

Quality People. Building Solutions.

Comfort Systems USA (Arkansas), Inc.
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Date: 8/11/2023

Return Request: 8/22/2023

Project: Southside HS & JH Additions

Supplier: Airetech

Manufacturer: Greenheck

Submittal: Custom Packaged Outdoor HVAC Equipment

Submittal Number: 23 75 00-01

Drawing # and Installation: Mechanical Drawings

ARCHITECT

Lewis Architects Engineers
11225 Huron Lane, Suite 104
Little Rock, AR 72211
501-223-9302

ENGINEER

Lewis Architects Engineers
11225 Huron Lane, Suite 104
Little Rock, AR 72211
501-223-9302

GENERAL CONTRACTOR

Nabholz
612 Garland St.
Conway, AR 72032
501-505-5800

MECHANICAL SUBCONTRACTOR

Comfort Systems USA (Arkansas), Inc.
9924 Landers Rd.
N. Little Rock, AR 72117
501-834-3320

Notes:

CSUSA PROJECT NO.

23-8009

dpierce@comfortar.com

9924 Landers Rd.
No. Little Rock, AR 72117



SUBMITTAL DATA

EQUIPMENT: Custom Packaged Outdoor HVAC Equipment

SPEC SECTION: 23 75 00

TAGS: RTU-12 & 13

PROJECT: Southside High School and Junior High Additions

LOCATION: Batesville, AR

ENGINEER:



CONTRACTOR:



DATE: 7/26/2023

SUBMITTED BY: Forrest Moseley
forrest@airetechcorp.com
501-425-6112

RVE-180-81D-60I-R-G2

Unit Performance

Design Conditions							
Elevation (ft)	Summer		Winter DB (F)	Supply (CFM)	Outdoor Air (CFM)	Recirc Air (CFM)	Exhaust Air (CFM)
	DB (F)	WB (F)					
256	95.0	75.0	10.0	18,000	8,250	9,750	8,250

Unit Specifications						
Qty	Weight (lb)	Cooling Type	Heating Type	Unit Installation	Unit ETL Listing	Furnace ETL Listing
2	10,834 (+/- 5%)	Packaged DX	Indirect Gas	Outdoor	ULcUL 1995	ANSI Z83.8 / CSA 2.6

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

ASHRAE 90.1-2019 Compliance			
	ASHRAE 90.1 Min. Efficiency	Calculated Efficiency	Compliance
EER	9.8	9.4	X
IEER	13	14.9	✓
Enthalpy Recovery Ratio (%)	50	75.2	✓

Energy Recovery Performance									
Design Condition	Temperature (F)								Capacity Reduction (BTU/h)
	Outdoor Air		Supply Air		Return Air		Exhaust Air		
	DB	WB	DB	WB	DB	WB/RH	DB	WB	
Summer	95.0	75.0	79.6	66.0	75.0	62.5/50	90.2	72.1	289,575.0
Winter	10.0	7.7	54.9	48.3	70.0	58.4/50	24.4	24.2	400,059.0

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	676.2	501.3	Inverter Scroll	77.1 / 64.1	51.7 / 51.2	250.3	64.6

Heating Specifications								
Type	Gas Type	Input (MBH)	Output (MBH)	Temperature Rise		Turndown	Performance	
				Min (F)	Max (F)		EAT (F)	LAT (F)
Indirect Gas	Natural	1,000.0	800.0	4.0	41.0	10:1	63.1	104.2

Air Performance							
Type	Total Volume (CFM)	External SP (in. wg)	Total SP (in. wg)	FRPM	Fan		
					Qty	Type	Drive-Type
Supply	18,000	1	4.334	2030	2	Plenum	Direct
Exhaust	8,250	0.75	1.741	2329	2	Plenum	Direct

Motor Specifications						
Motor	Qty	Operating Power (hp)	Size (hp)	Enclosure	Efficiency	RPM
Supply	2	8.92	10	ODP	PE	1750
Exhaust	2	1.96	2	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	158.9	175.0	151.0	0.902

*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	X
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 - BACNetIP	X
BMS Monitoring Points	
Supply Fan Control - Single Zone VAV	X
Exhaust Fan Control - Space Static Pressure by Factory	X
Economizer Control - Temp./Enthalpy	X
Exhaust Fan Only Power	
Web-Based User Interface	Std
Energy Wheel Economizer Control - Stop Wheel	X
Energy Wheel Rotation Sensor	Std
Damper Control - Single Zone VAV	X
Control Accessories	
Remote Display - w/10 ft cord	X
Dirty Filter Sensor(s) - All	X
Airflow Monitor	
Room Thermostat - Space Temp and RH	X
Phase/Brownout Protection	Std
Economizer Fault Detection Diagnostics	

