press Ckt B - Sensor Value Not Valid	107	High Suction Pressure - First Inverter	172	OAD Fault - Damper not Modulating
47	Suction Press Ckt A - Sensor Value Not Valid	108	Low Suction Pressure - First Inverter	173	OAD Fault - Excess Outdoor Air
48	Suction Press Ckt B - Sensor Value Not Valid	109	High Current - First Inverter	174	IG Furnace 1 - Combustion Fan Alarm
51	Discharge Temp Ckt A - Sensor Value Not Valid	110	High Pressure Ratio - First Inverte	175	IG Furnace 2 - Combustion Fan Alarm
52	Discharge Temp Ckt B - Sensor Value Not Valid	111	Low Pressure Ratio - First Inverter	176	Supply Fan - VFD Offline
55	Suction Temp Ckt A - Sensor Value Not Valid	112	Low Delta P - First Inverter	177	OA Damper Fault - Not Econ and should be
56	Suction Temp Ckt B - Sensor Value Not Valid	113	High Discharge Press - First Inverter	178	Return Fan - VFD Offline
59	Ckt A High Saturated - Discharge Temperature	114	Compressor Staging - Order Skipped	179	Energy Recovery - VFD Offline
60	Ckt B High Saturated - Discharge Temperature	115	Heat Pump Heating - Locked Out	180	Embedded EVD Error
.		116	EVD 1 Error - Unexpected Position	181	SF VFD Alarm - Check VFD

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 (Unit Off): Unit remains off when in unoccupied mode.

- Supply fan OFF
- Exhaust fan OFF
- Tempering OFF
- Outdoor air damper closed.
- Recirculation damper open.

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.

Duct Static Pressure Sensor: The supply blower is modulated based upon the signal from a duct static pressure sensor (factory provided and wired, field mounted and tubing by others). The controller will modulate the supply fan based upon a comparison of the duct static pressure set point (adj.) to the actual duct static pressure level reported from the sensor. (**Mechanical high static protection cutoffs must be installed by others to protect the system and equipment from over-pressurization. The manufacturer does not assume responsibility for this.**)

OUTDOOR AIR AND RE-CIRCULATED (RECIRC) AIR DAMPER CONTROL: The outdoor and recirculated air dampers are factory mounted and wired. Outside air damper and recirculation damper will be inverse positions of each other. Example, when the outside air damper is set to 35% opening, the recirculation damper will be at 65% opening. The modulating actuator will be controlled to dictate position by the following sequence.

Constant Position-Adj. Setpoint: The outdoor air damper will be set to a constant minimum position (adj.) and upon a field provided contact closure the outdoor air damper will open up to the maximum position (adj.). Both positions will be set by the controller.

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

0-10V VDC Signal by Others: The exhaust blower is modulated based upon a 0-10 VDC signal (field provided and wired) wired directly into the VFD. This would operate separately from the controller sequences.(Mechanical high static protection cutoffs must be installed by others to protect the system and equipment form over-pressurization. The manufacturer does not assume responsibility for this.)

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 0-50%, the inverter scroll will be controlled to maintain discharge temperature. From 50-100% the second stage will be on in combination with the inverter scroll compressor to maintain the discharge temperature. The electronic expansion valve will modulate to maintain 8F of superheat.

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

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.

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 (Winter Ramp): The controller will enable the outdoor air and recirc. air dampers to modulate in order to help the unit keep up with heating demand in the event of the unit operating outside design conditions. (This can be enabled 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.

Refrigerant Leak Detected In Air Tunnel: If a refrigerant leak is detected in the air tunnel, the supply fan will operate at minimum airflow requirement, recirculation damper to be fully open, outside air damper will be closed, powered exhaust fan will operate based configured sequence, energy recovery wheel will be off, and

compressors are disabled to reduce leakage rate. This operation is required in order to move stagnant refrigerant from within the unit, duct, and space ensuring proper dilution of the refrigerant. This operation is required even if the unit is called to be off. After leak detection is cleared, the unit will go back to normal operation. Exception to this operation is when the unit is receiving an active fire alarm signal at the unit controller. If unit controller is receiving a fire alarm input, the unit will not operate the leak mitigation supply fan sequence.

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 first modulate the energy wheel speed and then modulate the outdoor air and recirculated air dampers to maintain the supply air temperature set point. If the outdoor air damper modulates to the maximum 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.

Temp./Enthalpy: The economizer will be locked out when: the outdoor air is < 40 F DB (adj.) or > 75 F DB (adj.) or > 55 F dew point (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.

ENERGY WHEEL BYPASS DAMPERS

By Factory: The unit will be provided with energy wheel bypass dampers for both the outdoor air and return airstreams. During normal operation, the dampers will remain closed to allow full operation of the energy wheel. During economizer sequences, the bypass dampers will be open to alleviate pressure drop through the wheel, while allowing more outdoor air to be used for economizer cooling.

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.

Pressure Sensor Alarm: The controller sends an alarm in the case of a failed pressure sensor.

Humidity Sensor Alarm: The controller sends an alarm in the case of a failed humidity 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.

Airflow Monitoring: The outdoor airflow monitoring device is installed as a stand alone option in the control center. It includes a heated thermistor that is used to measure feet per minute in the housing. This feet per minute is converted to CFM in the factory supplied airflow readout device.

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.

Airflow Monitoring: The outdoor airflow monitoring device is installed as a standalone option in the control center. It includes a heated thermistor that is used to measure feet per minute in the housing. This feet per minute is converted to CFM in the factory supplied airflow readout device.

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 30 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.

VXE-312-74D-25K-O-G2

Unit Performance

7700 CFM @ Economizer

Design Conditions

Elevation (ft)	Summer DB (F)	Summer WB (F)	Winter DB (F)	Supply (CFM)	Outdoor Air (CFM)	Recirc Air (CFM)	Exhaust Air (CFM)
1,237	89.0	72.0	4.0	11,000	5,150	5,850	5,150

Unit Specifications

Qty	Weight (lb)	Cooling Type	Heating Type	Unit Installation	Unit ETL Listing	Furnace ETL Listing
1	7,929 (+/- 5%)	Packaged DX	Indirect Gas	Outdoor	UL\cUL 1995/ 60335-2-40	ANSI Z83.8 / CSA 2.6

Configuration

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

ASHRAE 90.1-2022 Compliance

	ASHRAE 90.1 Min. Efficiency	Calculated Efficiency	Compliance
EER	9.8	11.1	✓
IEER	13.0	15.8	✓
Enthalpy Recovery Ratio (%)	50	78	✓

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	89.0	72.0	77.7	64.7	75.0	62.3/50	86.2	70.0	143,685.0
Winter	4.0	2.1	57.0	46.4	72.0	55.6/35	17.7	17.3	294,786.0

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	278.1	241.0	Inverter Scroll	76.3 / 63.4	54.6 / 54.6	-	-

Heating Specifications

Type	Gas Type	Input (MBH)	Output (MBH)	Temperature Rise		Turndown	Performance	
				Min (F)	Max (F)		EAT (F)	LAT (F)
Indirect Gas	Natural	600.0	486.0	3.0	41.0	16:1	65.0	105.9
		500	405					

Motor Specifications

Motor	Qty	Operating Power (hp)	Size (hp)	Enclosure	Efficiency	RPM
Supply	2	5.28	7-1/2	ODP	PE	1770
Exhaust	2	0.97	3	ODP	PE	1165

Electrical Specifications

Power Supply	Rating (V/C/P)	MCA (A)	MOP (A)	FLA (A)	Fan Power (W/CFM)*
Unit	460/60/3	80.2	90.0	75.4	0.847

*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	Std
Energy Recovery Device - Polymer Wheel w/ Silica Gel Desiccant	Std
Controls	
Unit Controls - Full Control	Std
Internally Mounted Control Center with 24 VAC control transformer(s) and control circuiting fusing	Std
BMS Protocol - BACNetMSTP	X
BMS Monitoring Points	
Supply Fan Control - Duct Static Pressure By Factory	X
Exhaust Fan Control - 0-10VDC By Others	X
Economizer Control - Temp./Enthalpy	X
Exhaust Fan Only Power	
Web-Based User Interface	Std
Energy Wheel Economizer Control - Modulating Wheel, OA Temp Setpoint w/VFD Wheel	X
Energy Wheel Rotation Sensor	Std
Damper Control - Constant Position-Adj. Setpoint	X
Unoccupied Recirc Mode	
Control Accessories	
Remote Display	
Dirty Filter Sensor(s) - All	X
Airflow Monitor - Outdoor Air	X
Room Thermostat	
Phase/Brownout Protection	Std
Economizer Fault Detection Diagnostics	

Accessories	
Frost Control ModulatingWheel - Modulating Wheel	X
Outdoor Air Damper - Low Leakage	X
Return Air Damper	
Roof Curb	
Supply Air Filters - 2" Merv 8 And 2" Merv 13, 16-16x24x2, 8-20x24x2	X
Service Outlet - Shipped loose and powered by others	X
Piping Vestibule	
Service Lights	
Condensate Overflow Switch	X
Spare Filters - Both, 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, 4-20x24x2, 4-24x24x2	Std
Outdoor Air Filters - 2" Merv 8, 4-20x24x2, 4-24x24x2	Std
Furnace Control - 16:1 Modulating	X
Spare Energy Wheel Belt	X
Spare Energy Wheel Segments	
Energy Wheel Bypass Damper	X
Power Venting	Std
Hail Guards	
Warranty Options	
Unit Warranty - 2.5 Yrs. (1 Yr. Extended)	X
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
Outdoor Air Damper supplied is low leakage, motorized VCD-23 (leakage rate of 3 CFM/ft^2 @ 1 in. wg), Class 1A

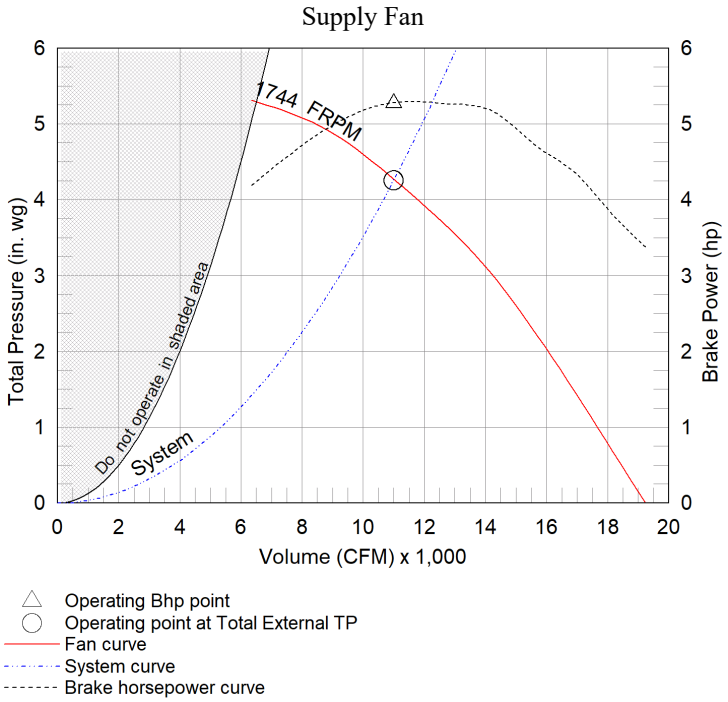
Supply Fan Charts And Performance

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
11,000	2	4.256	1744	5.28	2	7-1/2	2	Plenum	Direct

Pressure Drop (in. wg)							
Weatherhood	Filter	Damper	Cooling	Heating	External	Energy Wheel	Total
0.04	0.406	0.11	0.285	0.459	2	0.56	4.256

Sound Performance in Accordance with AMCA										
Sound Power by Octave Band								Lwa	dBA	Sones
62.5	125	250	500	1000	2000	4000	8000			
89	91	97	88	84	79	81	77	92	81	35

*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	5,150	1	1.505	1413	0.97	2	3	2	Plenum	Direct
Economizer	7,700	1	1.69	1774	1.85	2	3	2	Plenum	Direct

Pressure Drop (in. wg)

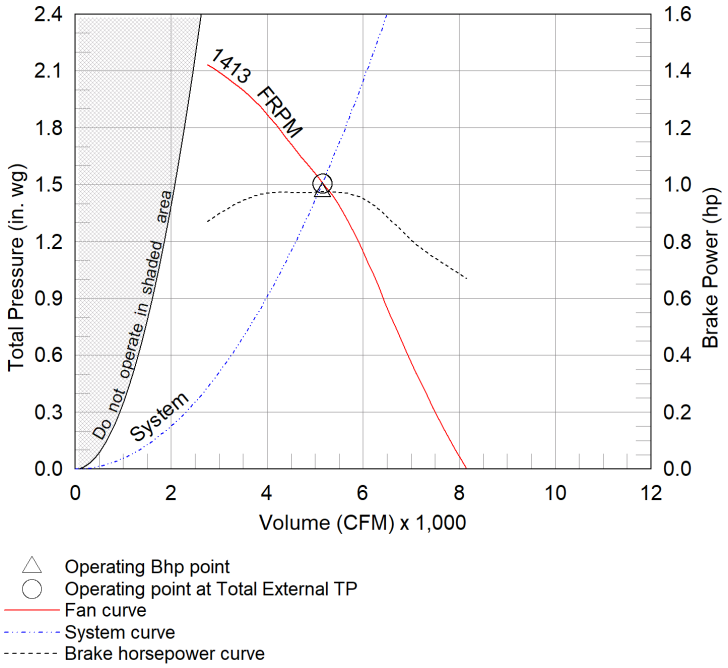
Mode	Weatherhood	Filter	Damper	Cooling	Heating	External	Energy Wheel	Total
Normal	0.02	-	-	-	-	1	0.49	1.505
Economizer	0.04	-	-	-	-	1	0.65	1.69

Sound Performance in Accordance with AMCA

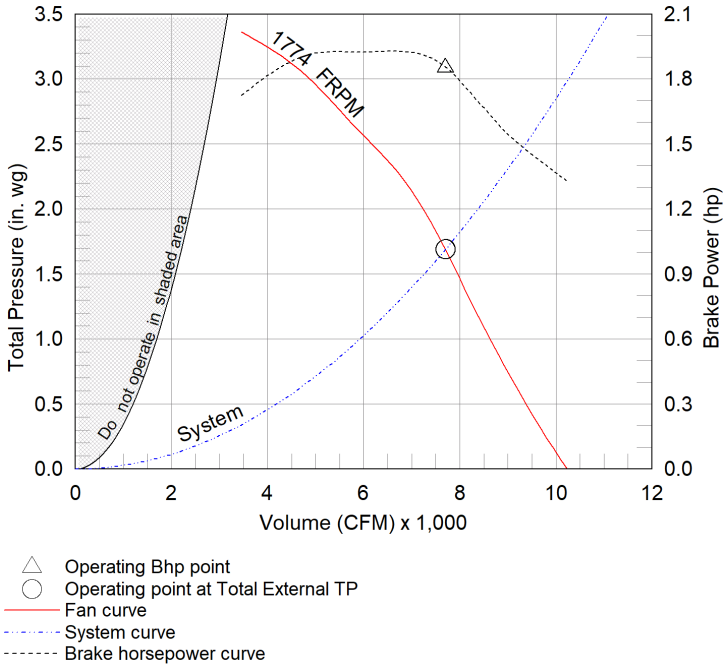
Mode	Sound Power by Octave Band								Lwa	dBA	Sones
	62.5	125	250	500	1000	2000	4000	8000			
Normal	74	78	72	68	65	63	68	60	73	62	12
Economizer	74	78	72	68	65	63	68	60	73	62	12

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

Exhaust Fan



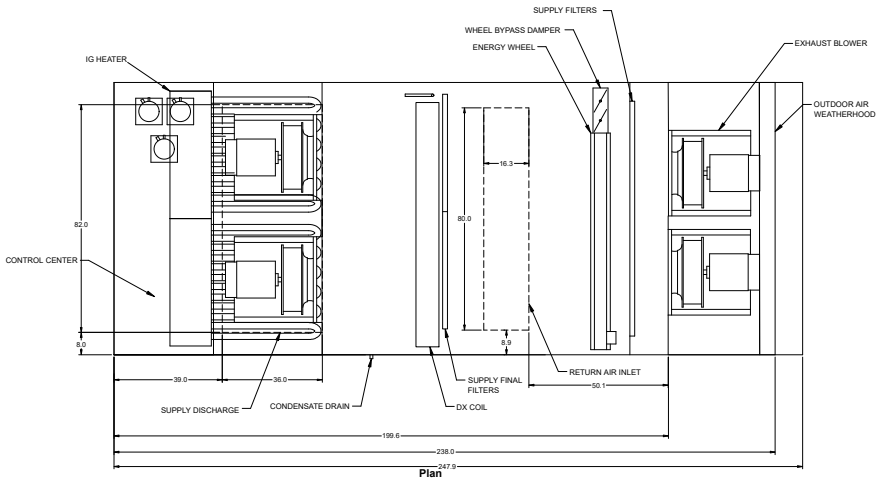
Exhaust Fan - Economizer



Radiated Sound

Position A

Dimensional Overview



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	89	88	90	87	87	79	74	71	95	90
B	92	88	93	91	93	87	80	77	99	96
C	90	89	92	87	86	80	75	71	96	91
D	83	80	80	77	72	65	59	53	86	76
E	95	95	87	84	85	79	72	68	99	89
Total	98	97	97	94	95	89	83	79	104	98

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)	
25.0	76.3	63.4	54.6	54.6	278.1	241.0	N/A	N/A	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)
DX38S04S12-56x86.5-RH	12	4	327	0.285	R-454B	1,021	33.6	47.9

Compressor Details					
Lead Compressor Type	Compressor Qty	Compressor RLA/MRC (A)		Compressor LRA (A)	
		Comp. #1	Comp. #2	Comp. #1	Comp. #2
Inverter Scroll	2	18.7	19.4	NA	147

A2L Installation Requirement - UL 60335-2-40		
Largest Circuit Charge	Minimum Circulation Airflow	Minimum Total Conditioned Room Area
25.1lb / 11.38kg	680 CFM	377 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
Crankcase heater on staged compressor
Electronic expansion valve on lead circuit, thermostatic expansion valve on staged circuit
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
Refrigerant low pressure switch (auto reset)
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	600.0	486.0	3.0	41.0	16:1	65.0	105.9

Unit Details
ANSI standard Z83.8 and CSA 2.6
High Thermal efficiency
Direct spark ignition
3/4" Gas Connection
At least 6 in. wg of natural gas pressure (14 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)	89.0	Dry Bulb (F)	77.7
Wet Bulb (F)	72.0	Wet Bulb (F)	64.7
Specific Humidity (gr/lb)	97	Specific Humidity (gr/lb)	75
Enthalpy (BTU/lb)	36.5	Enthalpy (BTU/lb)	30.3
Exhaust Air		**Return Air**	
Dry Bulb (F)	86.2	Dry Bulb (F)	75.0
Wet Bulb (F)	70.0	Rel. Humidity (%)	50
Specific Humidity (gr/lb)	89	Specific Humidity (gr/lb)	68
Enthalpy (BTU/lb)	34.6	Enthalpy (BTU/lb)	28.6

ENERGY WHEEL

Mixed Air Conditions

Dry-bulb (F)	Wet-bulb (F)	Specific Humidity (gr/lb)	Enthalpy (BTU/lb)
76.3	63.4	71	29.4

Design Air Flow Conditions

OA Volume (CFM)	ASHRAE 90.1 OA Enthalpy Recovery Ratio	EA Volume (CFM)	EA Wheel Effectiveness
5,150	78	5,150	76.3

Outdoor Air Cooling Reduction

OA Load w/o Energy Recovery		OA Load with Energy Recovery		Equipment Reduction (tons)
(BTU/h)	(tons)	(BTU/h)	(tons)	
308,228.0	25.69	164,543.0	13.71	11.97

Summer Conditions

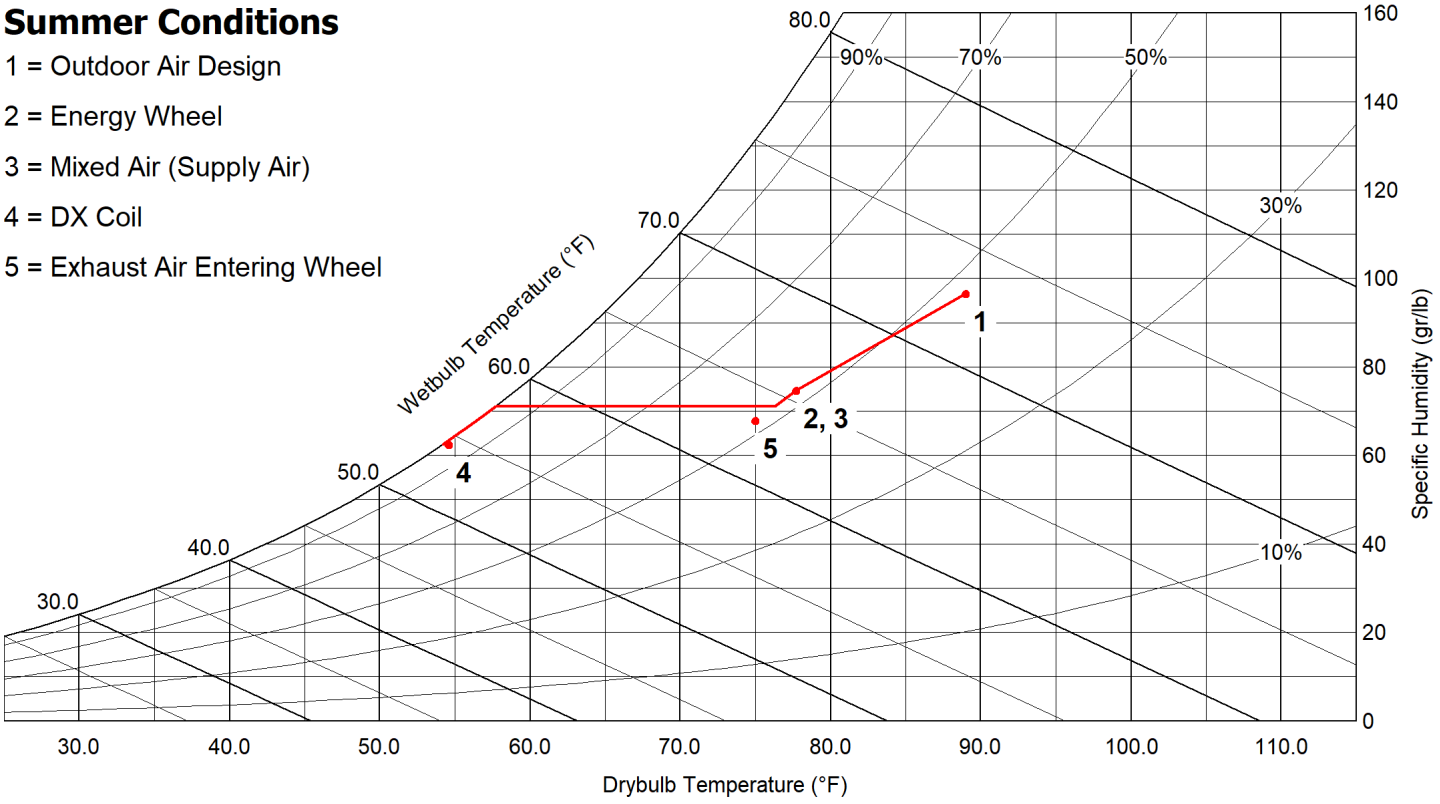
1 = Outdoor Air Design

2 = Energy Wheel

3 = Mixed Air (Supply Air)

4 = DX Coil

5 = Exhaust Air Entering Wheel



Energy Recovery Winter Performance w/out Preheater

Outdoor Air		Supply Air	
Dry Bulb (F)	4.0	Dry Bulb (F)	57.0
Wet Bulb (F)	2.1	Wet Bulb (F)	46.4
Specific Humidity (gr/lb)	4	Specific Humidity (gr/lb)	32
Enthalpy (BTU/lb)	1.5	Enthalpy (BTU/lb)	18.6
Exhaust Air		**Return Air**	
Dry Bulb (F)	17.7	Dry Bulb (F)	72.0
Wet Bulb (F)	17.3	Rel. Humidity (%)	35
Specific Humidity (gr/lb)	13	Specific Humidity (gr/lb)	43
Enthalpy (BTU/lb)	6.3	Enthalpy (BTU/lb)	23.9