Accessories	
Frost Control - None	
Outdoor Air Damper - Low Leakage	X
Return Air Damper	
Roof Curb	
Supply Air Filters, 6-20x24x4 MERV8, 6-20x20x4 MERV8	X
Service Outlet - Factory mounted and wired	X
Piping Vestibule	
Service Lights	
Condensate Overflow Switch	X
Spare Filters - Both, Qty: 2 set(s)	X
Exhaust Discharge Gravity Backdraft Damper	Std
ElectroFin Coil Coating	
Motor Shaft Grounding	
Return Air Filters - 2" Merv 8, 6-20x24x2, 2-20x20x2	Std
Outdoor Air Filters - 2" Merv 8, 9-20x24x2, 3-20x20x2	Std
Furnace Control - 10:1 Modulating	X
Spare Energy Wheel Belt	
Spare Energy Wheel Segments	
UV Lights	
Bipolar Ionization	
Smoke Detector(s)	
Barometric Relief Damper	
Energy Wheel Bypass Damper	
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

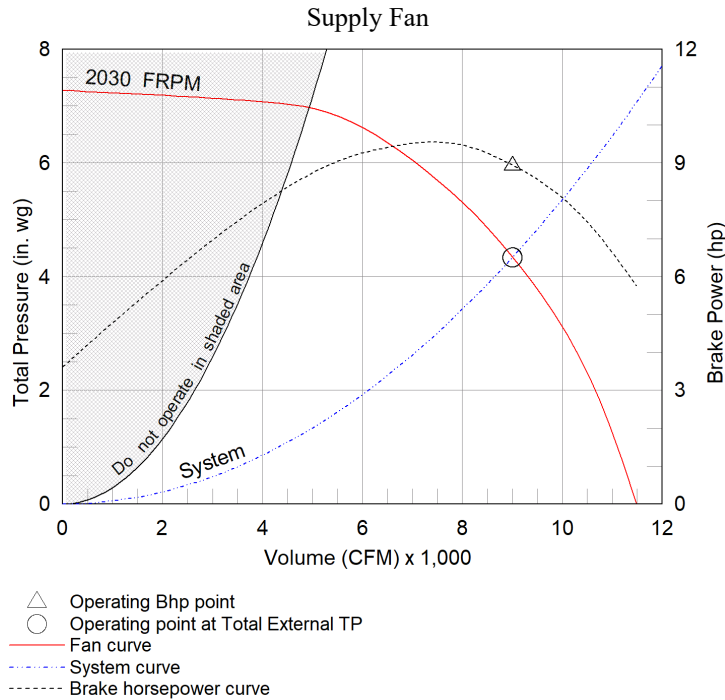
Supply Fan Charts And Performance

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
18,000	1	4.334	2030	8.92	2	10	2	Plenum	Direct

Pressure Drop (in. wg)							
Weatherhood	Filter	Damper	Cooling	Heating	External	Energy Wheel	Total
0.05	0.474	-	1.112	0.415	1	0.45	4.334

Sound Performance in Accordance with AMCA										
Sound Power by Octave Band								Lwa	dBA	Sones
62.5	125	250	500	1000	2000	4000	8000			
87	86	97	97	94	89	87	80	99	87	49