ENERGY WHEEL

Mixed Air Conditions

Dry-bulb (F)	Wet-bulb (F)	Specific Humidity (gr/lb)	Enthalpy (BTU/lb)
76.3	63.4	71	29.4

Design Air Flow Conditions

OA Volume (CFM)	ASHRAE 90.1 OA Enthalpy Recovery Ratio	EA Volume (CFM)	EA Wheel Effectiveness
5,150	76.4	5,150	78.2

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 (%)
378,216.0	83,430.0	294,786.0	79.6

Winter Conditions

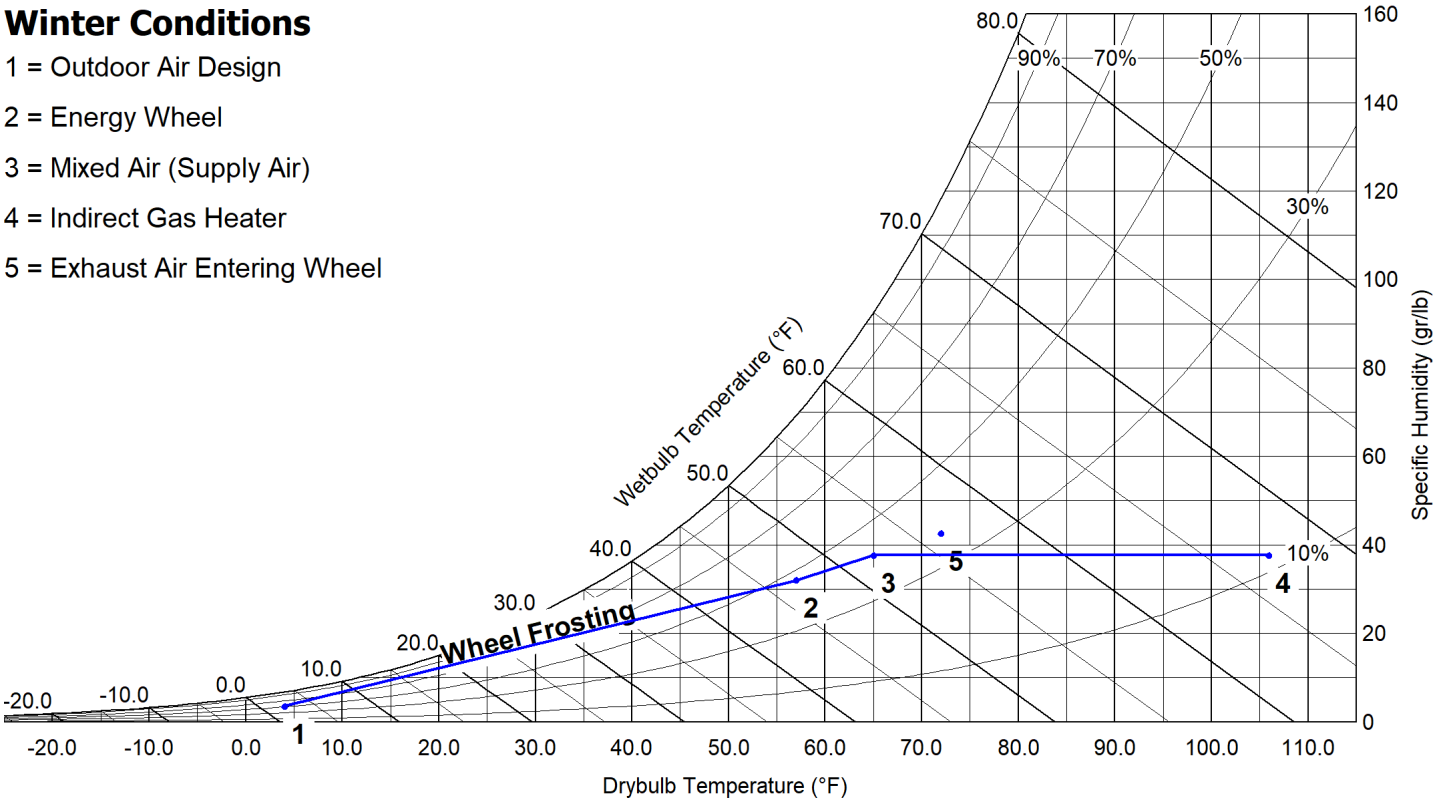
1 = Outdoor Air Design

2 = Energy Wheel

3 = Mixed Air (Supply Air)

4 = Indirect Gas Heater

5 = 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	
5,176	5418	5418	4.9	1.03	0.42	0.42	0

Thermal Effectiveness Ratings							
Enthalpy Recovery		Sensible Effectiveness		Latent Effectiveness		Total Effectiveness	
Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
78	76.4	79.5	79.6	73.9	74.2	76.3	78.2

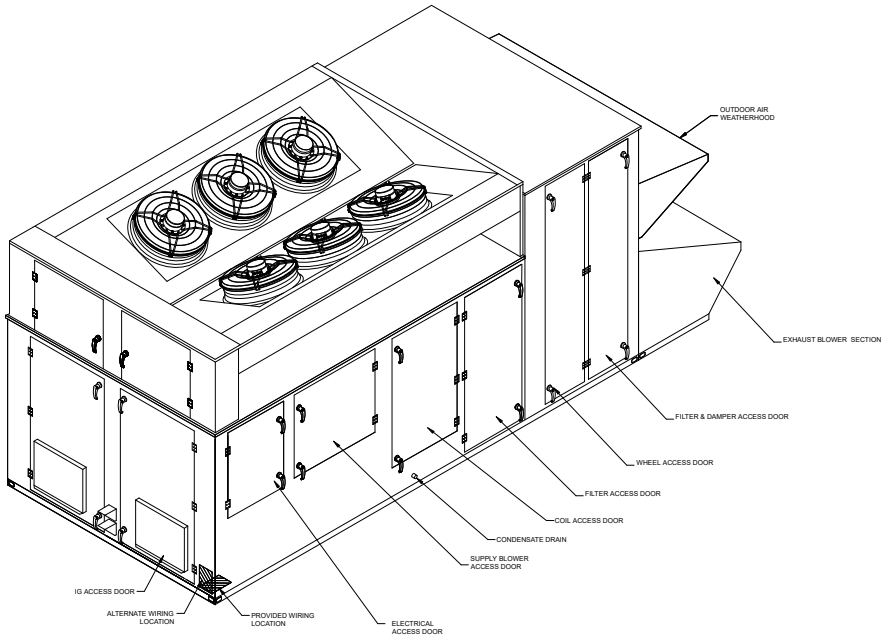
Note(s)

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.

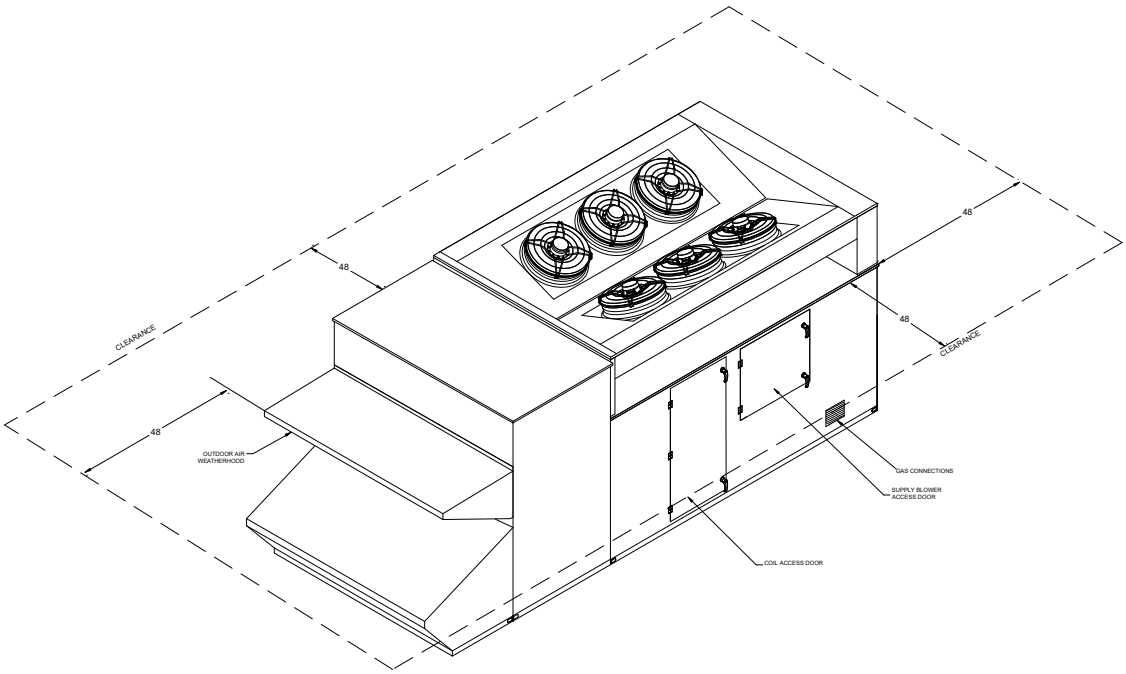
Isometric Drawings

Component Layout



Back Right Isometric

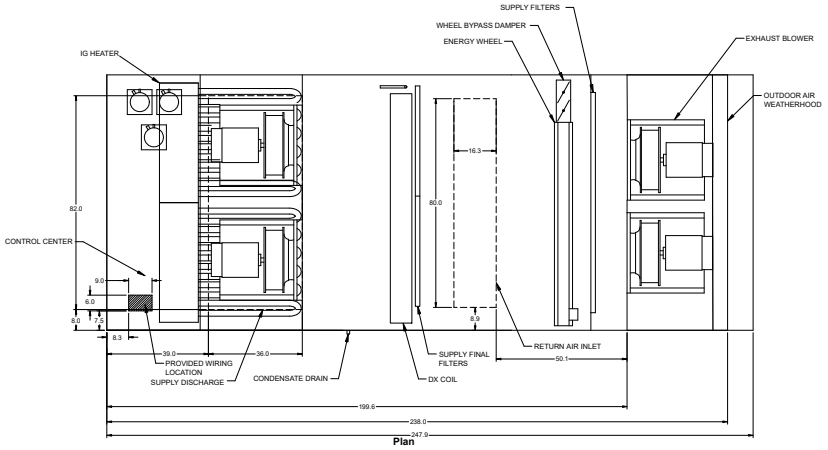
Service Clearances

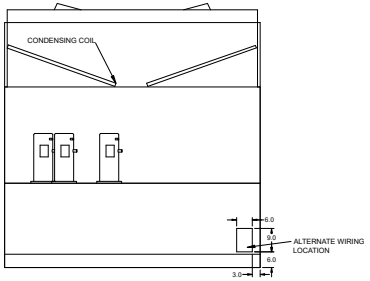


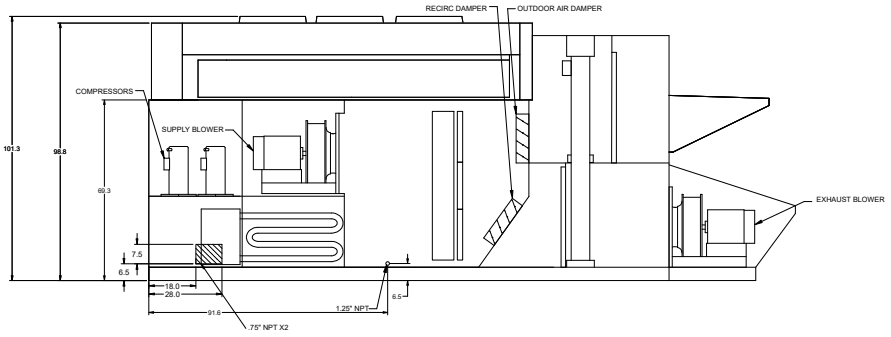
Front Left Isometric

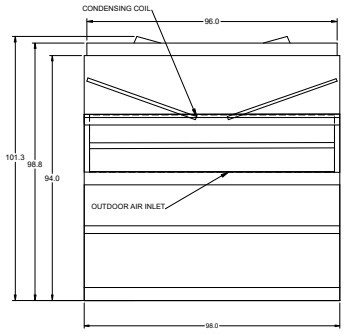
Overview Drawings

Dimensional Overview

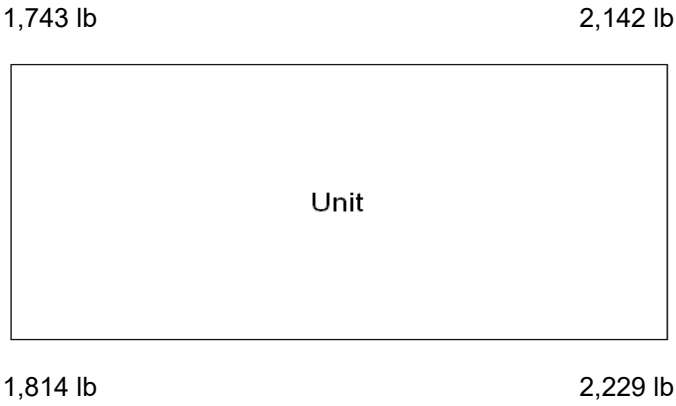








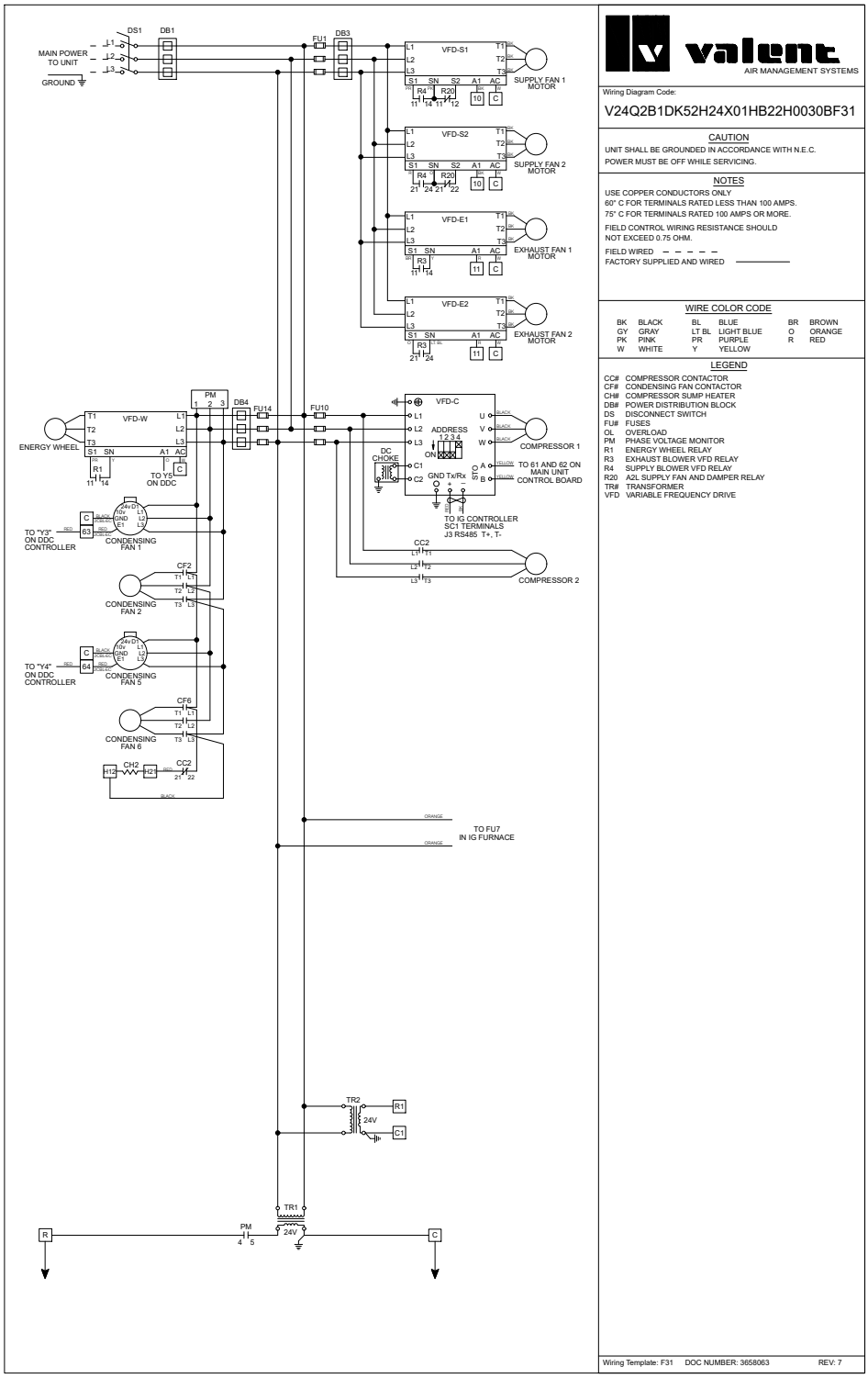
Unit Corner Weights



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



valent
AIR MANAGEMENT SYSTEMS

Wiring Diagram Code:

V24Q2B1DK52H24X01HB22H0030BF31

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

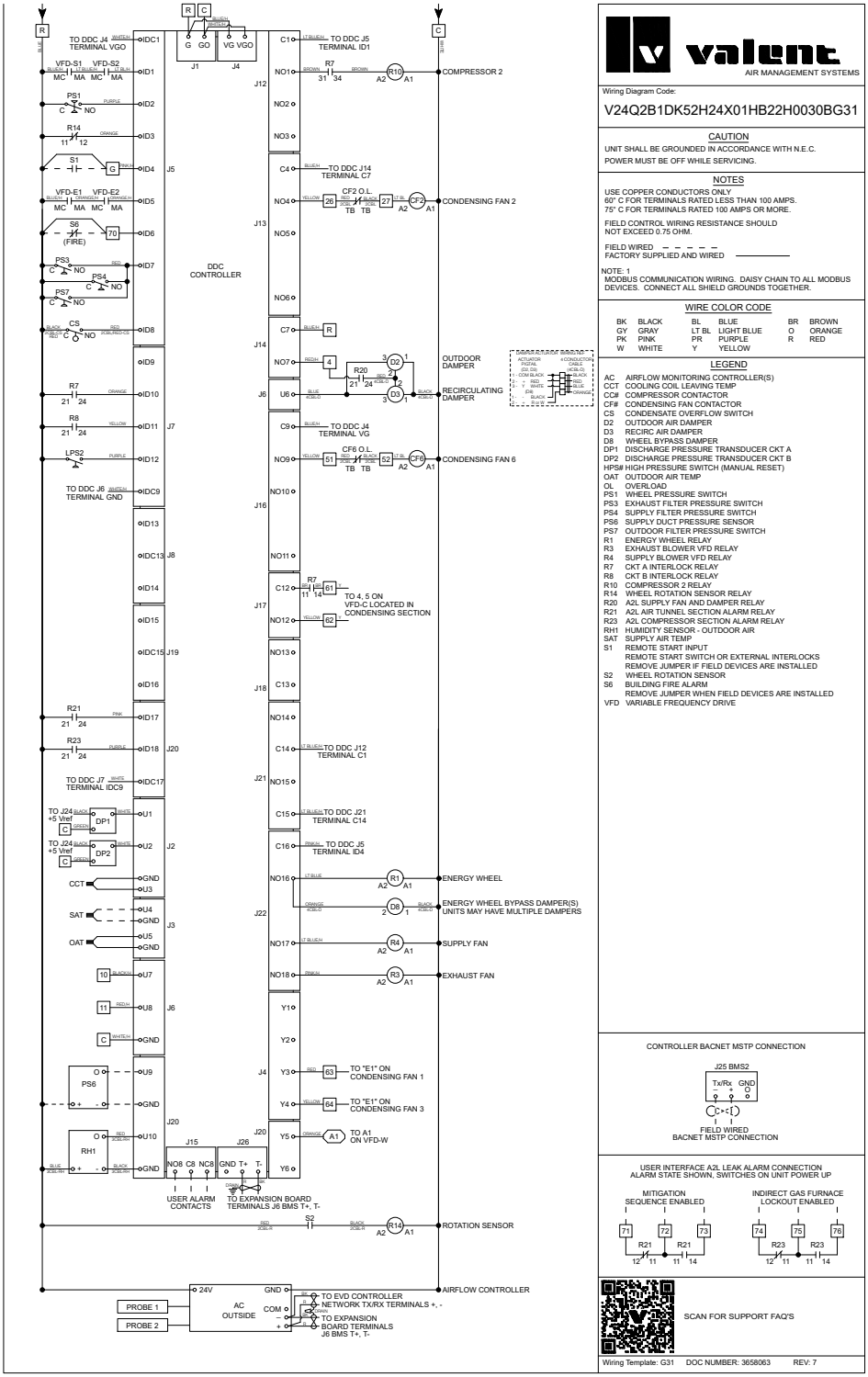
BK	BLACK	BL	BLUE	BR	BROWN
GY	GRAY	LT BL	LIGHT BLUE	O	ORANGE
PK	PINK	PR	PURPLE	R	RED
W	WHITE	Y	YELLOW		

LEGEND

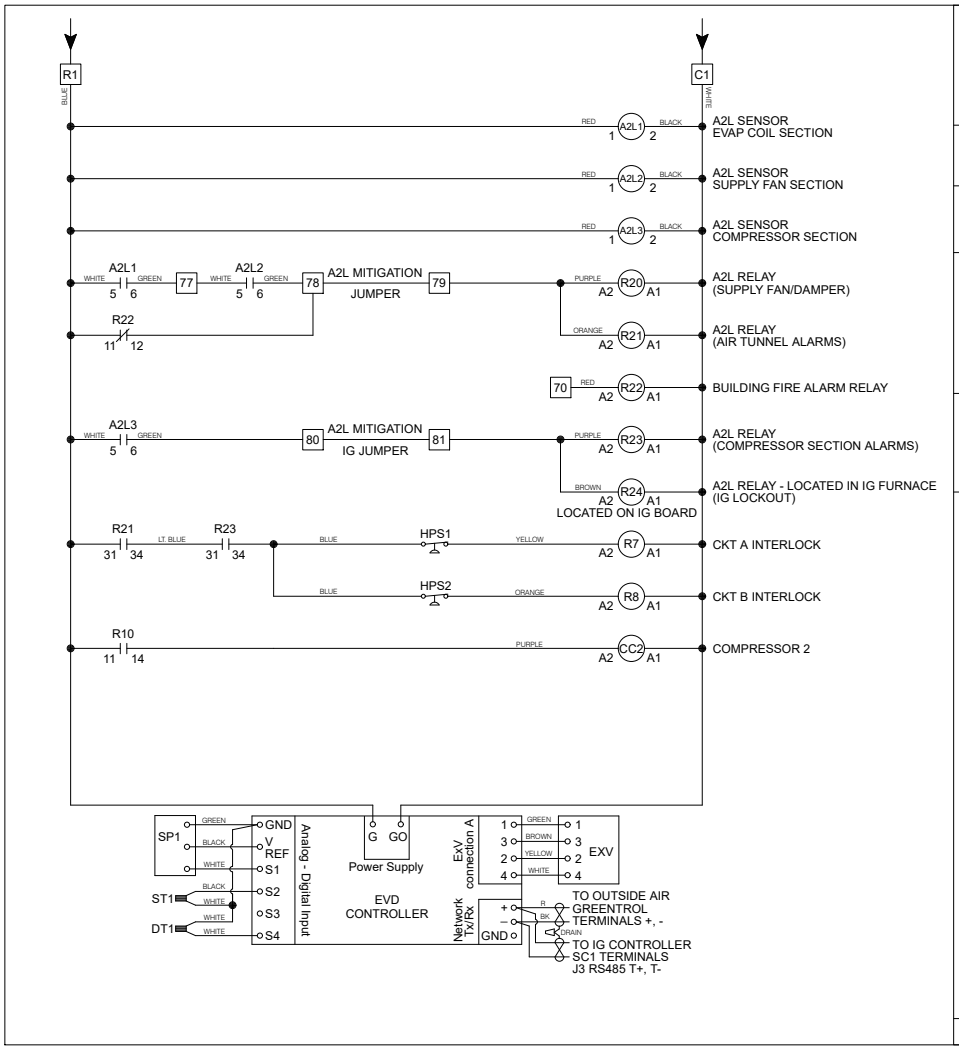
CC#	COMPRESSOR CONTACTOR
CF#	CONDENSING FAN CONTACTOR
CH#	COMPRESSOR SUMP HEATER
DB#	POWER DISTRIBUTION BLOCK
DS	DISCONNECT SWITCH
FU#	FUSES
OL	OVERLOAD
PM	PHASE VOLTAGE MONITOR
R1	ENERGY WHEEL RELAY
R3	EXHAUST BLOWER VFD RELAY
R4	SUPPLY BLOWER VFD RELAY
R20	A2L SUPPLY FAN AND DAMPER RELAY
TR#	TRANSFORMER
VFD	VARIABLE FREQUENCY DRIVE

Wiring Template: F31 DOC NUMBER: 3658063 REV: 7

Wiring Diagram 2



Wiring Diagram 3



AIR MANAGEMENT SYSTEMS

Wiring Diagram Code:

V24Q2B1DK52H24X01HB22H0030BL31

CAUTION

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NOTES

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75° C FOR TERMINALS RATED 100 AMPS OR MORE.