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



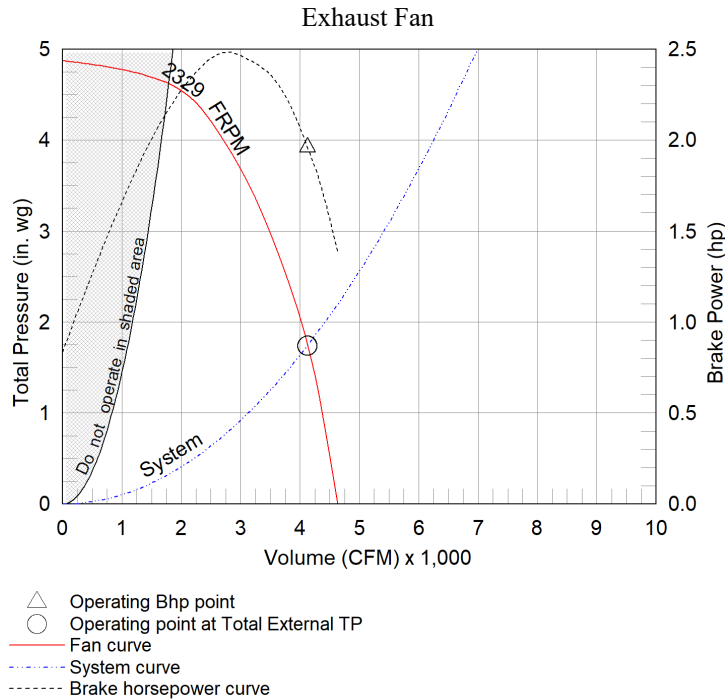
Exhaust Fan Charts And Performance

Exhaust Fan Performance									
Total Volume (CFM)	External SP (in. wg)	Total SP (in. wg)	RPM	Operating Power (hp)	Motor		Fan		
					Qty	Size (hp)	Qty	Type	Drive-Type
8,250	0.75	1.741	2329	1.96	2	2	2	Plenum	Direct

Pressure Drop (in. wg)							
Weatherhood	Filter	Damper	Cooling	Heating	External	Energy Wheel	Total
-	-	-	-	-	0.75	0.84	1.741

Sound Performance in Accordance with AMCA										
Sound Power by Octave Band								Lwa	dBA	Sones
62.5	125	250	500	1000	2000	4000	8000			
71	79	73	69	64	64	60	57	72	61	11

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



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)	
60.0	77.1	64.1	51.7	51.2	676.2	501.3	250.3	64.6	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)	
DX12C06T12-57.5x80-RH	12	6	563	1.112	R-410A	1,596	31.9	44.7	

Compressor Details									
Lead Compressor Type	Compressor Qty	Compressor RLA (A)				Compressor LRA (A)			
		Comp. 1	Comp. 2	Comp. 3	Comp. 4	Comp. 1	Comp. 2	Comp. 3	Comp. 4
Inverter Scroll	4	23.1	23.1	32	23.1	150	150	N/A	150

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
Multiple low sound condensing fans with Lead ECM condensing fan for modulating head pressure control
Inverter scroll compressor
Refrigerant low pressure switch (auto reset)

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	1,000.0	800.0	4.0	41.0	10:1	63.1	104.2

Unit Details
ANSI standard Z83.8 and CSA 2.6
High Thermal efficiency
Direct spark ignition
2" 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)	95.0	Dry Bulb (F)	79.6
Wet Bulb (F)	75.0	Wet Bulb (F)	66.0
Specific Humidity (gr/lb)	100	Specific Humidity (gr/lb)	75
Enthalpy (BTU/lb)	38.6	Enthalpy (BTU/lb)	30.8