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

WIRE COLOR CODE

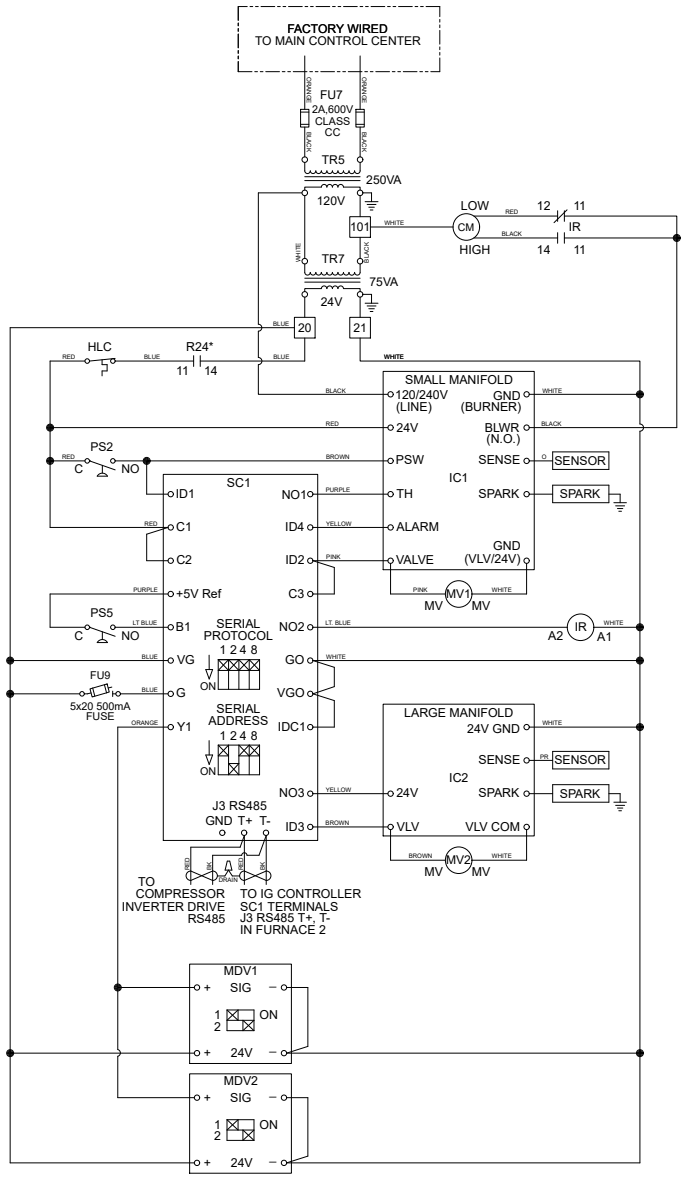
BK	BLACK	BL	BLUE	BR	BROWN
GY	GRAY	LT BL	LIGHT BLUE	O	ORANGE
PK	PINK	PR	PURPLE	R	RED
W	WHITE	Y	YELLOW		

LEGEND

A2L#	A2L REFRIGERANT LEAK SENSOR
CC#	COMPRESSOR CONTACTOR
EXV	ELECTRONIC EXPANSION VALVE
R7	CKT A INTERLOCK RELAY
R8	CKT B INTERLOCK RELAY
R10	COMPRESSOR 2 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: 3658063 REV: 7

INDIRECT GAS WIRING DIAGRAM
FURNACE 1 - HTD MODULATING



valent
AIR MANAGEMENT SYSTEMS

Wiring Diagram Code:

V6N52P1RX0251GS23

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

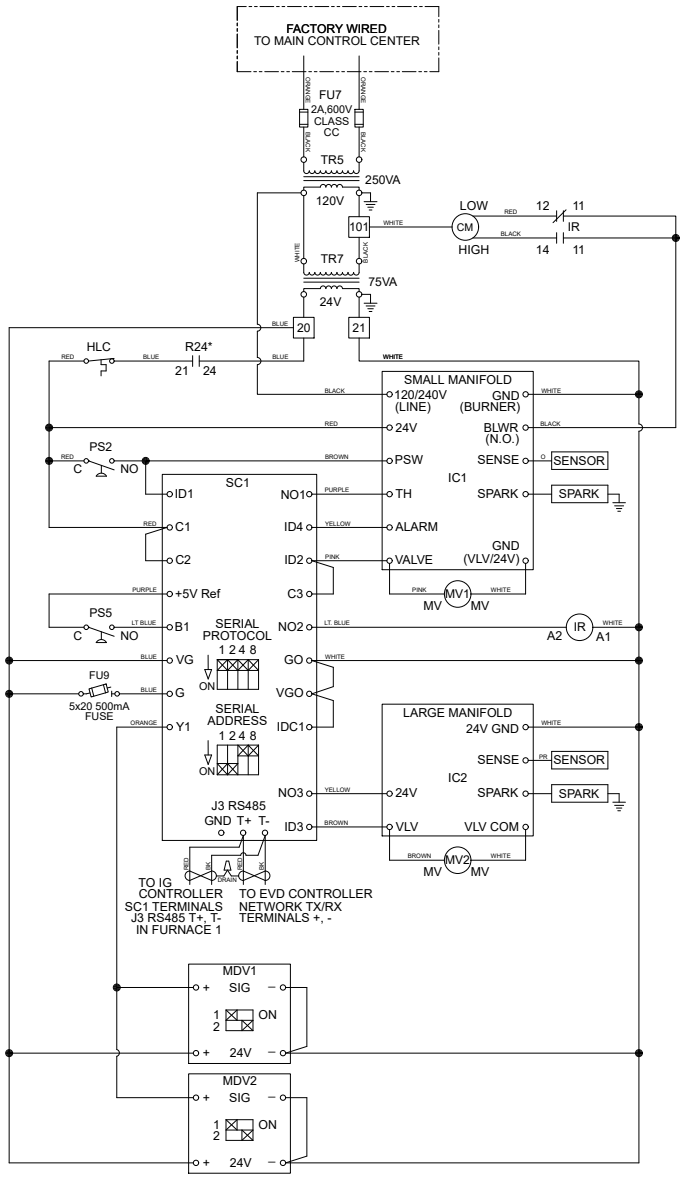
BK	BLACK	BL	BLUE	BR	BROWN
GY	GRAY	LT BL	LIGHT BLUE	O	ORANGE
PK	PINK	PR	PURPLE	R	RED
W	WHITE	Y	YELLOW		

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 RELAY LOCATED IN MAIN CONTROL CENTER
SC1	STAGE CONTROLLER
TR#	TRANSFORMER(S)

Wiring Template: S23 DOC NUMBER: 3658063 REV: 7

INDIRECT GAS WIRING DIAGRAM
FURNACE 2 - HTD MODULATING



valent
AIR MANAGEMENT SYSTEMS

Wiring Diagram Code:

V6N54P1RX0255GS23

CAUTION

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

NOTES

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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
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PK	PINK	PR	PURPLE	R	RED
W	WHITE	Y	YELLOW		

LEGEND

CM	COMBUSTION BLOWER MOTOR
FU#	FUSE(S)
HLC	HIGH TEMPERATURE LIMIT CONTROL
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IR	INDUCTION RELAY
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MDV2	MODULATING VALVE - LARGE MANIFOLD
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PS2	COMBUSTION AIR PROVING SWITCH
PS5	HIGH SPEED PRESSURE SWITCH
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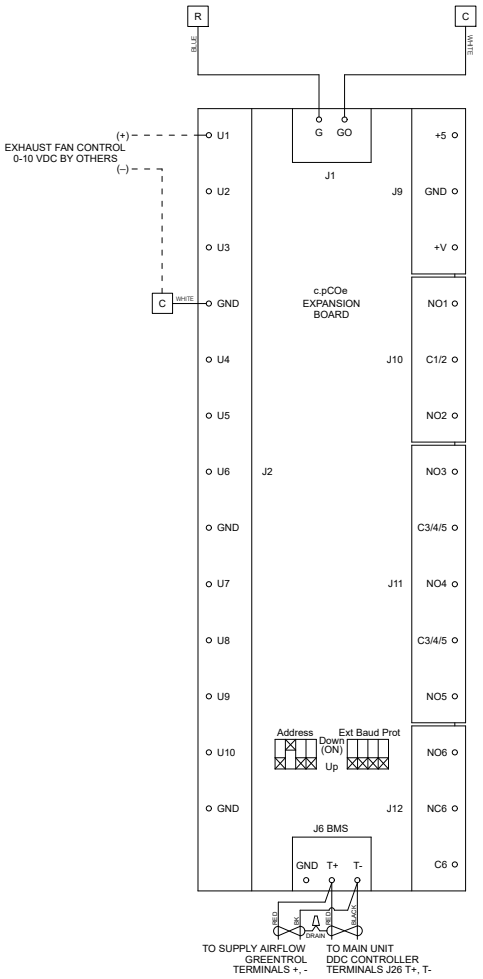
SC1	STAGE CONTROLLER
TR#	TRANSFORMER(S)

Wiring Template: S23 DOC NUMBER: 3658063 REV: 7

GENERATE TABLE START

Monitoring Points Wiring Diagram

EXPANSION BOARD
WIRING DIAGRAM



valent
AIR MANAGEMENT SYSTEMS

Wiring Diagram Code:

VG000XXXX000001BY07

CAUTION

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

NOTES

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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

Wiring Template: Y07 DOC NUMBER: ---- REV: ----

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_Temp_Analog_Input	Space Temperature	AI-1	30002	R	°F		
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	%		X
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		
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		
Economizer_Enthalpy_Enable_Setpoint	Economizer Enthalpy Enable Setpoint Allow Econ when OA Enthalpy is less than Setpoint	AV-13	40026	RW	btu/lb		X
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		X
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	%		X
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	%		X
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		X
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	%		X
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	

System Word Table (IV-10)	
Bit	System_Word
0	Heat Wheel Enable
1	Preheat Enable
2	Reversing Valve (Cooling (0)/Heating(1))
3	
4	
5	
6	Supply Temp Low Limit Alarm
7	Supply Temp High Limit Alarm
8	Supply High Duct Static Alarm.Active
9	Supply Fan 1 Alarm
10	Exhaust Fan 1 Alarm
11	Drain Pan Alarm
12	Freeze Stat Alarm
13	Filter Alarm
14	Space High Static Alarm
15	Return Low Static Alarm
16	Shutdown Input Alarm
17	Energy Recovery Wheel High Diff Pressure
18	Energy Recovery Wheel Rotation Alarm
19	
20	Heat Pump Heating Lock Out Alarm
21	Permanent Memory - Too Many Writes
22	BMS Offline Alarm
23	
24	
25	
26	
27	
28	Heat-Cool Only - Dehumidification Request Active
29	Heat-Cool Only - Heating Request Active
30	Heat-Cool Only - Coil Setpoint Alarm Active
31	Heat-Cool Only - Supply Setpoint Alarm Active

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

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

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

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

Device Offline Word Table (IV-8)	
Bit	Device_Offline_Word - Ext
0	Space TStat 1 Offline
1	Space TStat 2 Offline
2	Space TStat 3 Offline
3	Space TStat 4 Offline
4	VFD Offline Supply Fan
5	
6	
7	
8	Expansion Board 1 Alarm
9	Expansion Board 2 Alarm
10	Expansion Board 3 Alarm
11	Expansion Board 4 Alarm
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	Master Unit Offline Alarm
28	Slave Unit 1 Offline Alarm
29	Slave Unit 2 Offline Alarm
30	Slave Unit 3 Offline Alarm
31	Slave Unit 4 Offline Alarm

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

Alarm Table (Latest Alarm IV-5)					
0	No Active Alarms	63	Supply Air Temperature - Low Limit Shutdown	117	High SDT Lockout - Circuit A
1	Supply Fan 1 Run - Status Not Proven	64	Heat Wheel Rotation - Not Detected	118	High SDT Lockout - Circuit B
2	Freeze Protection - Thermostat Tripped	65	Slave Unit 1 Offline -	121	Inverter 1 Alarm -
3	High Supply Duct - Static Pressure	66	Slave Unit 2 Offline -	123	Inverter 1 Lockout - Cycle Power to Unit
4	Low Return Duct - Static Pressure	67	Slave Unit 3 Offline -	125	High SDT Lockout - Circuit A
5	Outside Air Temp - Sensor Value Not Valid	68	Slave Unit 4 Offline -	126	Inverter 1 Foldback - Input Current
6	Supply Air Temperature - Sensor Value Not Valid	69	Master Unit Offline -	127	Inverter 1 Foldback - Inverter Temp
7	Cold Coil 1 Temp - Sensor Value Not Valid	70	Heat Pump Defrost - Mode is Active	131	Inverter 1 Comms Lost - Compressor Offline
9	Exhaust Air Temp - Sensor Value Not Valid	71	Multi Devices per Ch - Contact Tech Support	133	Space Thermostat 1 - Sensor Offline
10	Mixed Air Temperature - Sensor Value Not Valid	74	Shutdown Contact - In Alarm Position	134	Space Thermostat 2 - Sensor Offline
11	Return Air Temperature - Sensor Value Not Valid	75	Comp Maint Alarm - Run Hours Spt Reached	135	Space Thermostat 3 - Sensor Offline
12	Space Temperature - Sensor Value Not Valid	76	Supply Air Temperature - High Limit Shutdown	136	Space Thermostat 4 - Sensor Offline
13	Return Air RH - Sensor Value Not Valid	77	Space High Static Pres - Shutdown	137	IG Furnace 1. No flame - after 3 tries
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	79	BMS Offline - Watchdog is FALSE	139	IG Furnace 1 combust - fan high pressure sw
16	Low Pressure Switch - Circuit A	80	Clg Coil Setpt Input - Value is not valid	140	IG Furnace 1 Ignition - controller alarm
17	Low Pressure Switch - Circuit B	81	Sup Air Setpt Input - Value is not valid	141	IG Furnace 1 pressure - switch fault alarm
20	High Pressure Switch - Circuit A	82	BACnet License - Not Installed	142	High SDT Lockout - Circuit B
21	High Pressure Switch - Circuit B	83	Low Suction SH ExV A - EVD 1 Alarm	143	IG Furnace 1 - Max retrys
24	Damper End Switch Fail - Dampers are not open	84	Low Suction SH ExV B - EVD 1 Alarm	144	IG Furnace 1 - High Limit Trip
25	Exhaust Fan 1 Run - Status Not Proven	85	LOP A EVD 1 - Low Operating Pressure	145	IG Furnace - pCOe 1 Offline
26	Filters are Dirty - Replace Filters	87	MOP A EVD 1 - Max Operating Pressure	146	IG Furnace 1 IC fault - Check Furnace Wiring
27	Cond Drain Pan Full - Check Drain	89	EEV A EVD 1 - Motor Alarm	147	IG Furnace 2 No flame - after 3 tries
28	Exp Board 1 Status - Board is Offline	91	LowSuct A EVD 1 - Refrigerant Temp	148	IG Furnace 2 Large - no flame after 3 tries
29	Exp Board 2 Status - Board is Offline	93	High Condensing Temp - EVD 1	149	IG Furnace 2 combust - fan high pressure sw
31	Exp Board 4 Status - Board is Offline	94	Sens S1 EVD 1 - Sensor Value Not Valid	150	IG Furnace 2 Ignition - controller alarm
32	Non-Volatile Memory Er - Contact Tech Support	95	Sens S2 EVD 1 - Sensor Value Not Valid	151	IG Furnace 2 pressure - switch fault alarm
33	Space 1 CO2 - Sensor Value Not Valid	96	Sens S3 EVD 1 - Sensor Value Not Valid	152	IG Furnace 2 combust - fan proving alarm
34	Space Static Pressure - Sensor Value Not Valid	97	Sens S4 EVD 1 - Sensor Value Not Valid	153	IG Furnace 2 - Max retrys
35	Supply Duct Stat Press - Sensor Value Not Valid	98	EVD 1 EEPROM Damaged - Call Tech Support	154	IG Furnace 2 - High Limit Trip
36	Return Duct Stat Press - Sensor Value Not Valid	99	Incomplete Closing - EVD 1	155	IG Furnace - pCOe 2 Offline
37	Sup Fan AFMS - Sensor Value Not Valid	101	Emergency Closing - EVD 1	156	IG Furnace 2 IC fault - Check Furnace Wiring
38	Exh Fan AFMS - Sensor Value Not Valid	101	EVD 1 Battery -	157	Outside Air Greentrol - Offline or Flow Error
39	Outside Damper AFMS - Sensor Value Not Valid	102	FW Incompatibility - EVD 1	158	Exhaust Air Greentrol - Offline or Flow Error
40	Space Setpt Adj Slider - Sensor Value Not Valid	106	EVD 1 Config Error -	159	Supply Air Greentrol - Offline or Flow Error
42	Return CO2 - Sensor Value Not Valid	105	High Discharge Temp - First Inverter	170	OA Damper Fault - Not Econ and should be
42	Discharge Press Ckt A - Sensor Value Not Valid	106	Low Discharge Pressure - First Inverter	171	OA Damper Fault - Econ and shouldn't be
43	Discharge Press Ckt A - Sensor Value Not Valid	106	Low Discharge Pressure - First Inverter	171	OA Damper Fault - Econ and shouldn't be
44	Discharge Press Ckt B - Sensor Value Not Valid	107	High Suction Pressure - First Inverter	172	OAD Fault - Damper not Modulating
47	Suction Press Ckt A - Sensor Value Not Valid	108	Low Suction Pressure - First Inverter	173	OAD Fault - Excess Outdoor Air
48	Suction Press Ckt B - Sensor Value Not Valid	109	High Current - First Inverter	174	IG Furnace 1 - Combustion Fan Alarm
51	Discharge Temp Ckt A - Sensor Value Not Valid	110	High Pressure Ratio - First Inverte	175	IG Furnace 2 - Combustion Fan Alarm
52	Discharge Temp Ckt B - Sensor Value Not Valid	111	Low Pressure Ratio - First Inverter	176	Supply Fan - VFD Offline
55	Suction Temp Ckt A - Sensor Value Not Valid	112	Low Delta P - First Inverter	177	OA Damper Fault - Not Econ and should be
56	Suction Temp Ckt B - Sensor Value Not Valid	113	High Discharge Press - First Inverter	178	Return Fan - VFD Offline
59	Ckt A High Saturated - Discharge Temperature	114	Compressor Staging - Order Skipped	179	Energy Recovery - VFD Offline
60	Ckt B High Saturated - Discharge Temperature	115	Heat Pump Heating - Locked Out	180	Embedded EVD Error
.		116	EVD 1 Error - Unexpected Position	181	SF VFD Alarm - Check VFD

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 (Unit Off): Unit remains off when in unoccupied mode.

- Supply fan OFF
- Exhaust fan OFF
- Tempering OFF
- Outdoor air damper closed.
- Recirculation damper open.

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.

Duct Static Pressure Sensor: The supply blower is modulated based upon the signal from a duct static pressure sensor (factory provided and wired, field mounted and tubing by others). The controller will modulate the supply fan based upon a comparison of the duct static pressure set point (adj.) to the actual duct static pressure level reported from the sensor. (**Mechanical high static protection cutoffs must be installed by others to protect the system and equipment from over-pressurization. The manufacturer does not assume responsibility for this.**)

OUTDOOR AIR AND RE-CIRCULATED (RECIRC) AIR DAMPER CONTROL: The outdoor and recirculated air dampers are factory mounted and wired. Outside air damper and recirculation damper will be inverse positions of each other. Example, when the outside air damper is set to 35% opening, the recirculation damper will be at 65% opening. The modulating actuator will be controlled to dictate position by the following sequence.

Constant Position-Adj. Setpoint: The outdoor air damper will be set to a constant minimum position (adj.) and upon a field provided contact closure the outdoor air damper will open up to the maximum position (adj.). Both positions will be set by the controller.

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

0-10V VDC Signal by Others: The exhaust blower is modulated based upon a 0-10 VDC signal (field provided and wired) wired directly into the VFD. This would operate separately from the controller sequences.(Mechanical high static protection cutoffs must be installed by others to protect the system and equipment form over-pressurization. The manufacturer does not assume responsibility for this.)

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 0-50%, the inverter scroll will be controlled to maintain discharge temperature. From 50-100% the second stage will be on in combination with the inverter scroll compressor to maintain the discharge temperature. The electronic expansion valve will modulate to maintain 8F of superheat.

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

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.

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 (Winter Ramp): The controller will enable the outdoor air and recirc. air dampers to modulate in order to help the unit keep up with heating demand in the event of the unit operating outside design conditions. (This can be enabled 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.

Refrigerant Leak Detected In Air Tunnel: If a refrigerant leak is detected in the air tunnel, the supply fan will operate at minimum airflow requirement, recirculation damper to be fully open, outside air damper will be closed, powered exhaust fan will operate based configured sequence, energy recovery wheel will be off, and

compressors are disabled to reduce leakage rate. This operation is required in order to move stagnant refrigerant from within the unit, duct, and space ensuring proper dilution of the refrigerant. This operation is required even if the unit is called to be off. After leak detection is cleared, the unit will go back to normal operation. Exception to this operation is when the unit is receiving an active fire alarm signal at the unit controller. If unit controller is receiving a fire alarm input, the unit will not operate the leak mitigation supply fan sequence.

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 first modulate the energy wheel speed and then modulate the outdoor air and recirculated air dampers to maintain the supply air temperature set point. If the outdoor air damper modulates to the maximum 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.

Temp./Enthalpy: The economizer will be locked out when: the outdoor air is < 40 F DB (adj.) or > 75 F DB (adj.) or > 55 F dew point (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.

ENERGY WHEEL BYPASS DAMPERS

By Factory: The unit will be provided with energy wheel bypass dampers for both the outdoor air and return airstreams. During normal operation, the dampers will remain closed to allow full operation of the energy wheel. During economizer sequences, the bypass dampers will be open to alleviate pressure drop through the wheel, while allowing more outdoor air to be used for economizer cooling.

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.

Pressure Sensor Alarm: The controller sends an alarm in the case of a failed pressure sensor.

Humidity Sensor Alarm: The controller sends an alarm in the case of a failed humidity 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.

Airflow Monitoring: The outdoor airflow monitoring device is installed as a stand alone option in the control center. It includes a heated thermistor that is used to measure feet per minute in the housing. This feet per minute is converted to CFM in the factory supplied airflow readout device.

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.

Airflow Monitoring: The outdoor airflow monitoring device is installed as a standalone option in the control center. It includes a heated thermistor that is used to measure feet per minute in the housing. This feet per minute is converted to CFM in the factory supplied airflow readout device.

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 30 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.

JOB NAME:	DAYTON STEM
TAG:	RTU-CRI

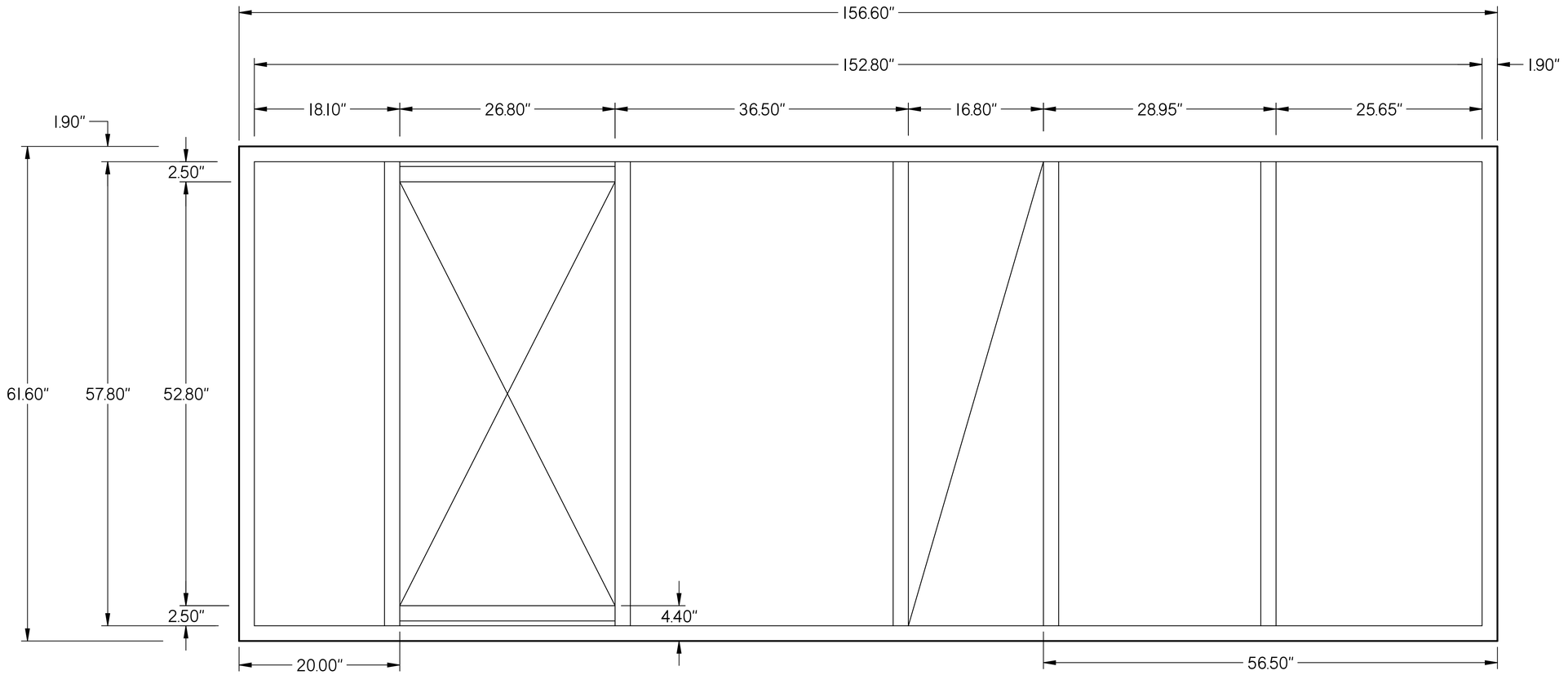
APPROVED BY: DATE:

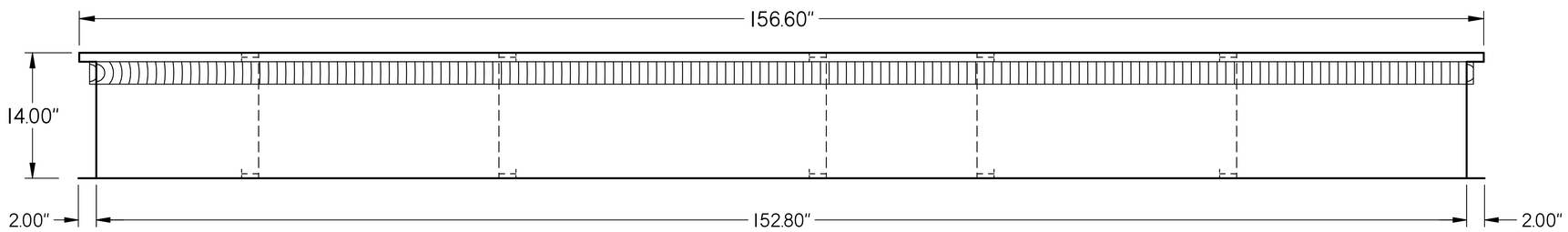
APPROXIMATE WEIGHT:

"IN THE ABSENCE OF A SIGNED DRAWING, MGM PRODUCTS ACCEPTS THE P.O AS CONFIRMATION OF WHAT IS TO BE BUILT"

REVISION HISTORY

REV	DESCRIPTION	DATE	ENGINEER
1	INITIAL DRAWING	9/9/24	FA





MGM PRODUCTS, INC.

1080 CULPEPPER DRIVE CONYERS, GA 30094
PHONE: (770) 483-0055; (800) 341-3536 FAX: (770) 483-0130
WWW.MGMPRODUCTS.COM

ATTACHMENT TO STRUCTURE:
MGM RECOMMENDS FULL PERIMETER SUPPORT FOR ALL WIND RATED CURBS
IF FULL PERIMETER SUPPORT - #12 TEK SCREW OR 1/2" STITCH WELD MINIMUM, (1) IN EACH CORNER PLUS 24" O.C.
IF CROSS PURLIN SUPPORT ONLY - #12 TEK SCREW OR 1/2" STITCH WELD MINIMUM, (1) IN EACH CORNER PLUS 18" O.C.
CONCRETE ATTACHMENT:
24" O.C. WITH MINIMUM 1/4" DIAMETER TAPCON SCREWS

NOTES:
1. 14 GA GALVANIZED STEEL CONSTRUCTION
2. FULLY WELDED
3. FULL DEPTH WALLS
4. 2" BLACK DUCT LINER INSULATION
5. GASKET, LIFT EYES, 1X4 NAILER

TITLE: **GKD-61.6_156.6-G14**
14" TALL WIND RATED FRC

	NAME	DATE
DRAWN	felix	9/9/2024
WEIGHT		
SHEET	SHEET 1 OF 2	
FILE NAME	GKD-61.6_156.6-G14-(14" TALL WIND RATED FRC)-RTU-CRI, GYM.DFT	

Q# 63548

JOB NAME:	DAYTON STEM		
TAG:	RTU-CRI	APPROVED BY:	DATE:
	APPROXIMATE WEIGHT:	*"IN THE ABSENCE OF A SIGNED DRAWING, MGM PRODUCTS ACCEPTS THE P.O AS CONFIRMATION OF WHAT IS TO BE BUILT"*	

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REV	DESCRIPTION	DATE	ENGINEER
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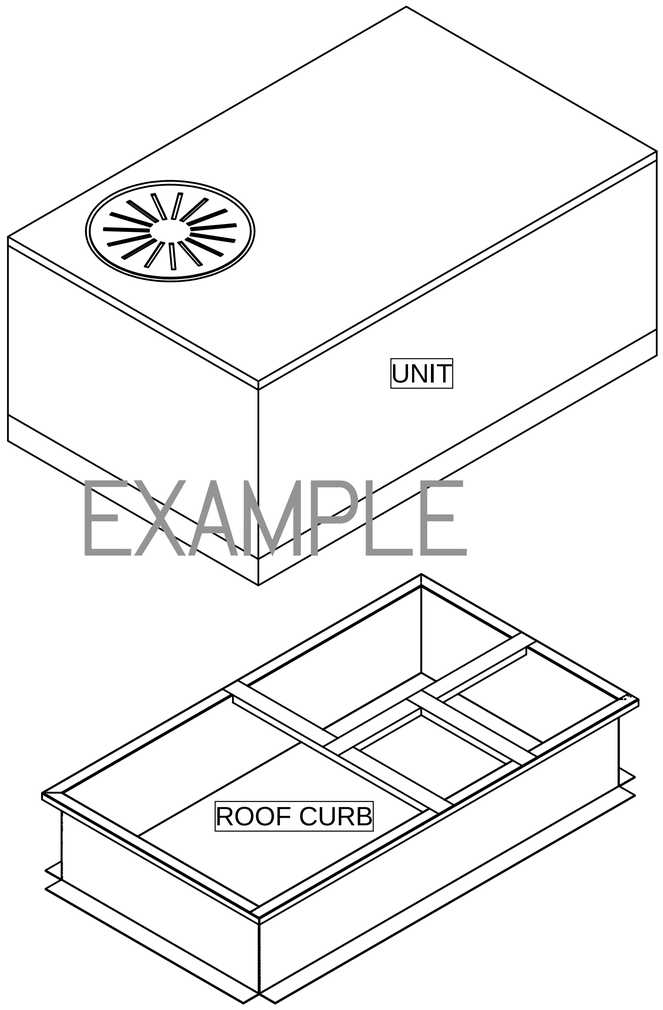

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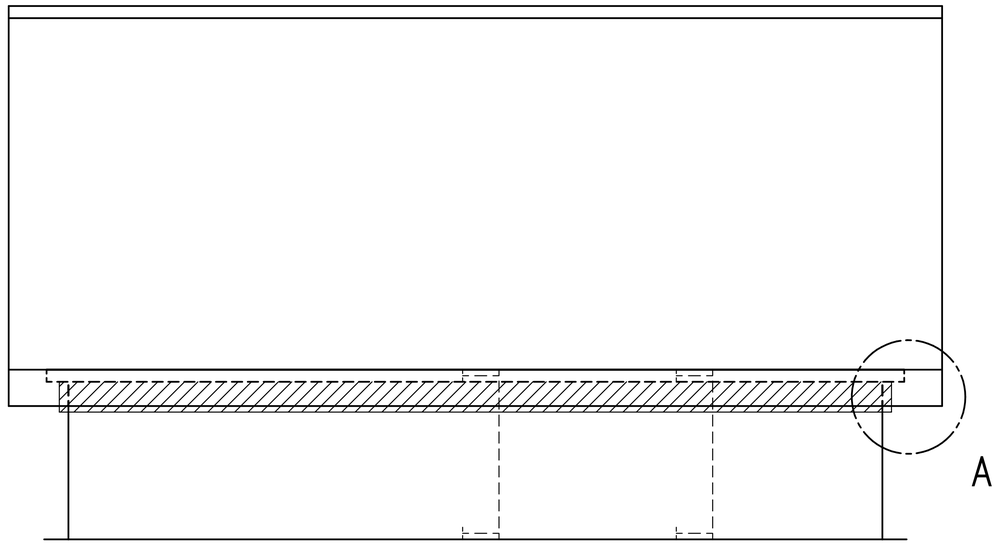
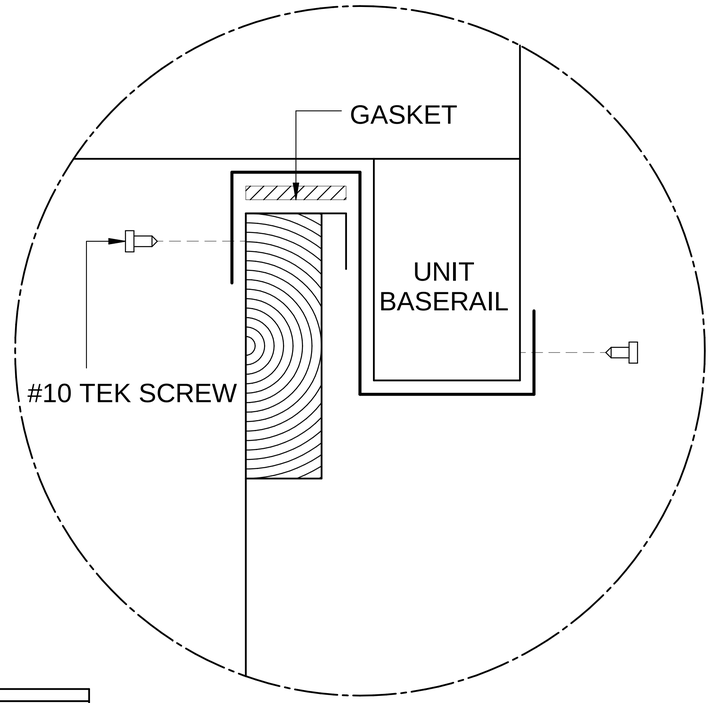
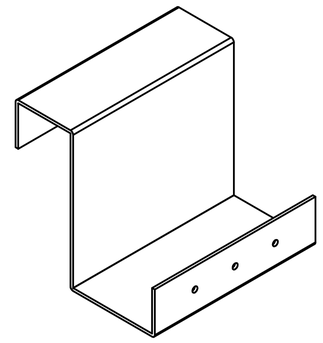




DETAIL A



HOLD DOWN STRAP
EVERY 36" O.C.
[14 GA]

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CONCRETE ATTACHMENT:
24" O.C. WITH MINIMUM 1/4" DIAMETER TAPCON SCREWS

NOTES:
1. 14 GA GALVANIZED STEEL CONSTRUCTION
2. FULLY WELDED
3. FULL DEPTH WALLS
4. 2" BLACK DUCT LINER INSULATION
5. GASKET, LIFT EYES, 1X4 NAILER

TITLE	GKD-61.6_156.6-G14 14" TALL WIND RATED FRC		
	NAME	DATE	Q# 63548
DRAWN	felix	9/9/2024	
WEIGHT			
SHEET	SHEET 2 OF 2		
FILE NAME	GKD-61.6_156.6-G14-[14" TALL WIND RATED FRC]-RTU-CRI, GYM.DFT		

JOB NAME:	DAYTON STEM
TAG:	RTU-CR3, CR2

APPROVED BY: DATE:

APPROXIMATE WEIGHT:

"IN THE ABSENCE OF A SIGNED DRAWING, MGM PRODUCTS ACCEPTS THE P.O AS CONFIRMATION OF WHAT IS TO BE BUILT"

REVISION HISTORY			
REV	DESCRIPTION	DATE	ENGINEER
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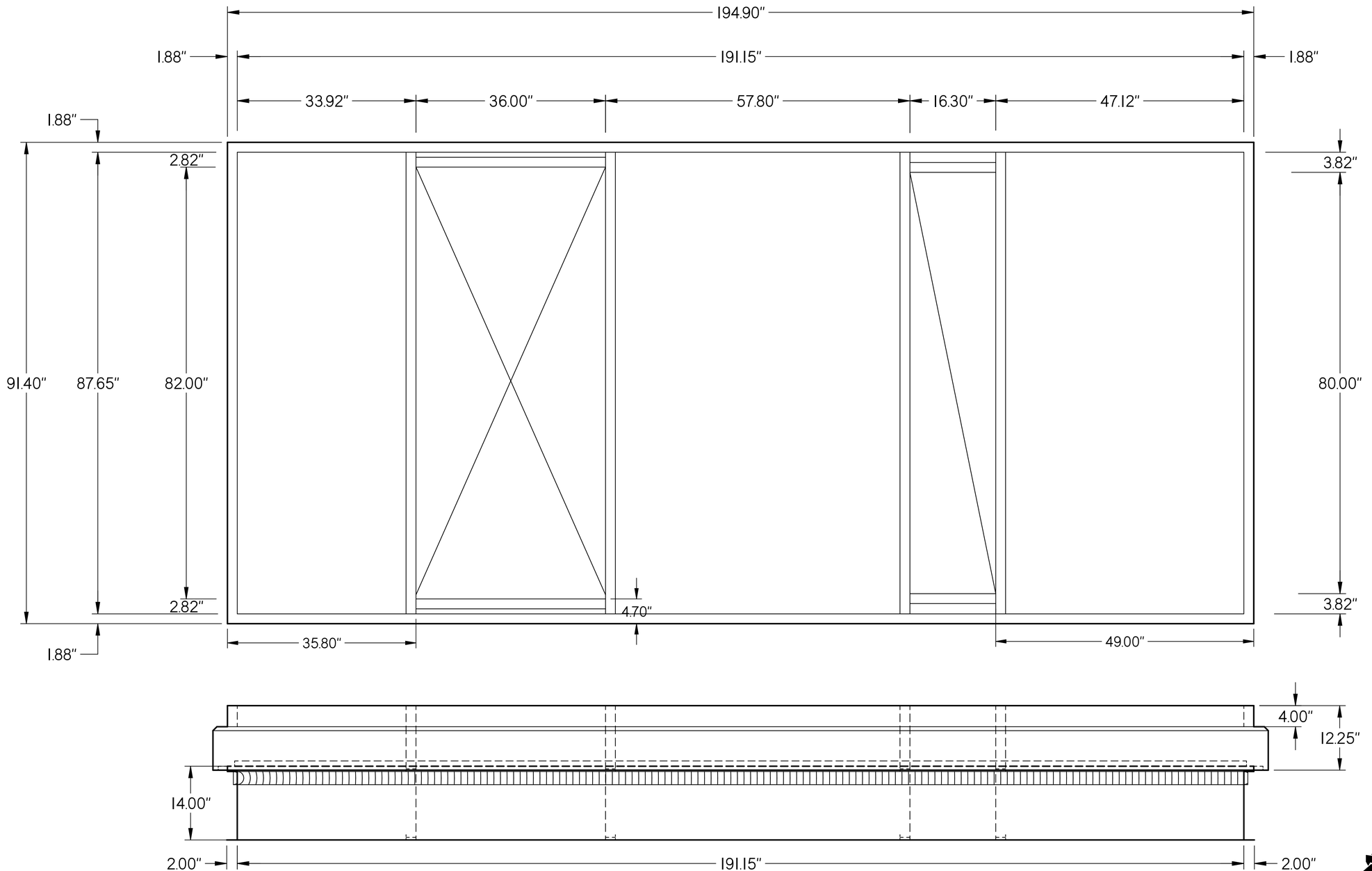

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CONCRETE ATTACHMENT:
24" O.C. WITH MINIMUM 1/4" DIAMETER TAPCON SCREWS

NOTES:

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2. FULLY WELDED
3. FULL DEPTH WALLS
4. 2" BLACK DUCT LINER INSULATION
5. GASKET, LIFT EYES, 1X4 NAILER

TITLE: **GKD-91.4_194.9-G14 14" TALL WIND RATED FRC, 1" DEF ISO RAIL**

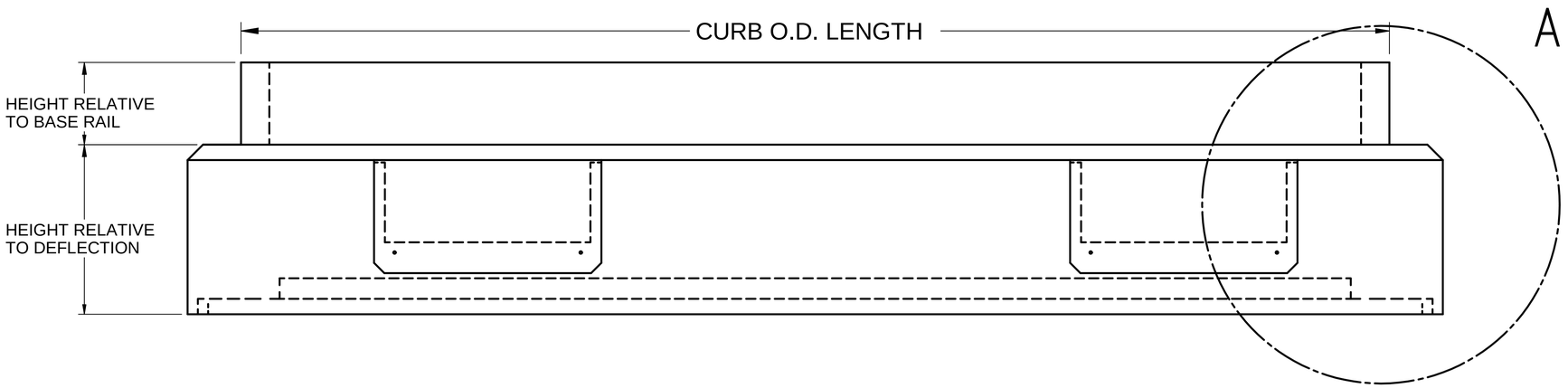
	NAME	DATE
DRAWN	felix	9/9/2024
WEIGHT		
SHEET	SHEET 1 OF 2	
FILE NAME	GKD-91.4_194.9-G14-(14" TALL WIND RATED FRC)-RTU-CR3,CR2.DFT	

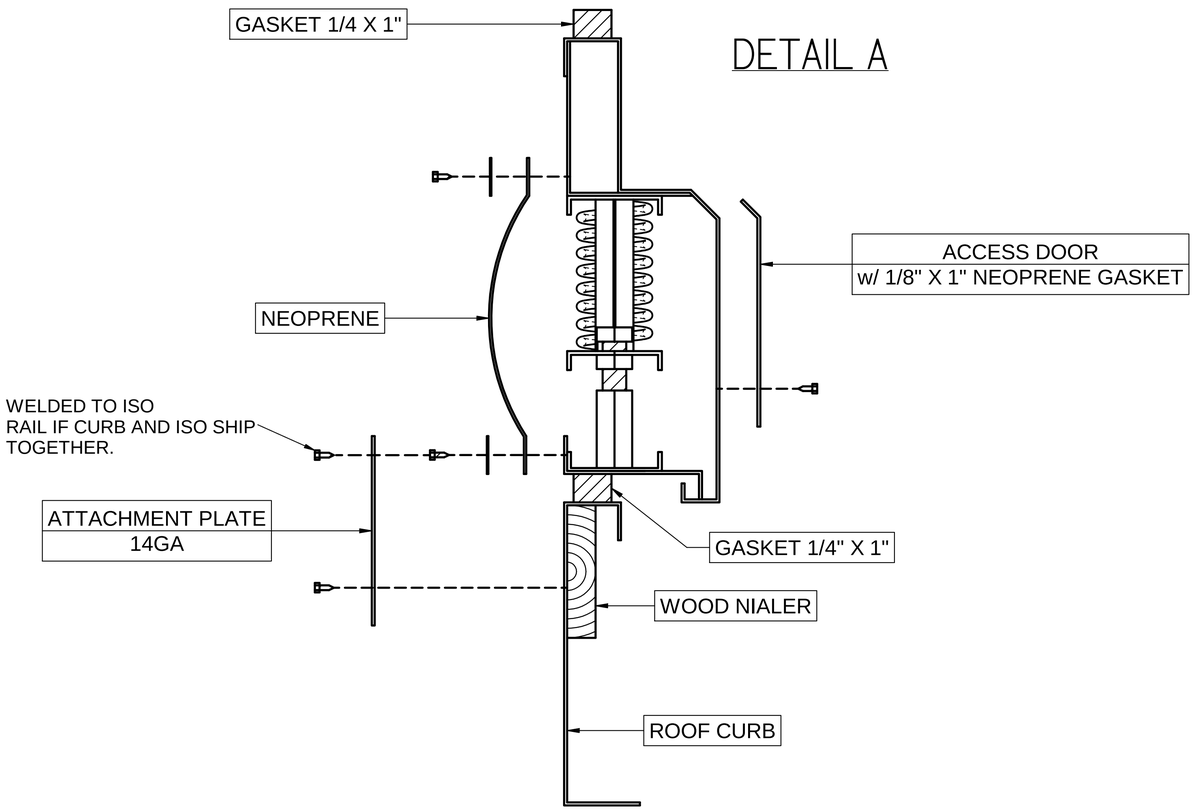
Q# 63548

ADJUSTABLE VIBRATION ISOLATION RAILS

STANDARD FEATURES:

- Minimum 14 gauge, G-90 Galvanized Steel
- Spring Isolators are selected to provide a Standard 1", 2", OR 3" Deflection with a built in 50% overload capacity. Higher deflection range and custom overload capacities can be achieved as required.
- Spring size, location, and quantity are determined by factory corner weights of the unit being mounted.
- Spring Isolators are mounted to "Z" base-rail within a fully enclosed housing providing lateral stability.
- Weather tight removable panels are provided at each spring location to provide access for adjustment and spring replacement.
- All Welds Sealed with Cold Galvanizing..
- Isolation Rails come fully assembled.
- Spring Isolators are adjustable and replaceable post unit installation without having to remove unit.