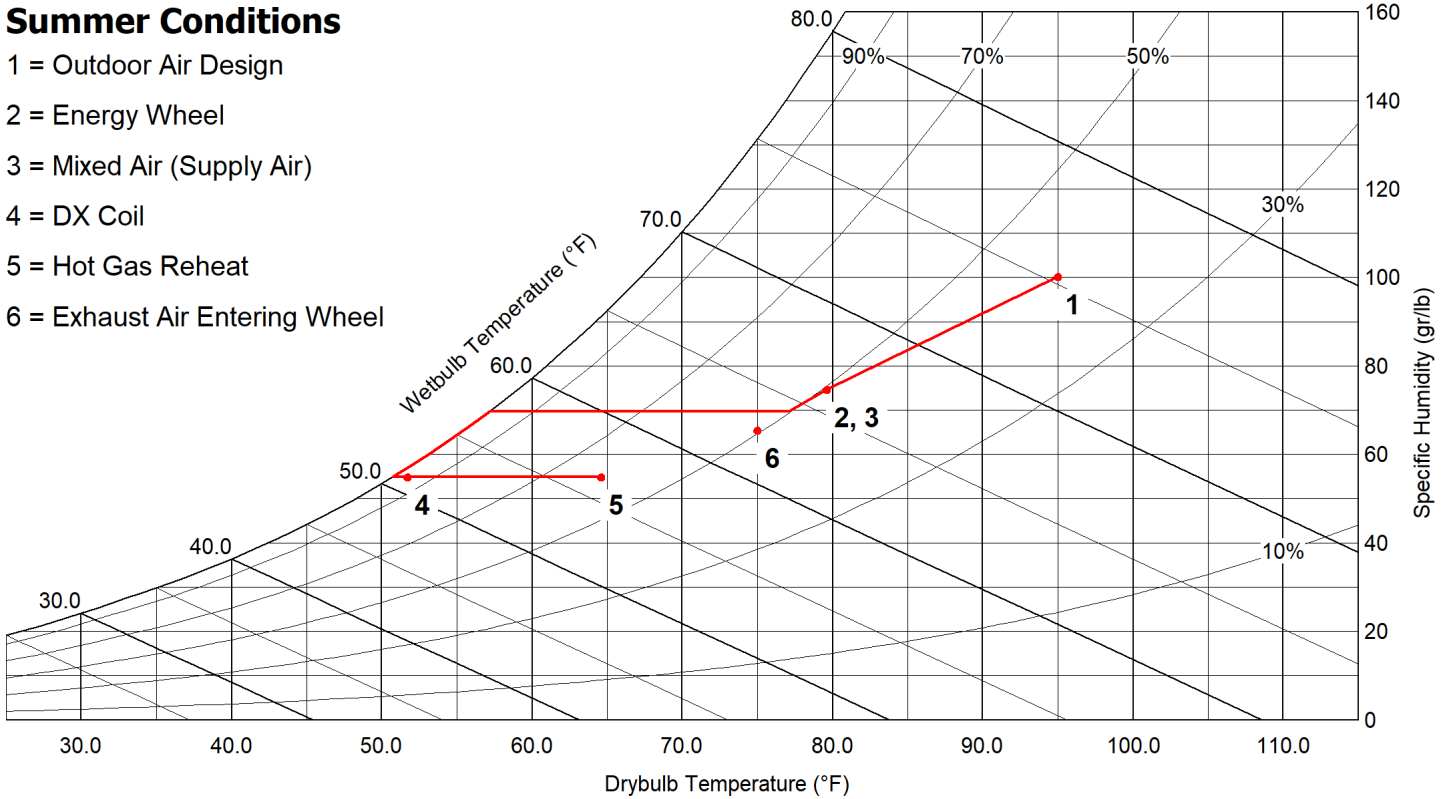
Exhaust Air		Return Air	
Dry Bulb (F)	90.2	Dry Bulb (F)	75.0
Wet Bulb (F)	72.1	Rel. Humidity (%)	50
Specific Humidity (gr/lb)	90	Specific Humidity (gr/lb)	66
Enthalpy (BTU/lb)	35.7	Enthalpy (BTU/lb)	28.2

Mixed Air Conditions			
Dry-bulb (F)	Wet-bulb (F)	Specific Humidity (gr/lb)	Enthalpy (BTU/lb)
77.1	64.1	70	29.4

Design Air Flow Conditions			
OA Volume (CFM)	ASHRAE 90.1 OA Enthalpy Recovery Ratio	EA Volume (CFM)	EA Wheel Effectiveness
8,250	75.2	8,250	73.7

Summer Conditions

- 1 = Outdoor Air Design
- 2 = Energy Wheel
- 3 = Mixed Air (Supply Air)
- 4 = DX Coil
- 5 = Hot Gas Reheat
- 6 = Exhaust Air Entering Wheel