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WWW.MGMPRODUCTS.COM

TITLE	ADJUSTABLE VIBRATION ISOLATION RAIL	
	NAME	DATE
DRAWN	B.W.	1/20/2022
WEIGHT		
GAUGE		
FILE NAME	ISO CATALOG.DFT	

JOB NAME:	DAYTON STEM		
TAG:	RTU-CR3, CR2	APPROVED BY:	DATE:
	APPROXIMATE WEIGHT:	*"IN THE ABSENCE OF A SIGNED DRAWING, MGM PRODUCTS ACCEPTS THE P.O AS CONFIRMATION OF WHAT IS TO BE BUILT"*	

REVISION HISTORY

REV	DESCRIPTION	DATE	ENGINEER
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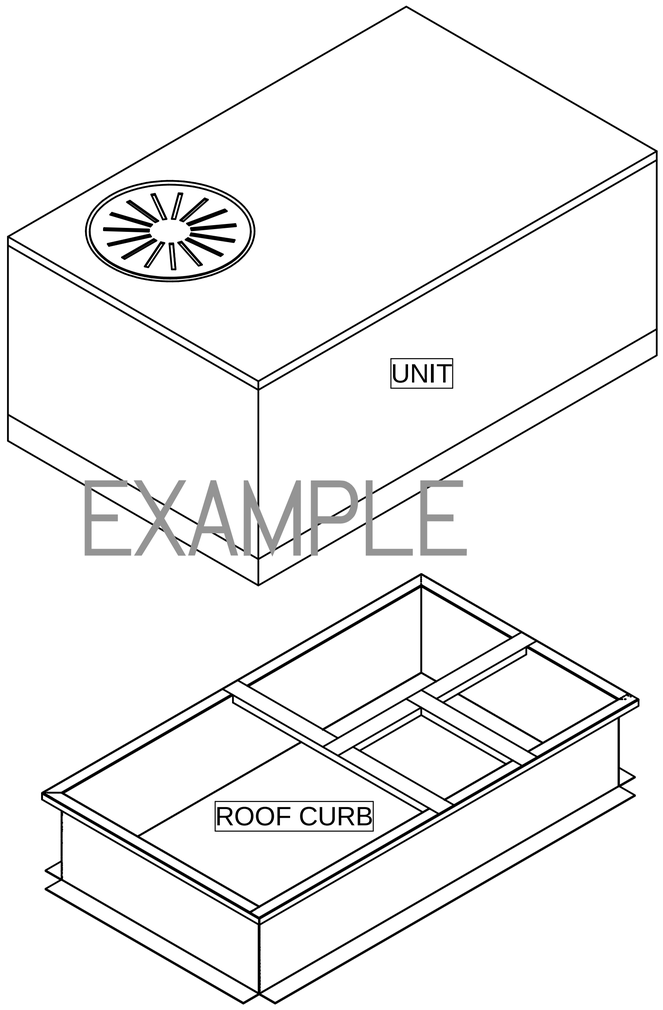
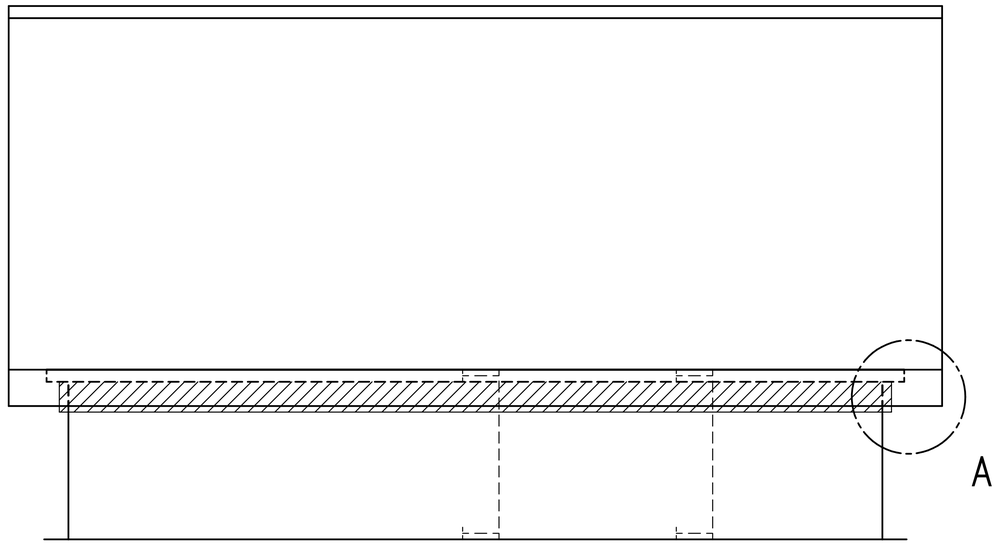
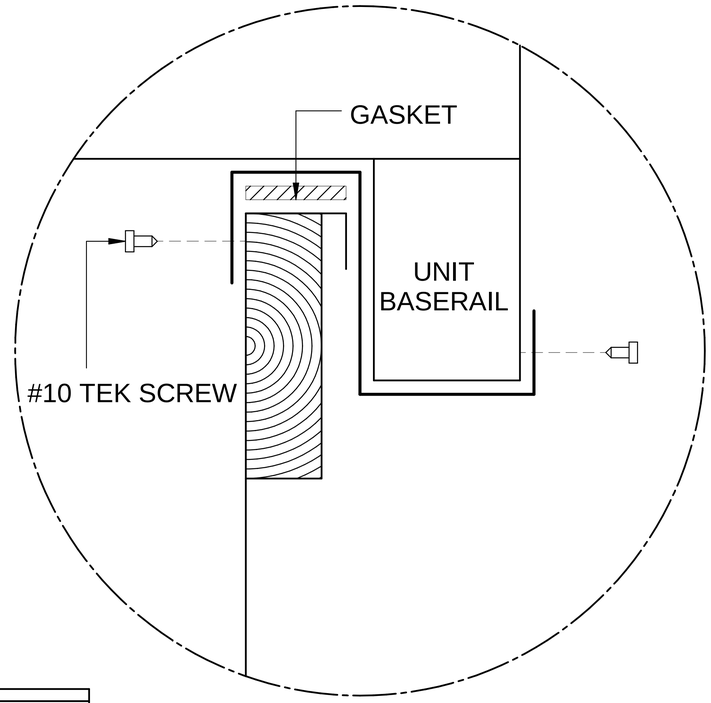
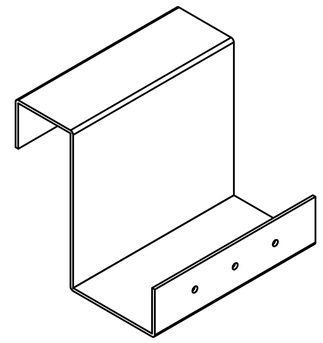


EXAMPLE





DETAIL A



HOLD DOWN STRAP
EVERY 36" O.C.
[14 GA]

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NOTES:

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2. FULLY WELDED
3. FULL DEPTH WALLS
4. 2" BLACK DUCT LINER INSULATION
5. GASKET, LIFT EYES, 1X4 NAILER

TITLE	GKD-91.4_194.9-G14 14" TALL WIND RATED FRC, 1" DEF ISO RAIL		
	NAME	DATE	Q# 63548
DRAWN	felix	9/9/2024	
WEIGHT			
SHEET	SHEET 2 OF 2		
FILE NAME	GKD-91.4_194.9-G14-[14" TALL WIND RATED FRC]-RTU-CR3,CR2.DFT		

Dayton Regional STEM K-5
2850 Donation Circle
Kettering, OH 45240

Packaged Rooftop Units
RTU-GYM, RTU-OFFICE
Specification: 237416.13

Submission Date: 10.7.2024

SHP
312 Plum St, Suite 700
Cincinnati, OH 45202

Engineering Account Executive:
Brett Graham
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ElitAire Responsibility Matrix

Equipment	Startup Services	Labor Warranty	VFDs	Disconnects
RTU-GYM	YES	NO	YES	YES
RTU-OFFICE	YES	NO	YES	YES

Important Information

Equipment	Clarifications & Exclusions
RTUs	**General** Daikin Rebel Packaged High Efficiency units Painted galvanized steel casing with 2,500 hr. salt spray rating Double wall Foam Injected Panel Casing RTU-GYM: Horizontal Supply and Vertical Return Duct Connections RTU-OFFICE: Vertical Supply and Return Duct Connections **Electrical** Factory installed disconnect 10kVA SCCR 115V convenience outlet **(field powered)** **Economizer/Relief (RTU-GYM, RTU-OFFICE only)** ECM Supply Fans ECM Exhaust Fans Comparative enthalpy economizer Factory Installed Outside airflow monitoring station **DX Cooling** Variable speed inverter driven compressor 2” MERV-8 and 2” MERV-13 supply air filters **(2 sets)** Stainless steel drain pan Modulating hot gas reheat **(RTU-GYM only)** **Condenser** ECM Variable speed condenser fans **Indirect Fired Natural Gas Heat** Stainless steel heat exchanger Fully modulating control (10:1 turndown RTU-GYM;5:1 turndown RTU-Office)

	Supply Fan Direct drive ECM fan Single-Zone VAV **(RTU-GYM)** Multi-zone VAV duct static pressure control for true VAV operation **(RTU-OFFICE)** **Controls** Factory installed DDC unit controller with LCD Display Configurable Control Sequence BACnet integration card Space Zone Sensor thermostat with Temperature, Humidity and CO2, adjustable display **(RTU-GYM only)** **Roof Curb** 14” insulated, Wind-rated (Note: Submittal shows standard roofcurb for dimensional reference) **Start-up and Warranty** Factory start-up and owner training 2-year complete unit parts warranty 5-year compressor parts warranty 10-year Gas heat exchanger parts warranty
	Exclusions Rigging and installation supervision Seismic Calculations

SUBMITTAL DATA

Job Name	Dayton STEM K-5
For	RTU-GYM, RTU-Office
Sold To	Starco
Prepared For	SHP
Customer PO#	7959
Prepared By	ElitAire
Date	10/7/2024

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PRODUCT CATALOG

CAT-261

APRIL 2024

REBEL® DPS

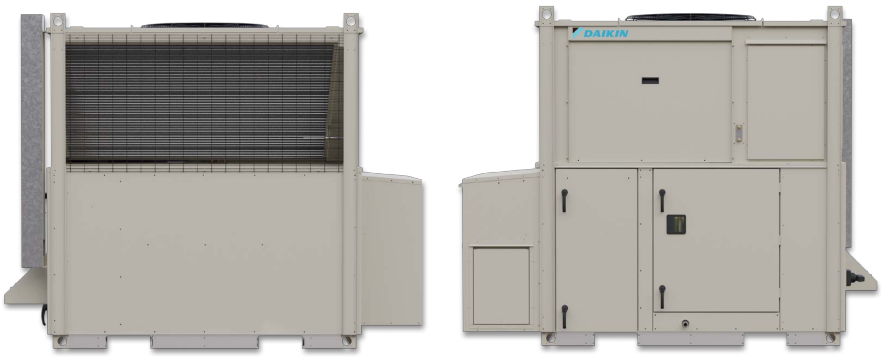
PACKAGED ROOFTOP SYSTEM WITH HEAT PUMP TECHNOLOGY AND LOW-GWP R-32 REFRIGERANT

- MODEL DPS
- 3 TO 31 TONS (UP TO 12,500 CFM)
- R-32 REFRIGERANT

LEARN MORE AT **DAIKINAPPLIED.COM**

OVERVIEW

ADVANCED TECHNOLOGIES TO PROPEL PERFORMANCE AND SAVINGS



PERFORMANCE

- Cooling and heat pump
- 3-31 tons
- Up to 12,500 cfm
- Low-GWP R-32 Refrigerant
- 22.7 IEER

LINKS:

Video

Experience industry-leading performance and climate comfort with the Rebel rooftop system. Featuring options up to 31 tons, Rebel's heat pump operates in temperatures as low as -10°F. This enables year-round heat pump use, dramatically reducing fossil fuel reliance and achieving a smaller carbon footprint. And by utilizing low-GWP R-32 refrigerant, Rebel delivers exceptional results without compromising performance, seamlessly aligning with environmental initiatives.

Engineered for exceptional efficiency, Rebel delivers up to 22.7 IEER and 55% savings above ASHRAE standards. This minimizes building energy consumption and actively supports LEED and other green building certifications. Plus, with a complete system payback in under two years, it provides substantial cost-savings.

To provide uninterrupted comfort, Rebel prioritizes serviceability. Its cabinet configurations are engineered with features for faster, more efficient service visits, minimizing downtime and keeping your unit running seamlessly for continuous comfort and optimal performance.

CERTIFICATIONS

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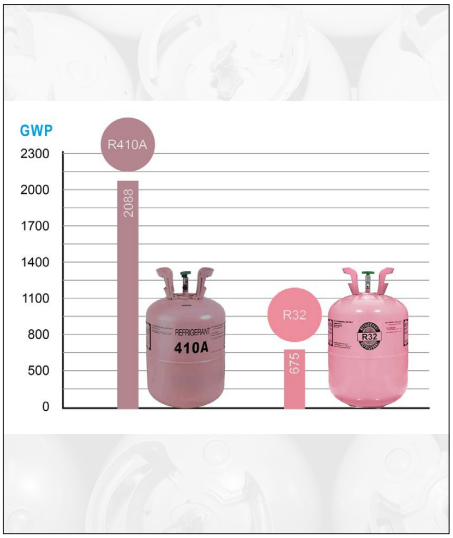
OVERVIEW

Environmentally Friendly

Rebel's heat pump technology uses electricity to move heat, rather than generating it through gas-powered heating. This results in lower carbon emissions and a more environmentally sustainable heating and cooling solution for various climate regions and seasons. So much so, that many government financial incentives are available to encourage adoption of the technology.

The Rebel heat pump system utilizes advanced variable speed compressors and electronic commutated motor fans to enable precise temperature control while minimizing energy waste to ensure optimal performance, sustainable operation, and lessen impact on your building's financial budget.

Low GWP Refrigerant



With a GWP of 675, R-32 contributes less to global warming potential compared to other refrigerants like R-410A. Because of R-32's excellent thermodynamic performance characteristics, an R-32 system could have up to 40% less charge than R-410A in certain applications, meaning you could reduce refrigerant usage in the equipment and potentially also reduce quantities leaking to the environment.

Being a pure, single-component refrigerant, R-32 can't lose its composition like a blended refrigerant and is well suited to retain its quality over time. It can be topped off and recharged in the field in both liquid and gas phases; because the composition doesn't change, it's easy to clean and reuse on site. R-32 can be reclaimed and recycled with a simple cleaning process, as compared to blends with less stable HFOs that must be distilled to their pure compounds and then remixed.

Compared to R-410A and R-454B, R-32 has several advantages when it comes to Life Cycle Climate Performance (LCCP). Its lower leakage and service charge result in reduced emissions during use, contributing to a lower overall LCCP. Additionally, R-32's ease of reclamation comparatively showcases lower potential for overall emissions at the end of its lifecycle.

Industry-Leading Performance

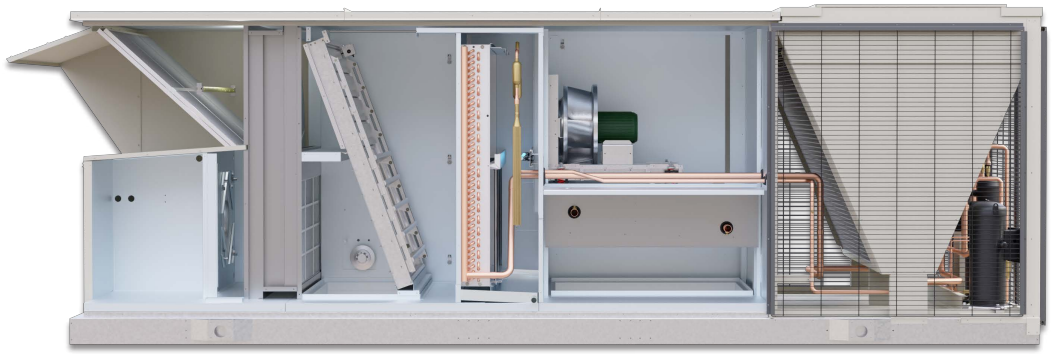
If you are a commercial building owner, facility manager, or specifying engineer with demanding rooftop performance criteria, you need the best performance. With a Daikin Rebel rooftop system you'll experience outstanding energy efficiency, unwavering performance, low-audible sound, superior comfort control and dehumidification, while benefitting your bottom line from substantial cost-savings.

Producing an astounding 22.7 IEER and 55% energy savings above ASHRAE's 90.1 standard, Rebel generates efficiencies previously unachievable in a commercial rooftop system. Rebel's exceptional performance makes it ideal for any low-rise commercial building like schools, offices, grocery, or retail stores, as well as 100% outdoor air, VAV with duct pressure control, single-zone VAV, and VRV applications.

Up to **22.7** IEER

DOAS OR **ECONOMIZER**

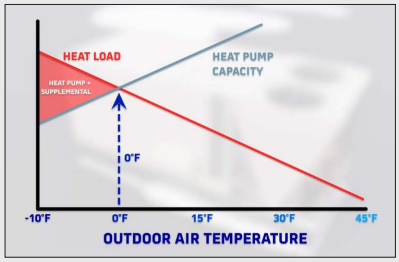
ADVANTAGES/TECHNOLOGIES

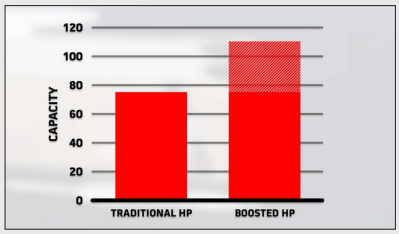


SUSTAINABLE HEAT PUMP TECHNOLOGY
WITH HIGHER CAPACITY FOR COLD CLIMATE APPLICATIONS

Direct Expansion (DX) Heat Pump

The Rebel HVAC Rooftop System offers the flexibility of both heating and cooling capabilities. By utilizing direct expansion heat pump technology, this system can efficiently provide heating during colder months and cooling during warmer months. This versatility eliminates the need for separate heating and cooling systems, making the Daikin Rebel an ideal choice for various applications in varying climates and locations.

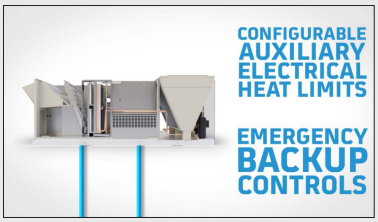




Conventional heat pump technology struggle to meet building loads in cold climates—often requiring large, inefficient electric heaters to provide supplemental heat. That's why we set out to develop a new generation of heat pump technology that delivers high levels of performance in the coldest of conditions. As outdoor temperatures decrease, a typical building's heating demand increases. Simultaneously, as the outdoor temperature decreases, the heat pump's output capacity decreases forcing the remaining heat load to be supplemented by a gas or electric heat source.

Unlike traditional heat pumps that have limited heating capacity at low ambient temperatures, Daikin's inverter compressor technology overcomes this challenge by boosting the compressors heating output on the coldest days. This allows our heat pumps to satisfy building demand during colder conditions in turn reducing the capacity and run time of supplemental heat, providing a more efficient solution that lowers the electrical load and produces fewer carbon emissions when compared to electric resistance heating.

Typically, replacing gas equipment with electric alternatives can double a building's electrical needs, leading to higher installation costs. Rebel tackles this challenge by leveraging existing wiring and isolating new loads on smaller circuits, reducing installation costs. Additionally, Rebel offers configurable auxiliary electric heat limits and emergency backup controls, further minimizing peak electrical load.



ADVANTAGES/TECHNOLOGIES

Energy Recovery

By incorporating an energy recovery wheel or fixed plate heat exchanger energy recovery system, Rebel can help improve overall energy efficiency by recovering and reusing energy that would otherwise be wasted. This can result in significant energy savings, particularly for facilities with high heating or cooling demands.

Energy Savings: Improves overall energy efficiency by recovering and reusing energy that would otherwise be wasted

Equipment Savings: Allows for a 30% downsize of the cooling system

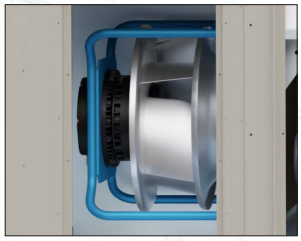
Eco Friendly: Lower energy consumption translates to reduced greenhouse gas emissions

Comfort: Maintains a consistent indoor temperature and air quality while helping regulate humidity levels to ensure fresh air is supplied to the building

EC Fan Motors

Compared to traditional AC fan motors, EC motors deliver significantly higher efficiency and substantial energy cost savings. This is attributed to two key innovations: permanent magnets which eliminate energy losses associated with generating magnetism, and advanced electronic controls that enable direct energy conversion and variable speed operation. These technologies work together to create a solution that minimizes energy waste and reduces the cooling load.

Additionally, ECM fans require minimal maintenance. Their technologically advanced design eliminates the need for mechanical maintenance on belts and bearings, contributing to reliable performance throughout their extended lifecycle.



Up to

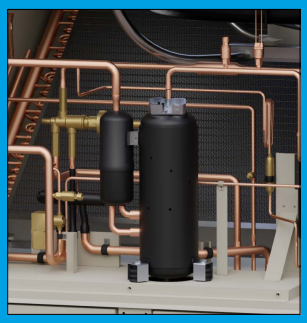
70% LESS

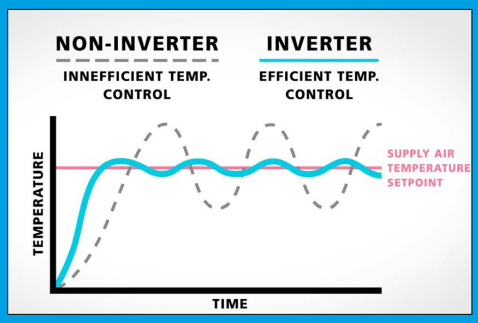
Energy Consumption*

**Energy efficiency values compared to traditional AC fan motor*

Inverter Scroll Compressors

Daikin inverter compressors are designed to operate at variable speeds, making them energy-efficient. Unlike traditional compressors that operate at fixed speeds, inverter compressors can adjust their power output according to the cooling requirements. By continuously regulating the compressor's speed, they ensure that only the required amount of energy is consumed, resulting in significant energy savings. This not only lowers your electricity bills and reduces your carbon footprint, but it also delivers precision air temperature and humidity control, making it the environmentally friendly choice.





Job Information	Technical Data Sheet
Job Name	Dayton STEM K-5
Date	10/7/2024
Submitted By	Mike Kirchens
Software Version	12.83
Unit Tag	RTU-GYM

Unit Overview

Model Number	Voltage V/Hz/Phase	Design Cooling Capacity Btu/hr	AHRI 340/360 Standard Efficiency		ASHRAE 90.1-2022 Compliant
			EER	IEER	
DPSC17B	460/60/3	197399	10.8	18.8	ASHRAE 90.1-2022 compliant

Unit

Model Number:	DPSC17B
Model Type:	Cooling
Heat Type:	Gas
Hot Gas Reheat:	MHGRH
Energy Recovery:	None
Application:	Variable Air Volume, Single Zone (Mixed Air or 100% OA)
Controls:	Microtech
Outside Air:	0-100% Economizer with Comparative Enthalpy Control
Altitude:	0 ft
Approval	cETLus

Physical

Dimensions and Weight

Length	Height	Width	Weight
101.6 in	85.9 in	73.4 in	2418 lb

Corner Weights

L1	L2	L3	L4
742 lb	588 lb	481 lb	606 lb

Construction

Exterior	Insulation and Liners	Air Opening Location	
		Return	Supply
Painted Galvanized Steel	1" Injected Foam, R-7, Galvanized Steel Liner	Bottom	Horizontal

Electrical

Unit FLA	MCA	MROPD	SCCR
50.6 A	59.6 A	90 A	10 kAIC

Note: Use only copper supply wires with ampacity based on 75° C conductor rating. Connections to terminals must be made with copper lugs and copper wire.

Return/Outside/Exhaust Air

Outside Air Option

Type	Damper Pressure Drop	Exhaust Air Type
90.1 and California Title 24 Compliant Economizer	0.29 inH_2O	Airfoil Power Exhaust Fan

Type	Drive Type	Wheel Diameter	Fan Series
SWSI AF	Direct Drive	12 in	Series II

Motor

(Qty) Horsepower	Type	Efficiency	Full Load Current (Each)
(1) 2.1 HP	ECM - Series II	Premium	2.8 A

Performance

Air Flow CFM	External Static Pressure inH_2O	Fan Speed RPM	Brake Horsepower HP
3000	0.20	3108	1.15

Filter Section

Physical

Type	Quantity / Size	Face Area	Face Velocity	Air Pressure Drop
COMBO RACK-2" MERV8 & 4" MERV14 from factory	6 / 18 in x 24 in x 2 in & 6 / 18 in x 24 in x 4 in	18.0 ft^2	333.3 ft/min	0.47

DX Cooling Coil

Physical

Coil Type	Refrigerant Type	Fins per Inch	Rows	Face Area	Face Velocity	Air Pressure drop	Drain Pan Material	UV Light
Cu Tube/ Al Fin	R32	12	6	15.4 ft^2	388.9 ft/min	0.49 inH_2O	Stainless Steel	None

Cooling Performance

Capacity			Indoor Air Temperature					Ambient air Temperature °F
			Entering		Leaving			
Total Btu/hr	Sensible Btu/hr	Moisture Removal lb/h	Dry Bulb °F	Wet Bulb °F	Dry Bulb °F	Wet Bulb °F	Dewpoint °F	
197399	150527	40.4	80.6	66.7	56.5	55.8	55.3	95.0

Condensate Connection Size: 3/4 in. Male NPT

Hot Gas Reheat Coil Section

Type	Face Area	Air Pressure Drop	Total Capacity	Leaving Air Temperature	
				Dry Bulb	Wet Bulb
Aluminum Tube Micro-Channel	21.6 ft^2	0.10 inH_2O	88170 Btu/hr	70.0 °F	60.7 °F

Fan Section

Fan

Type	Fan Wheel Diameter	Fan Series	Fan Isolation
SWSI AF	14 in	Series II	None

Performance

Airflow	Total Static Pressure	Fan Speed	Brake Horsepower	Altitude
6000 CFM	3.3 inH_2O	1577 rpm	4.43 HP	0 ft

Motor | **Drive**

Type	Horsepower	Efficiency	FLA	Type
ECM Motor	6.1	Premium	6.2 A	Direct Drive

Gas Heat Section

Physical

Airflow	Max Allowable Burner Temp Rise	Size	Connection (Qty) Size	Heat Exchanger Material
6000 CFM	100.0 °F	400 MBH	(1) 0.75 in. Female NPT	Stainless Steel

Performance

Capacity Btu/hr	Air Temperature Dry Bulb		Air Pressure Drop inH_2O	Gas Pressure		Modulation
	Entering °F	Leaving °F		Minimum inH_2O	Maximum inH_2O	
324000	34.8	84.6	0.25	5	14	Modulating 10:1 Turndown

Unit Discharge Conditions

AirTemperature

Motor Heat Btu/hr	Moisture Removal lb/h	Unit Leaving Dry Bulb °F	Unit Leaving Wet Bulb °F	Unit Leaving Dewpoint °F
12823	40.4	58.4	56.4	55.3

Minimum Airflows

Notes: Refer to fan curve for applicability of approximate airflows

Condensing Section

Compressor

Type	Quantity	Refrigerant Charge lb	Total Power	Capacity Control	Compressor Isolation
Inverter Scroll	1	24.9	12.89 kW	Mod Control with Inverter Compressor	Rubber in Shear

Compressor Amps:

Compressor 1	36.0 A

Condenser Coil

Type	Fins per Inch	Fin Material
Microchannel	23	Aluminum

Coil Options: Vandal Guard

Condenser Fan Motors

Number of Motors	Full Load Current (Total)
2	3.4 A

AHRI 340/360 Certified Data at AHRI 340/360 Standard Conditions

Net Capacity	EER	IEER	ASHRAE 90.1
178859 Btu/hr	10.8	18.8	ASHRAE 90.1-2022 compliant

Internal Pressure Drop Calculation

External Static Pressure:	1.50 inH_2O
Filter:	0.47 inH_2O
Dirty Filter:	0.25 inH_2O
Outside Air:	0.29 inH_2O
DX Coil:	0.49 inH_2O
Hot Gas Reheat:	0.10 inH_2O
Gas Heat:	0.25 inH_2O
Total Static Pressure:	3.35 inH_2O

Sound

	Sound Power (db)							
Frequency	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1 kHz**	**2 kHz**	**4 kHz**	**8 kHz**
Inlet	80	82	90	87	90	89	86	81
Discharge	80	82	90	87	90	89	86	81
Radiated	85	85	81	78	77	73	70	60

Options

Unit	
Ventilation Controls:	Outdoor Air Monitor
Electrical	
Field Connection:	Single Disconnect
Powered Receptacle:	Field powered 115V GFI outlet
Controls	
Communication Card:	BACnet MSTP

Factory Installed Sensors

Leaving Coil/Entering Fan Temperature Sensor
Duct High Limit Switch
Return Air Temperature Sensor
Discharge Air Temperature sensor – Wired in unit, mounted in supply duct
Outside Air Temperature Sensor
Return Air Enthalpy Sensor
Outside Air Enthalpy Sensor
Dirty Filter On/Off Switch
Supply Fan Air Proving Via Modbus
Building Static Pressure Sensor
Ebtron Airflow Station

Warranty

Parts:	Additional One Year, Two Year Total
Compressor:	Additional Four Year, Five Year Total
Gas Heat Exchanger:	Extended Nine Year, Ten Year Total

Specials

Unit	
Specials Description:	

Notes

Forklift slots to remove unit from a truck bed. The fork lift slots are not to be used to place unit on a roof curb. Unit is to be lifted onto curb per IOM instructions.

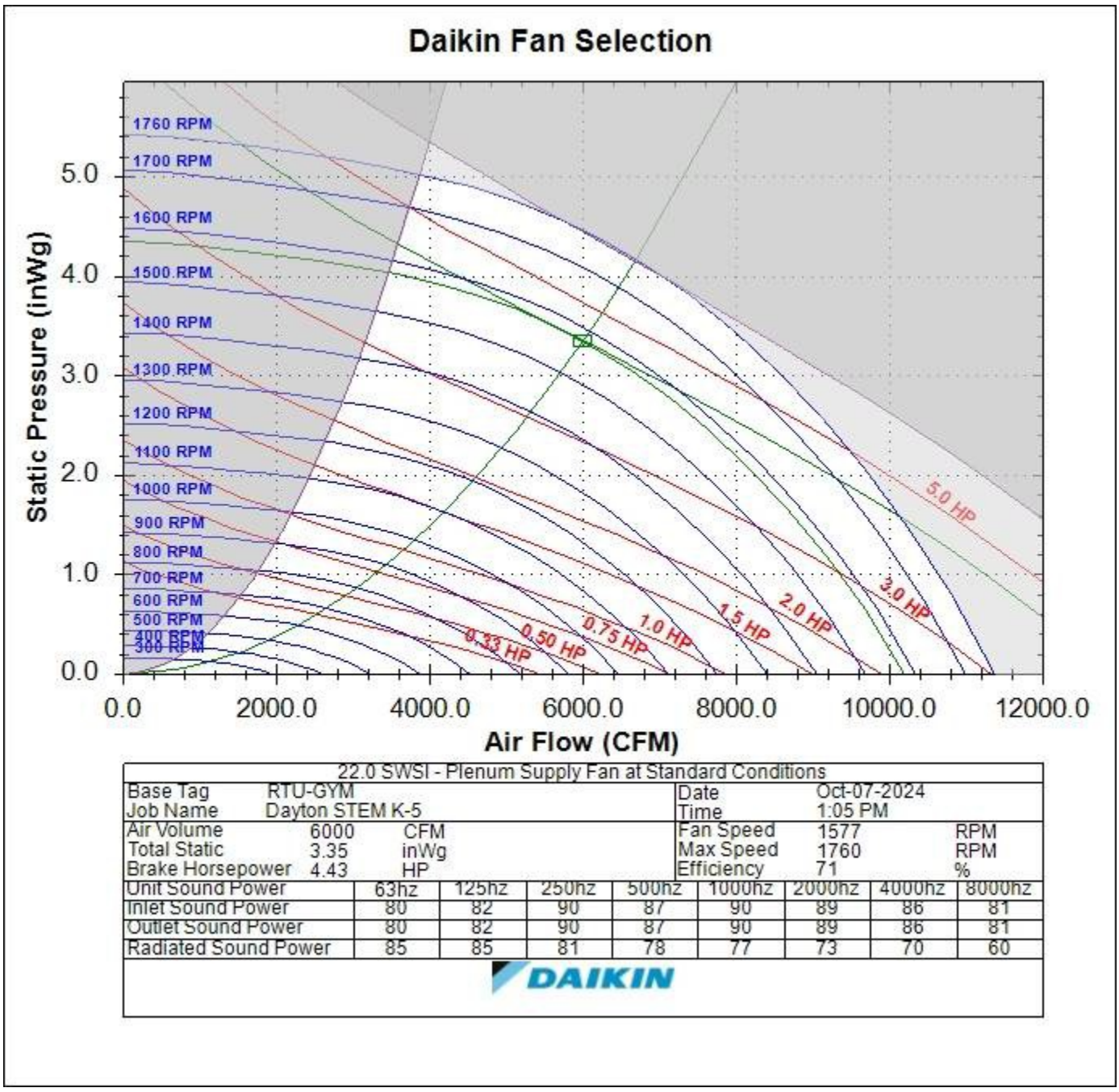
Accessories

Mandatory

Part Number	Description
910278050	Space Sensor with Set Point Adj. Humidity and CO2

Optional

Part Number	Description
910373171	14" Roof Curb, No ERW, Size 007-017



22.0 SWSI - Plenum Supply Fan at Standard Conditions

Base Tag	RTU-GYM		Date	Oct-07-2024	
Job Name	Dayton STEM K-5		Time	1:05 PM	
Air Volume	6000	CFM	Fan Speed	1577	RPM
Total Static	3.35	inWg	Max Speed	1760	RPM
Brake Horsepower	4.43	HP	Efficiency	71	%

Unit Sound Power	63hz	125hz	250hz	500hz	1000hz	2000hz	4000hz	8000hz
Inlet Sound Power	80	82	90	87	90	89	86	81
Outlet Sound Power	80	82	90	87	90	89	86	81
Radiated Sound Power	85	85	81	78	77	73	70	60

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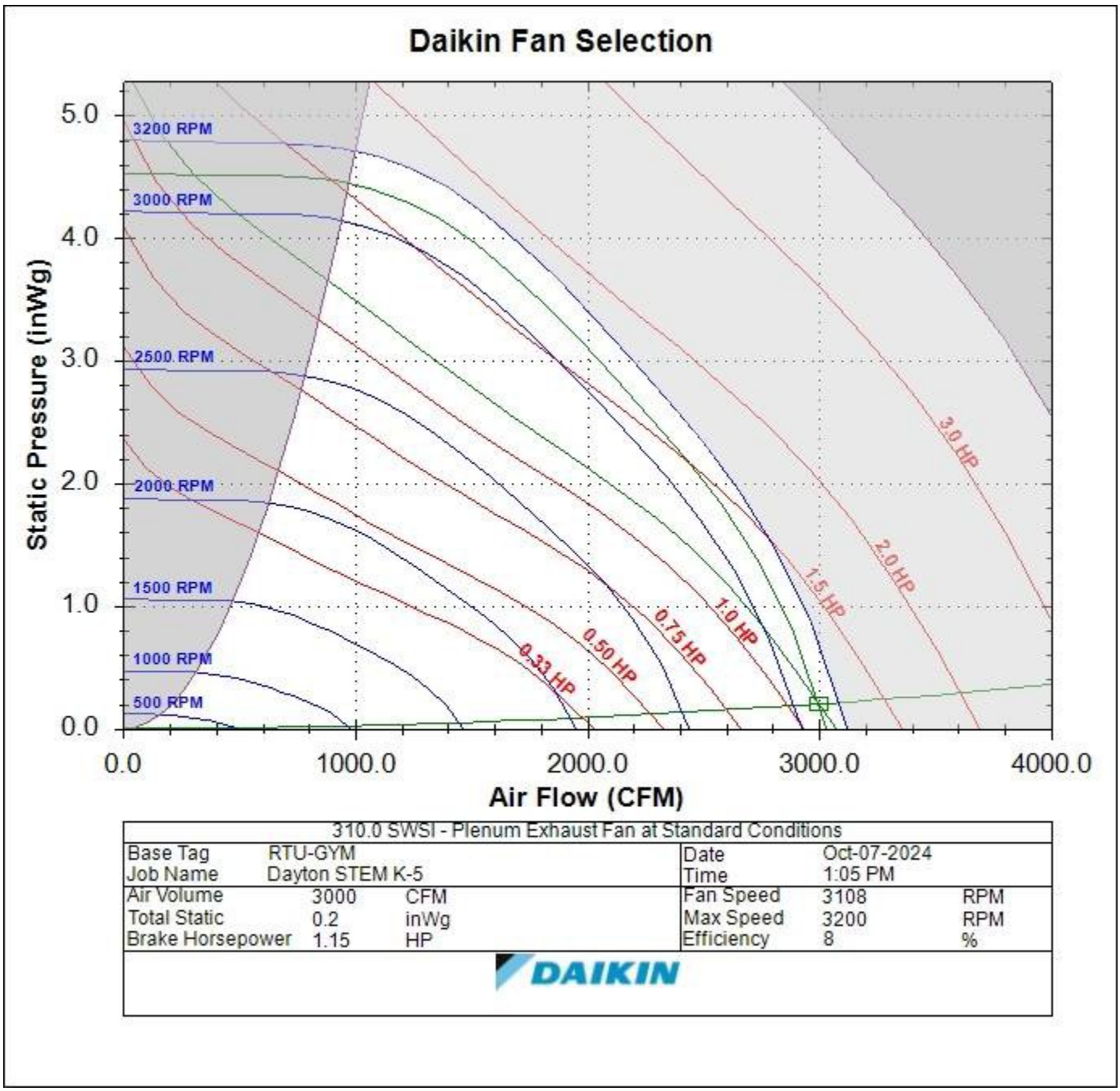
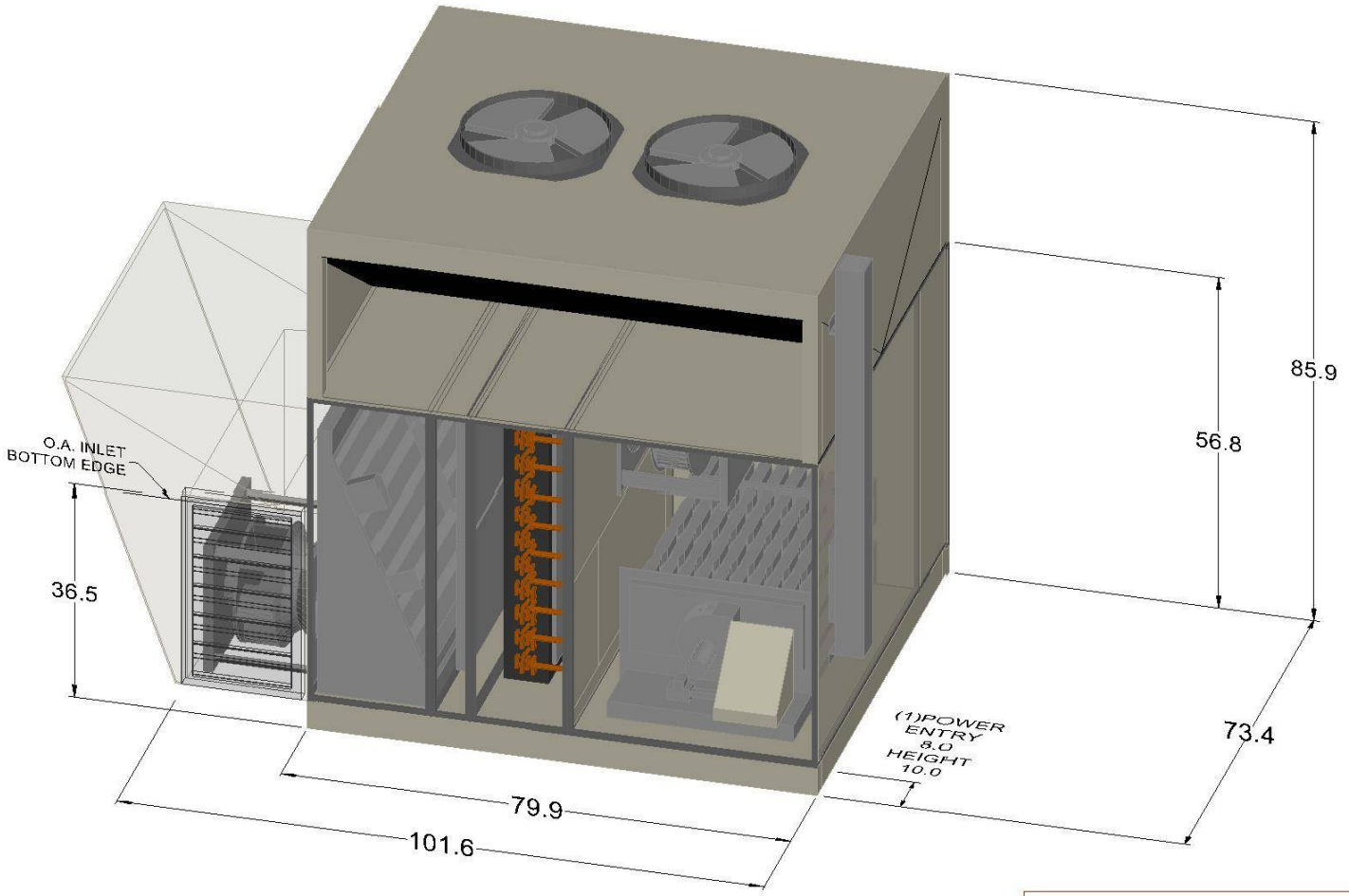

Daikin Fan Selection
Static Pressure (inWg)
Air Flow (CFM)
5.0
4.0
3.0
2.0
1.0
0.0
0.0
1000.0
2000.0
3000.0
4000.0
3200 RPM
3000 RPM
2500 RPM
2000 RPM
1500 RPM
1000 RPM
500 RPM
0.33 HP
0.50 HP
0.75 HP
1.0 HP
1.5 HP
2.0 HP
3.0 HP
310.0 SWSI - Plenum Exhaust Fan at Standard Conditions
Base Tag RTU-GYM
Job Name Dayton STEM K-5
Date Oct-07-2024
Time 1:05 PM
Air Volume 3000 CFM
Total Static 0.2 inWg
Brake Horsepower 1.15 HP
Fan Speed 3108 RPM
Max Speed 3200 RPM
Efficiency 8 %
DAIKIN



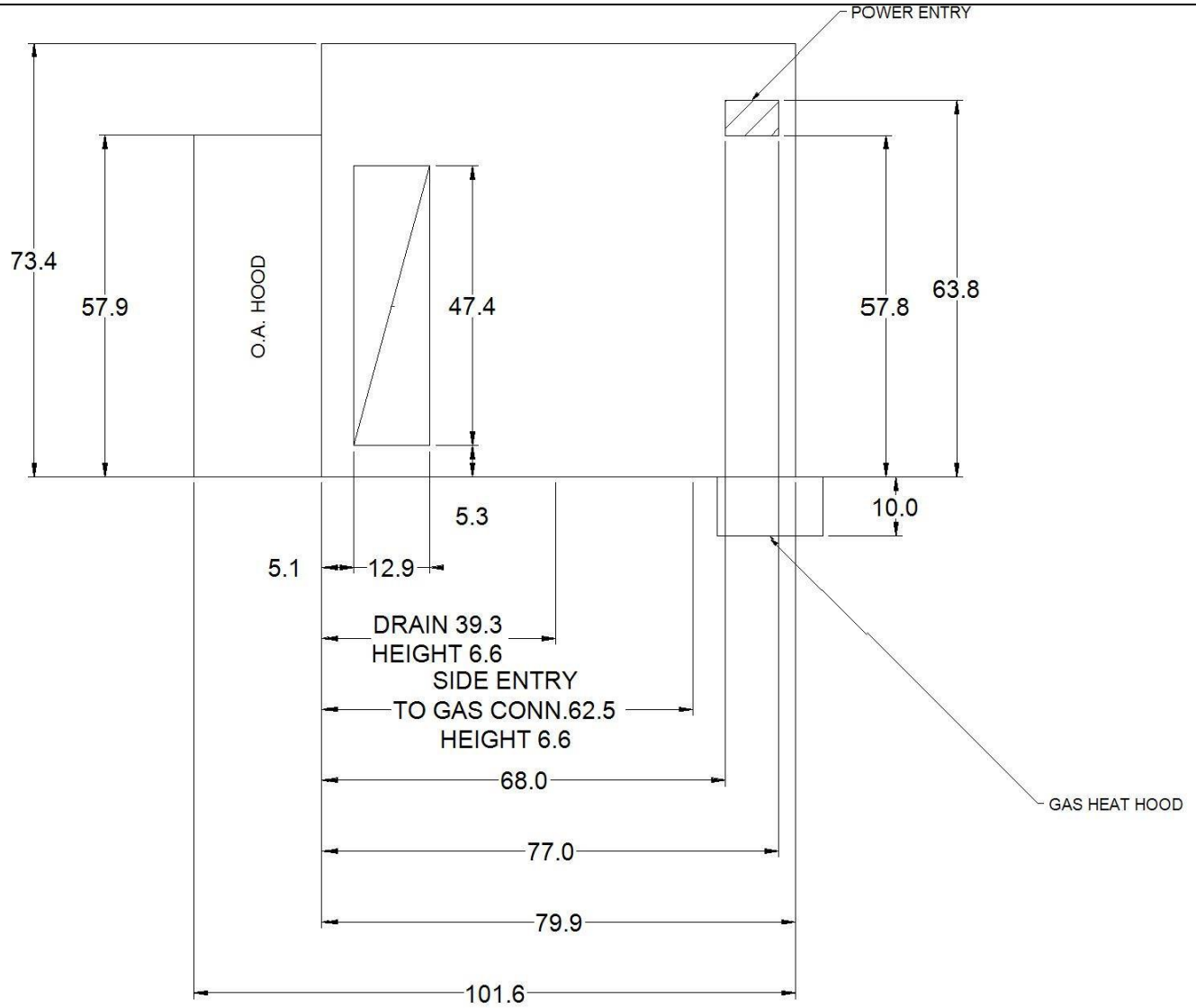
Notes:
(1) Recommended location for optional field cut side power connection.
(2) Horizontal gas connection only. Gas pipe routing within the roofcurb is not available.