Energy Recovery Winter Performance w/out Preheater

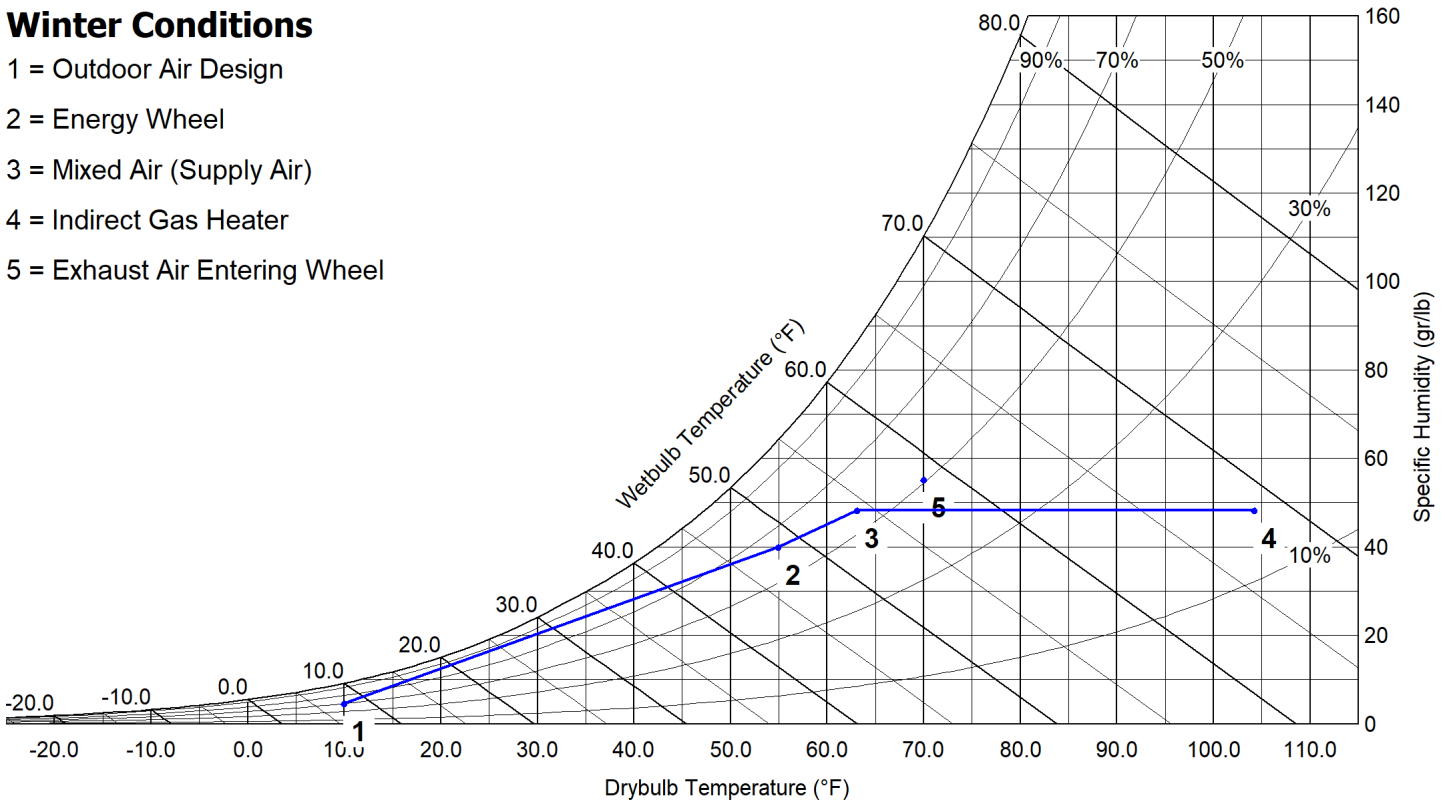
Outdoor Air		Supply Air	
Dry Bulb (F)	10.0	Dry Bulb (F)	54.9
Wet Bulb (F)	7.7	Wet Bulb (F)	48.3
Specific Humidity (gr/lb)	5	Specific Humidity (gr/lb)	40
Enthalpy (BTU/lb)	3.1	Enthalpy (BTU/lb)	19.4
Exhaust Air		Return Air	
Dry Bulb (F)	24.4	Dry Bulb (F)	70.0
Wet Bulb (F)	24.2	Rel. Humidity (%)	58.4
Specific Humidity (gr/lb)	19	Specific Humidity (gr/lb)	55
Enthalpy (BTU/lb)	8.7	Enthalpy (BTU/lb)	25.4

Mixed Air Conditions			
Dry-bulb (F)	Wet-bulb (F)	Specific Humidity (gr/lb)	Enthalpy (BTU/lb)
63.1	54.0	48	22.6

Design Air Flow Conditions			
OA Volume (CFM)	ASHRAE 90.1 OA Enthalpy Recovery Ratio	EA Volume (CFM)	EA Wheel Effectiveness
8,250	73	8,250	74.2

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	
8588	8588	8250	3.9	1.02	0.50	0.50	0

Thermal Effectiveness Ratings							
Enthalpy Recovery		Sensible Effectiveness		Latent Effectiveness		Total Effectiveness	
Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
75.2	73	77.2	77.1	72.4	72.5	73.7	74.2

Note(s)