WARNING / AVERTISSEMENT

FOR INSTALLATION ON NON-COMBUSTIBLE FLOORS ONLY	POUR L'INSTALLATION UNIQUEMENT SUR DES SOLS NON COMBUSTILBLES

910209643

	Unit Tag: RTU-GYM			Sales Office: ElitAire, Inc.			DAIKIN
Product: Rebel	Project Name: Dayton STEM K-5			Sales Engineer:			13600 Industrial Park Blvd. Minneapolis, MN 55441
Model: DPSC17B	Oct. 07, 2024	Ver/Rev:	Sheet: 1 of 1	Scale: NTS	Tolerance: +/- 0.25"	Dwg Units: in [mm]	www.DaikinApplied.com Software Version: 12.83



PLAN VIEW - OPENINGS & OVERALL

	Unit Tag: RTU-GYM			Sales Office: ElitAire, Inc.			
Product: Rebel	Project Name: Dayton STEM K-5			Sales Engineer:			
Model: DPSC17B	Oct. 07, 2024	Ver/Rev:	Sheet: 1 of 1	Scale: NTS	Tolerance: +/- 0.25"	Dwg Units: in [mm]	

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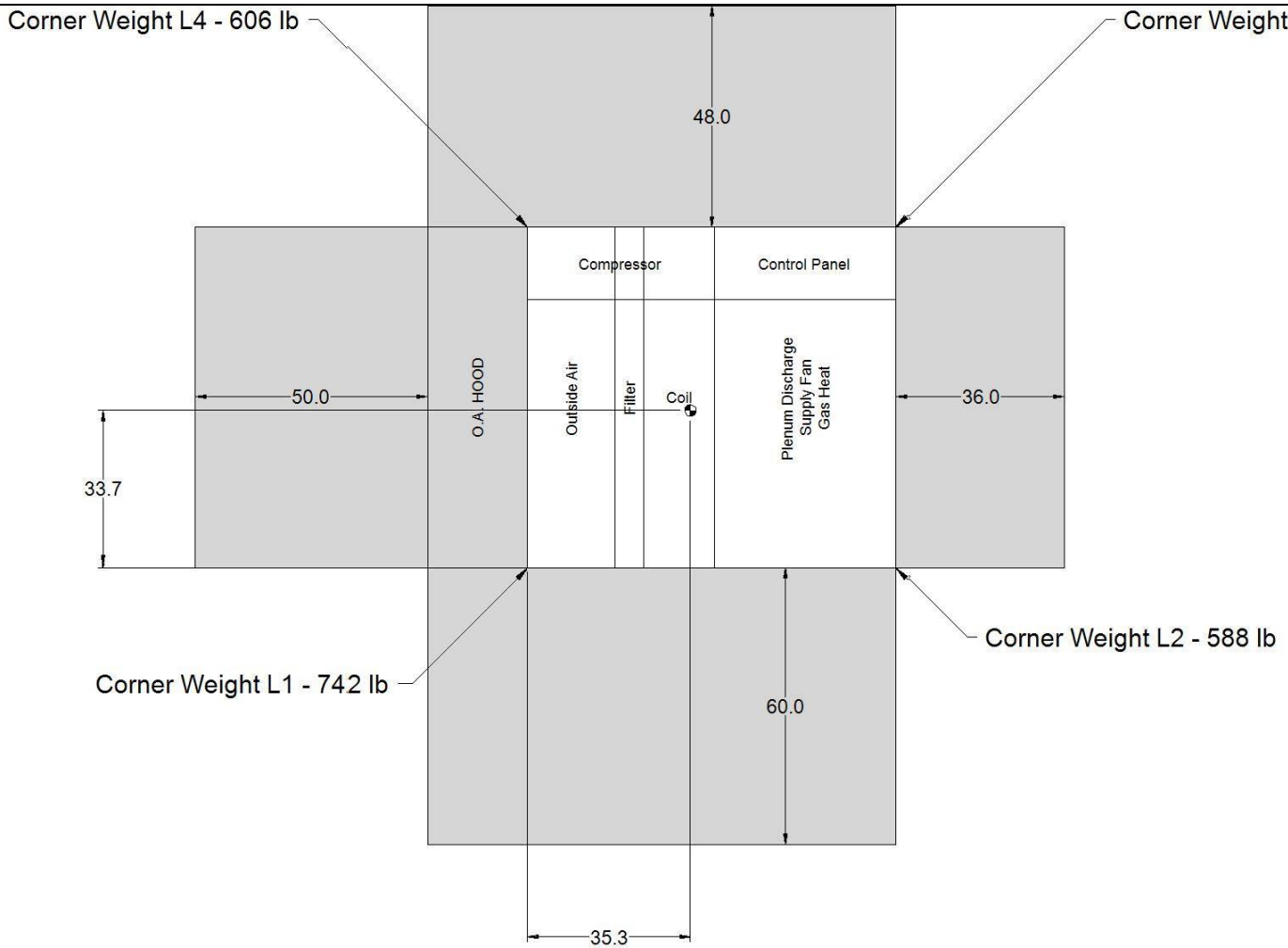
13600 Industrial Park Blvd. Minneapolis, MN 55441
www.DaikinApplied.com Software Version: 12.83



PLAN VIEW - CG, CORNER WEIGHTS, SERVICE CLEARANCE

Notes:
(1) Center of Gravity Height = 25
(2) Total Weight = 2418 lb

	Unit Tag: RTU-GYM			Sales Office: ElitAire, Inc.			DAIKIN
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GVQ5PO

Dayton STEM K-5

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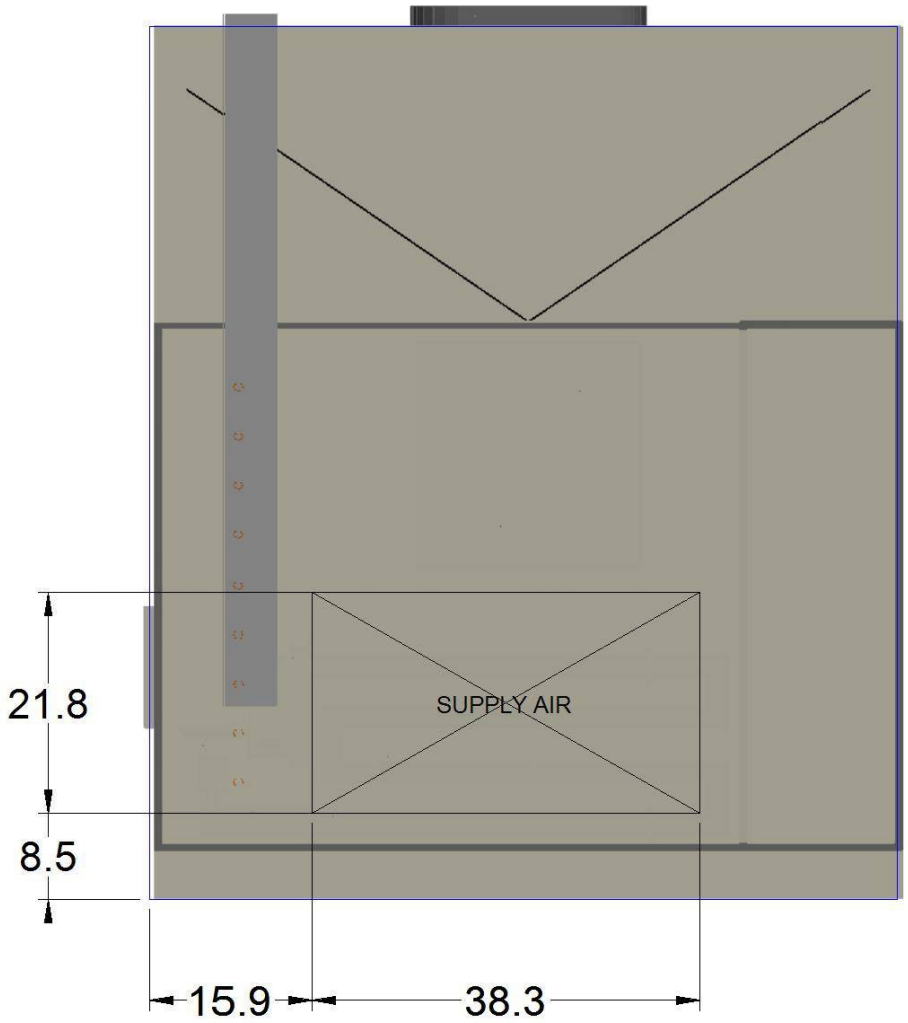
10/7/2024

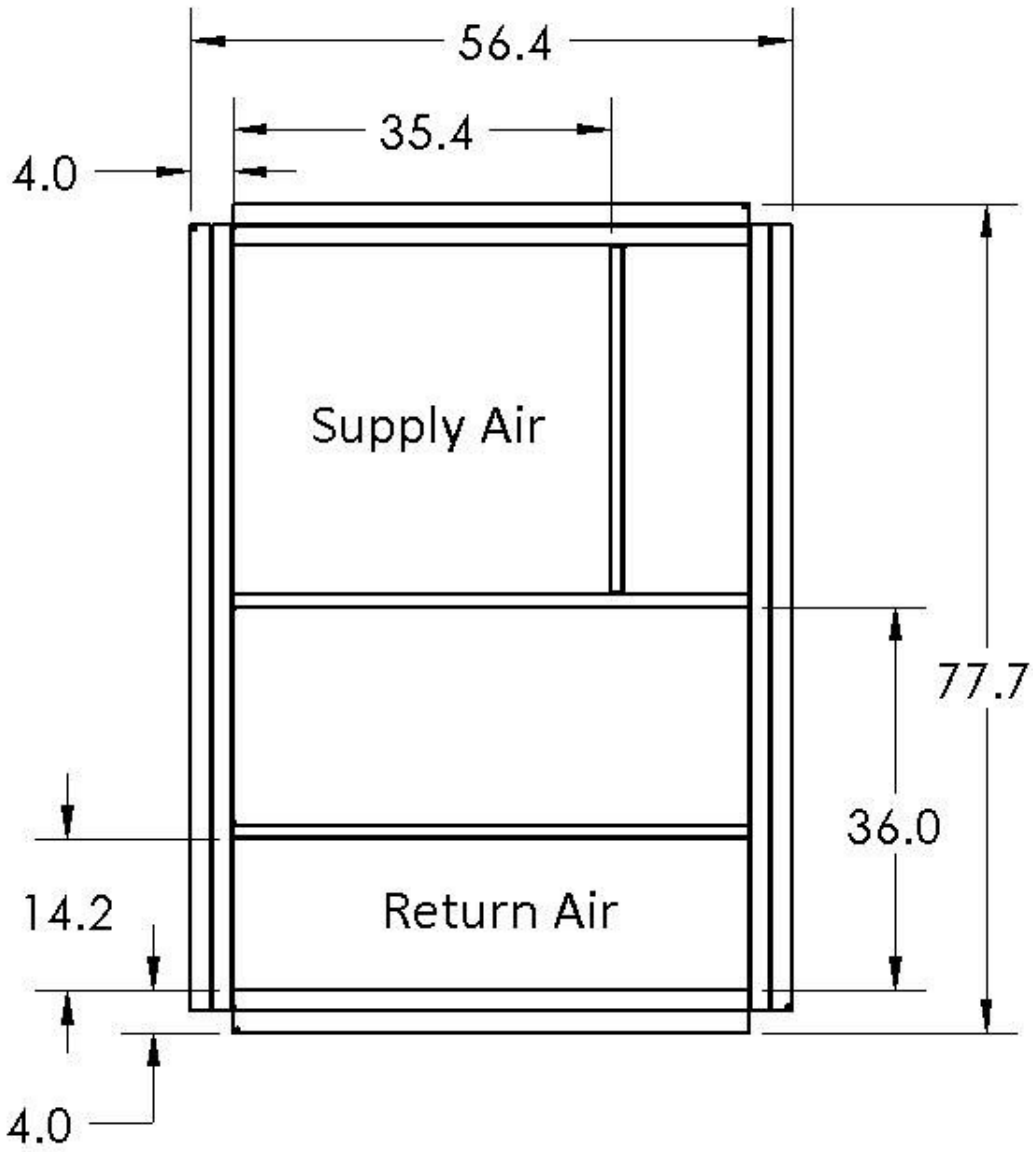
RTU-GYM

Rebel Drawings



ELEVATION VIEW - SUPPLY SIDE OPENING LOCATION

	Unit Tag: RTU-GYM			Sales Office: ElitAire, Inc.			DAIKIN
Product: Rebel	Project Name: Dayton STEM K-5			Sales Engineer:			13600 Industrial Park Blvd. Minneapolis, MN 55441
Model: DPSC17B	Oct. 07, 2024	Ver/Rev:	Sheet: 1 of 1	Scale: NTS	Tolerance: +/- 0.25"	Dwg Units: in [mm]	www.DaikinApplied.com Software Version: 12.83



Curb View	Unit Tag: RTU-GYM			DAIKIN		
Product: Rebel	Project Name: Dayton STEM K-5			13600 Industrial Park Blvd. Minneapolis, MN 55441		
Model: DPSC17B	Sales Office: ElitAire, Inc.			www.DaikinApplied.com Software Version: 12.83		
Sales Engineer:	Oct. 07, 2024	Ver/Rev:	Sheet 1 of 1	Scale: NTS	Tolerance: +/-0.25"	Dwg Units: in [mm]

Job Information	*Technical Data Sheet*
Job Name	Dayton STEM K-5
Date	10/7/2024
Submitted By	Mike Kirchens
Software Version	12.83
Unit Tag	RTU-Office

Unit Overview

Model Number	Voltage V/Hz/Phase	Design Cooling Capacity Btu/hr	AHRI 340/360 Standard Efficiency		ASHRAE 90.1-2022 Compliant
			EER	IEER	
DPSC07B	460/60/3	96743	13.0	20.0	ASHRAE 90.1-2022 compliant

Unit

Model Number:	DPSC07B
Model Type:	Cooling
Heat Type:	Gas
Energy Recovery:	None
Application:	Variable Air Volume, Duct SP Control (Mixed Air or 100% OA)
Controls:	Microtech
Outside Air:	0-100% Economizer with Comparative Enthalpy Control
Altitude:	0 ft
Approval	cETLus

Physical

Dimensions and Weight

Length	Height	Width	Weight
101.6 in	85.9 in	73.4 in	2172 lb

Corner Weights

L1	L2	L3	L4
662 lb	518 lb	436 lb	557 lb

Construction

Exterior	Insulation and Liners	Air Opening Location	
		Return	Supply
Painted Galvanized Steel	1" Injected Foam, R-7, Galvanized Steel Liner	Bottom	Bottom

Electrical

Unit FLA	MCA	MROPD	SCCR
24.4 A	27.7 A	40 A	10 kAIC

Note: Use only copper supply wires with ampacity based on 75° C conductor rating. Connections to terminals must be made with copper lugs and copper wire.

Return/Outside/Exhaust Air

Outside Air Option

Type	Damper Pressure Drop	Exhaust Air Type
90.1 and California Title 24 Compliant Economizer	0.07 inH_2O	Airfoil Power Exhaust Fan

Type	Drive Type	Wheel Diameter	Fan Series
SWSI AF	Direct Drive	12 in	Series II

Motor

(Qty) Horsepower	Type	Efficiency	Full Load Current (Each)
(1) 0.5 HP	ECM - Series II	Premium	1.1 A

Performance

Air Flow CFM	External Static Pressure inH_2O	Fan Speed RPM	Brake Horsepower HP
1500	0.20	1610	0.17

Filter Section

Physical

Type	Quantity / Size	Face Area	Face Velocity	Air Pressure Drop
COMBO RACK-2" MERV8 & 4" MERV14 from factory	6 / 18 in x 24 in x 2 in & 6 / 18 in x 24 in x 4 in	18.0 ft^2	166.7 ft/min	0.22

DX Cooling Coil

Physical

Coil Type	Refrigerant Type	Fins per Inch	Rows	Face Area	Face Velocity	Air Pressure drop	Drain Pan Material	UV Light
Cu Tube/ Al Fin	R32	15	4	15.4 ft^2	194.4 ft/min	0.29 inH_2O	Stainless Steel	None

Cooling Performance

Capacity			Indoor Air Temperature					Ambient air Temperature °F
			Entering		Leaving			
Total Btu/hr	Sensible Btu/hr	Moisture Removal lb/h	Dry Bulb °F	Wet Bulb °F	Dry Bulb °F	Wet Bulb °F	Dewpoint °F	
96743	75929	19.0	77.8	64.9	53.6	53.6	53.6	95.0

Condensate Connection Size: 3/4 in. Male NPT

Fan Section

Fan

Type	Fan Wheel Diameter	Fan Series	Fan Isolation
SWSI AF	14 in	Series II	None

Performance

Airflow	Total Static Pressure	Fan Speed	Brake Horsepower	Altitude
3000 CFM	2.1 inH_2O	2570 rpm	1.62 HP	0 ft

Motor | **Drive**

Type	Horsepower	Efficiency	FLA	Type
ECM Motor	4.4	Premium	4.7 A	Direct Drive

Gas Heat Section

Physical

Airflow	Max Allowable Burner Temp Rise	Size	Connection (Qty) Size	Heat Exchanger Material
3000 CFM	60.0 °F	200 MBH	(1) 0.75 in. Female NPT	Stainless Steel

Performance

Capacity Btu/hr	Air Temperature Dry Bulb		Air Pressure Drop inH_2O	Gas Pressure		Modulation
	Entering °F	Leaving °F		Minimum inH_2O	Maximum inH_2O	
162000	52.0	101.8	0.02	5	14	Modulating 5:1 Turndown

Unit Discharge Conditions

AirTemperature

Motor Heat Btu/hr	Moisture Removal lb/h	Unit Leaving Dry Bulb °F	Unit Leaving Wet Bulb °F	Unit Leaving Dewpoint °F
5239	19.0	55.2	54.1	53.6

Minimum Airflows

Notes:	Refer to fan curve for applicability of approximate airflows

Condensing Section

Compressor

Type	Quantity	Refrigerant Charge lb	Total Power	Capacity Control	Compressor Isolation
Inverter Scroll	1	15.5	5.58 kW	Mod Control with Inverter Compressor	Rubber in Shear

Compressor Amps:

Compressor 1	13.0 A

Condenser Coil

Type	Fins per Inch	Fin Material
Microchannel	23	Aluminum

Condenser Fan Motors

Number of Motors	Full Load Current (Total)
2	3.4 A

AHRI 340/360 Certified Data at AHRI 340/360 Standard Conditions

Net Capacity	EER	IEER	ASHRAE 90.1
91691 Btu/hr	13.0	20.0	ASHRAE 90.1-2022 compliant

Internal Pressure Drop Calculation

External Static Pressure:	1.50 inH_2O
Filter:	0.22 inH_2O
Outside Air:	0.07 inH_2O
DX Coil:	0.29 inH_2O
Gas Heat:	0.02 inH_2O
Total Static Pressure:	2.11 inH_2O

Sound

	Sound Power (db)							
Frequency	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1 kHz**	**2 kHz**	**4 kHz**	**8 kHz**
Inlet	75	74	82	77	79	78	73	68
Discharge	75	77	85	82	85	84	81	76
Radiated	85	85	81	78	76	71	68	60

Options

Unit	
Ventilation Controls:	Outdoor Air Monitor
Electrical	
Field Connection:	Single Disconnect
Powered Receptacle:	Field powered 115V GFI outlet
Controls	
Communication Card:	BACnet MSTP

Factory Installed Sensors

- Leaving Coil/Entering Fan Temperature Sensor
- Duct High Limit Switch
- Duct Static Pressure Sensor
- Return Air Temperature Sensor
- Discharge Air Temperature sensor – Wired in unit, mounted in supply duct
- Outside Air Temperature Sensor
- Return Air Enthalpy Sensor
- Outside Air Enthalpy Sensor
- Dirty Filter On/Off Switch
- Supply Fan Air Proving Via Modbus
- Building Static Pressure Sensor
- Ebtron Airflow Station

Warranty

Parts:	Additional One Year, Two Year Total
Compressor:	Additional Four Year, Five Year Total
Gas Heat Exchanger:	Extended Nine Year, Ten Year Total

Specials

Unit	
Specials Description:	

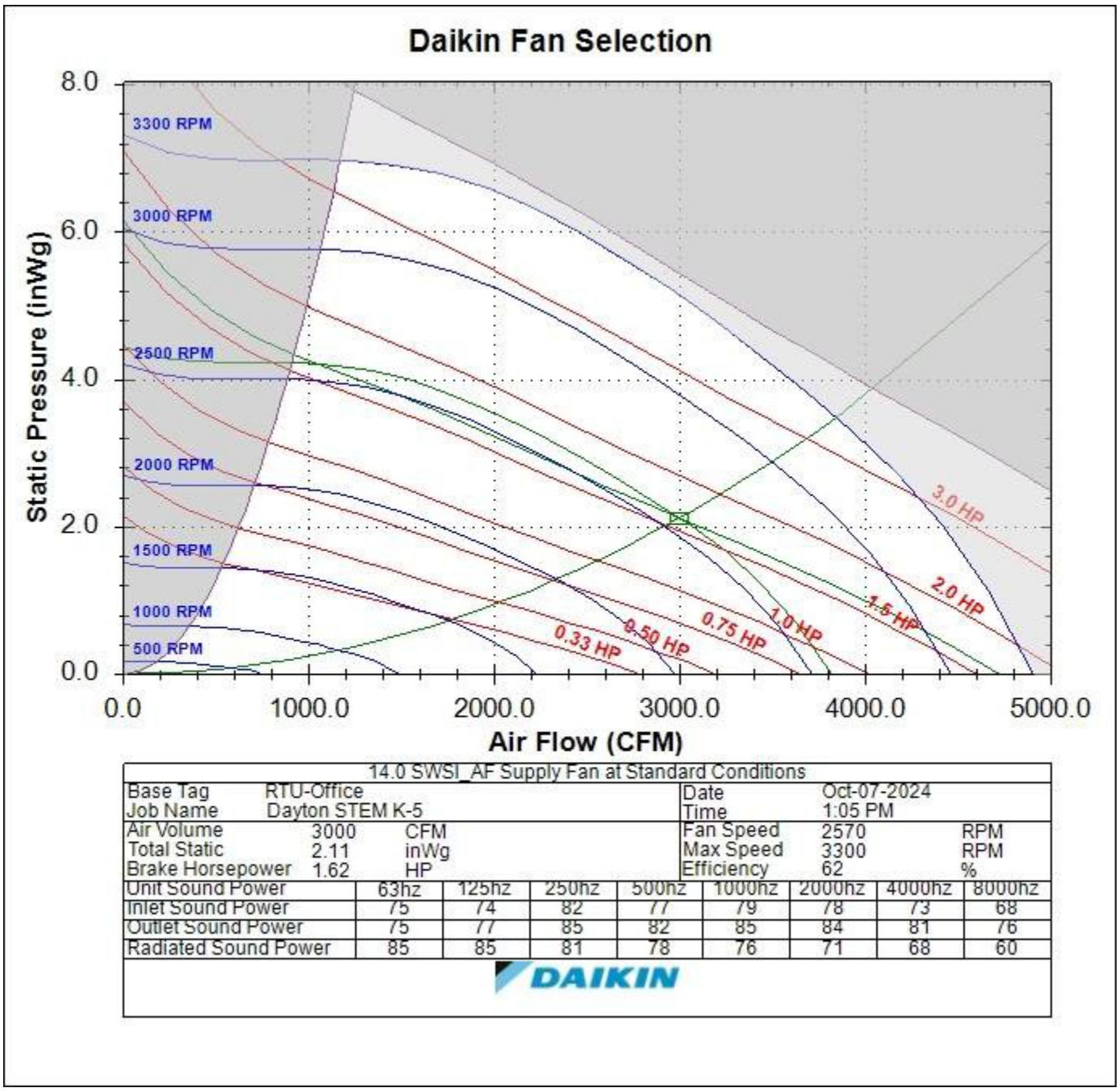
Notes

Forklift slots to remove unit from a truck bed. The fork lift slots are not to be used to place unit on a roof curb. Unit is to be lifted onto curb per IOM instructions.

Accessories

Optional

Part Number	Description
910373171	14" Roof Curb, No ERW, Size 007-017



14.0 SWSI_AF Supply Fan at Standard Conditions

Base Tag	RTU-Office		Date	Oct-07-2024	
Job Name	Dayton STEM K-5		Time	1:05 PM	
Air Volume	3000	CFM	Fan Speed	2570	RPM
Total Static	2.11	inWg	Max Speed	3300	RPM
Brake Horsepower	1.62	HP	Efficiency	62	%

Unit Sound Power	63hz	125hz	250hz	500hz	1000hz	2000hz	4000hz	8000hz
Inlet Sound Power	75	74	82	77	79	78	73	68
Outlet Sound Power	75	77	85	82	85	84	81	76
Radiated Sound Power	85	85	81	78	76	71	68	60

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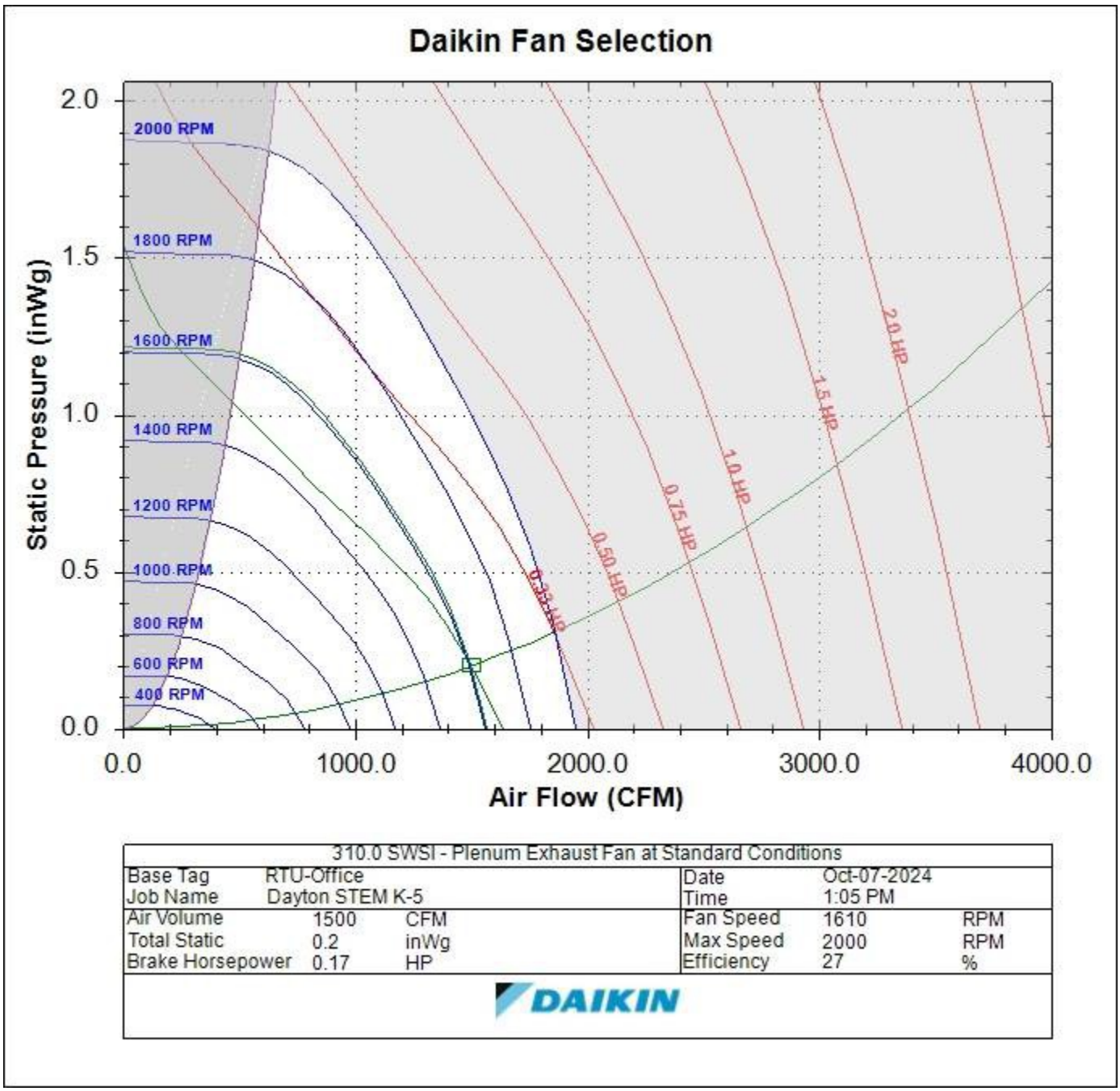
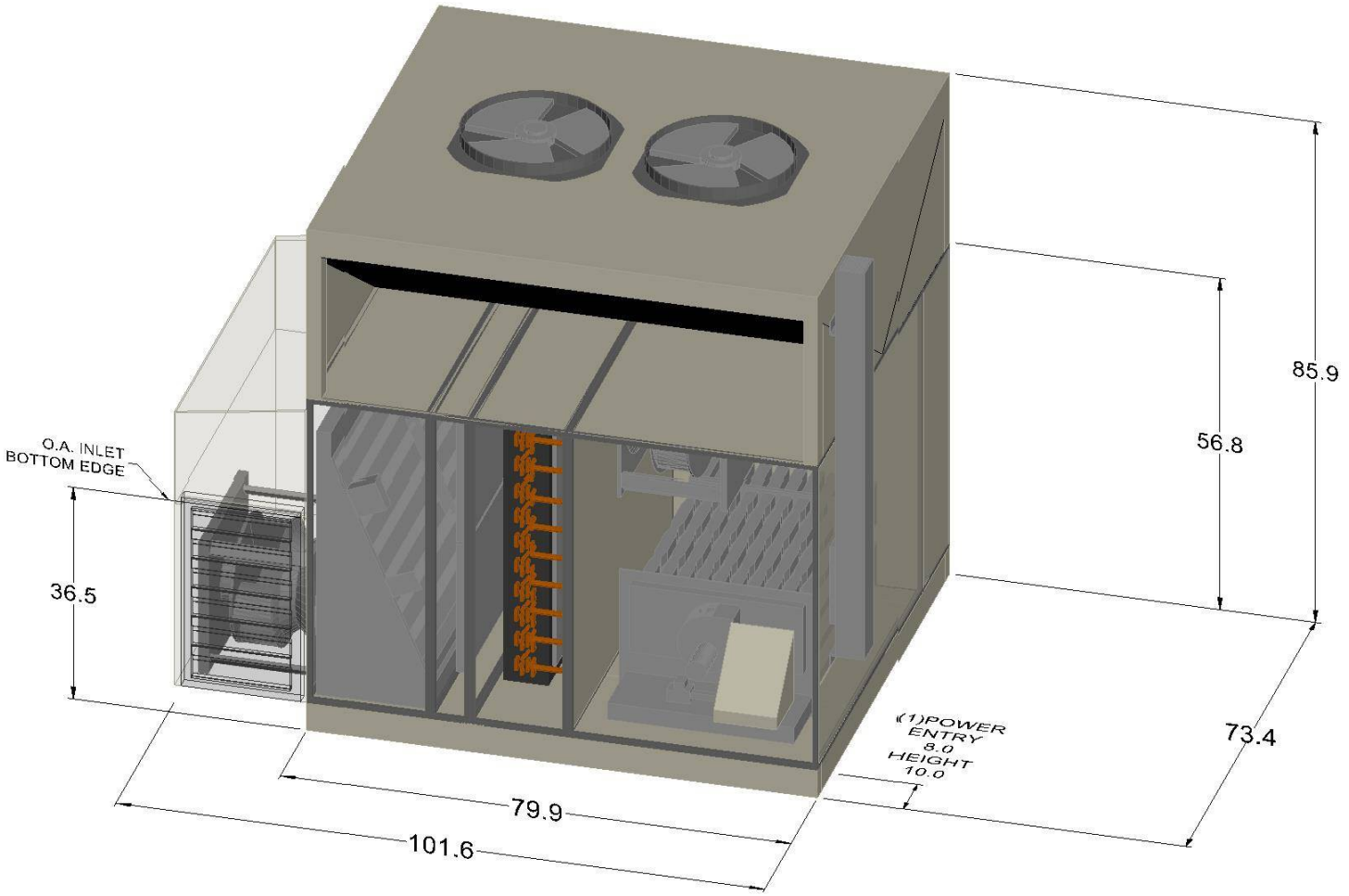

Daikin Fan Selection
Static Pressure (inWg)
Air Flow (CFM)
2.0
1.5
1.0
0.5
0.0
0.0
1000.0
2000.0
3000.0
4000.0
2000 RPM
1800 RPM
1600 RPM
1400 RPM
1200 RPM
1000 RPM
800 RPM
600 RPM
400 RPM
0.33 HP
0.50 HP
0.75 HP
1.0 HP
1.5 HP
2.0 HP
310.0 SWSI - Plenum Exhaust Fan at Standard Conditions
Base Tag RTU-Office
Job Name Dayton STEM K-5
Date Oct-07-2024
Time 1:05 PM
Air Volume 1500 CFM
Total Static 0.2 inWg
Brake Horsepower 0.17 HP
Fan Speed 1610 RPM
Max Speed 2000 RPM
Efficiency 27 %
DAIKIN



Notes:
(1) Recommended location for optional field cut side power connection.
(2) Horizontal gas connection only. Gas pipe routing within the roofcurb is not available.

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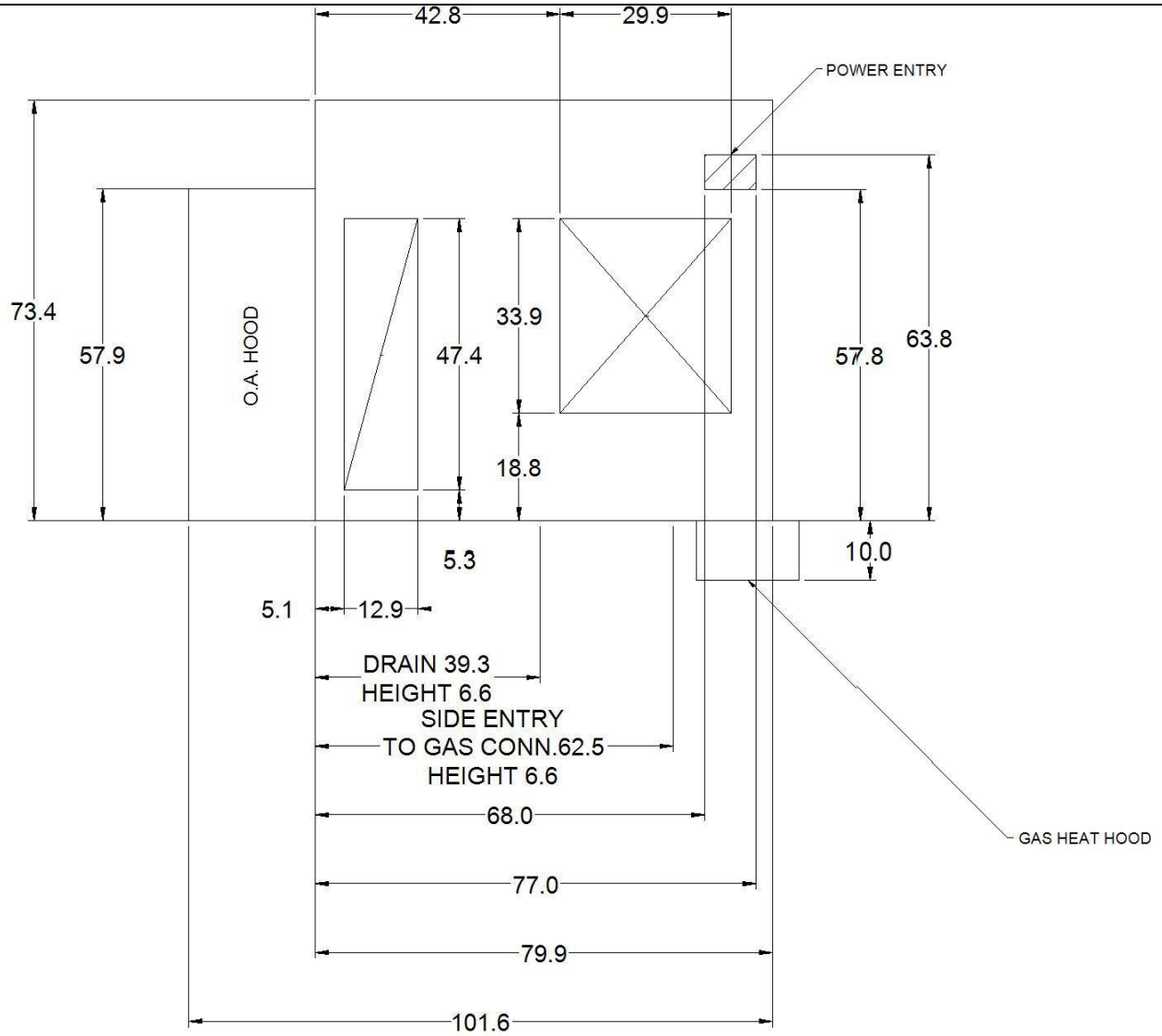

PLAN VIEW - OPENINGS & OVERALL

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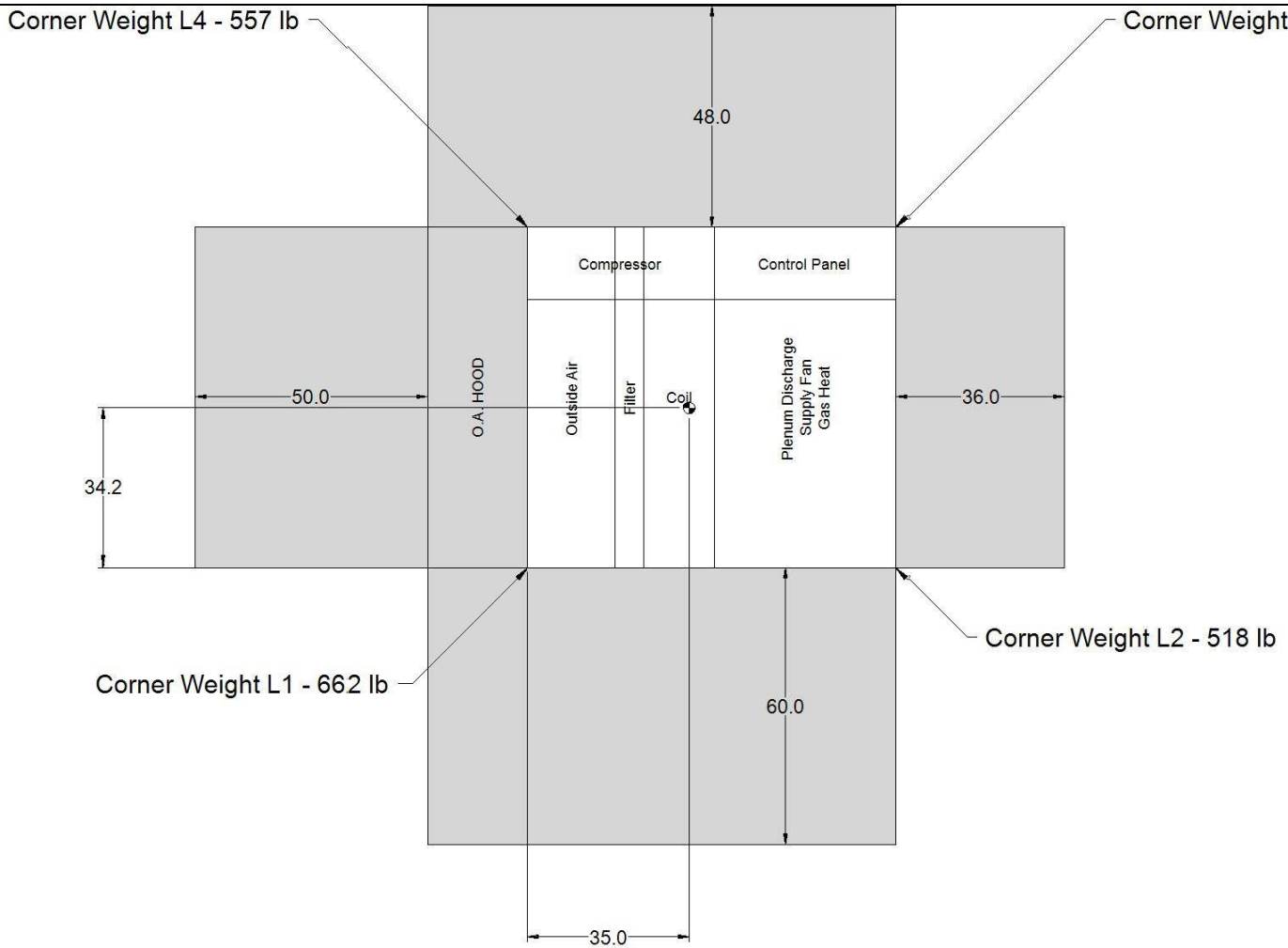

PLAN VIEW - CG, CORNER WEIGHTS, SERVICE CLEARANCE

Notes:
(1) Center of Gravity Height = 25.8
(2) Total Weight = 2172 lb

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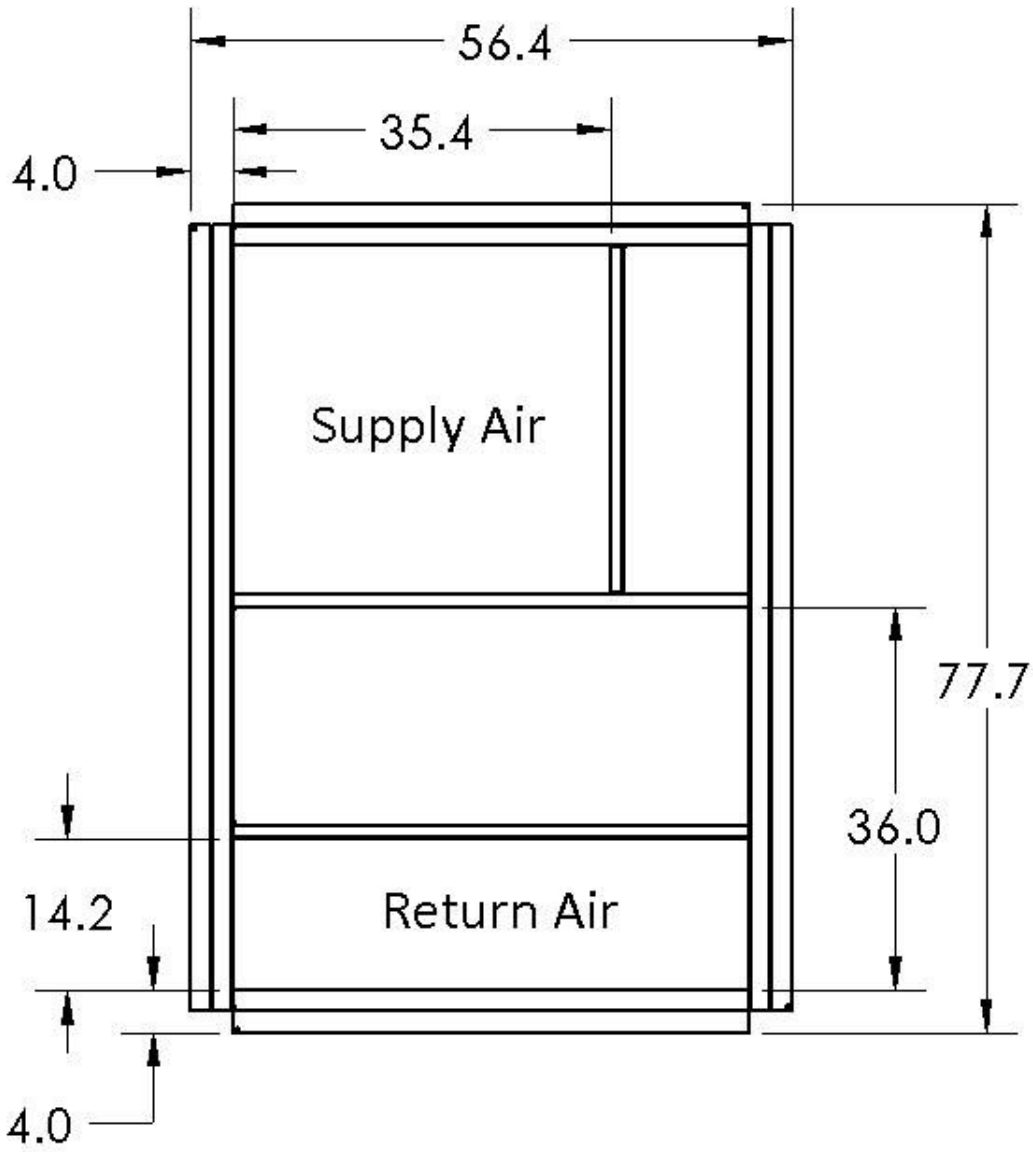


Curb View	Unit Tag: RTU-Office			DAIKIN		
Product: Rebel	Project Name: Dayton STEM K-5			13600 Industrial Park Blvd. Minneapolis, MN 55441		
Model: DPSC07B	Sales Office: ElitAire, Inc.			www.DaikinApplied.com Software Version: 12.83		
Sales Engineer:	Oct. 07, 2024	Ver/Rev:	Sheet 1 of 1	Scale: NTS	Tolerance: +/-0.25"	Dwg Units: in [mm]

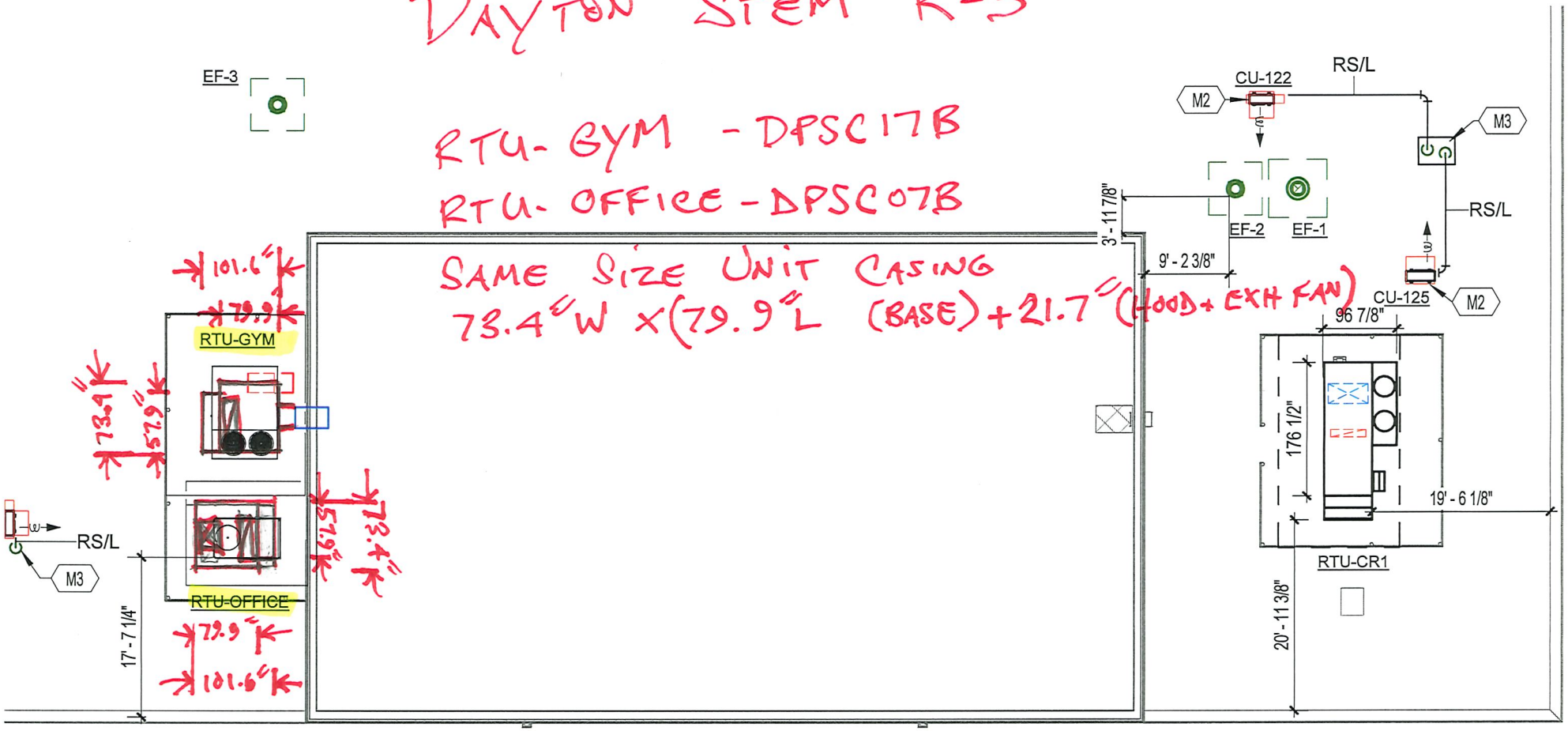
DAYTON STEM K-5

RTU- GYM - DPSC17B

RTU- OFFICE - DPSC07B

SAME SIZE UNIT CASING

73.4"W x (79.9"L (BASE) + 21.7" (HOOD + EXH FAN)



N

1 / M301 ROOF LEVEL

1/16" = 1'-0"