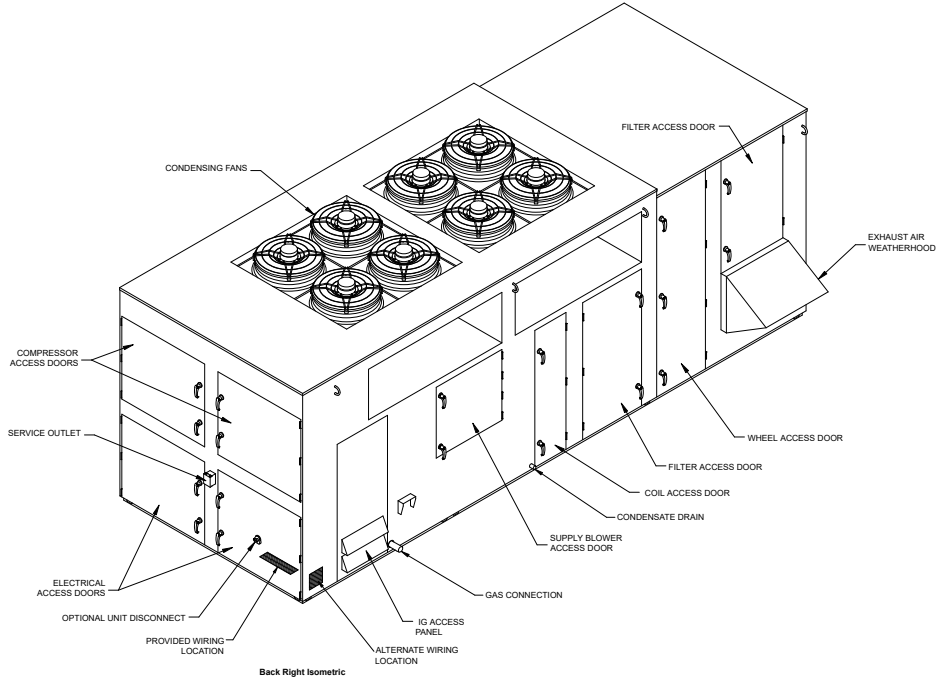
Summer Design Conditions:
 Certified in accordance with the AHRI ERV Certification Program, which is based on AHRI Standard 1060. Certified units may be found in the AHRI Directory at www.ahridirectory.org.



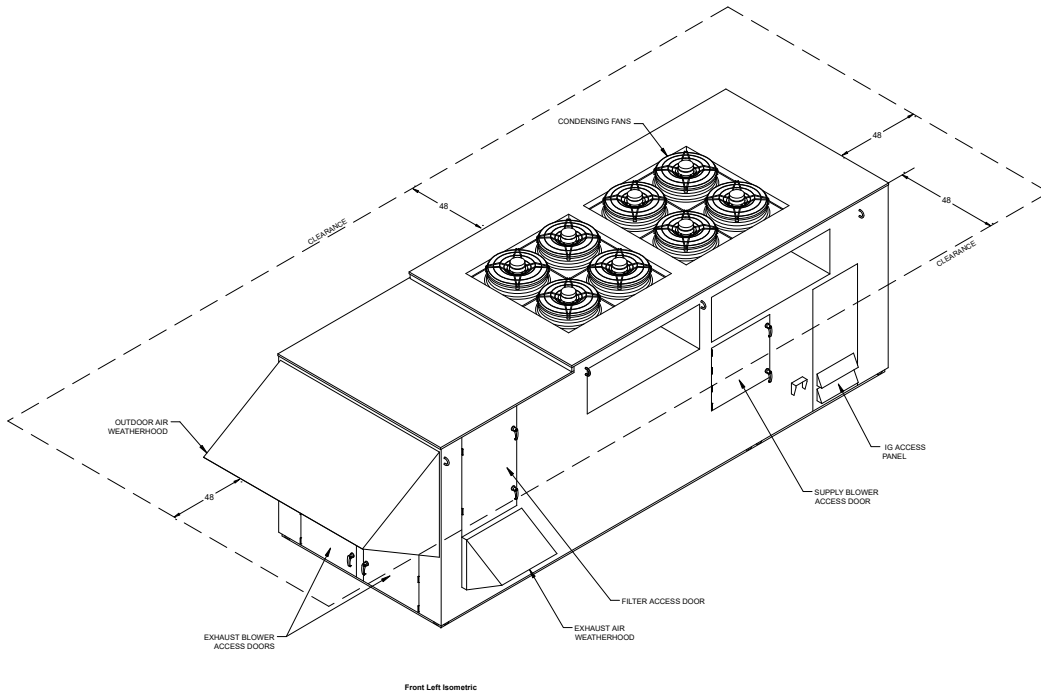
Winter Design Conditions:
 Please consult the factory for AHRI 1060 ERV Certification information.

Isometric Drawings

Component Layout

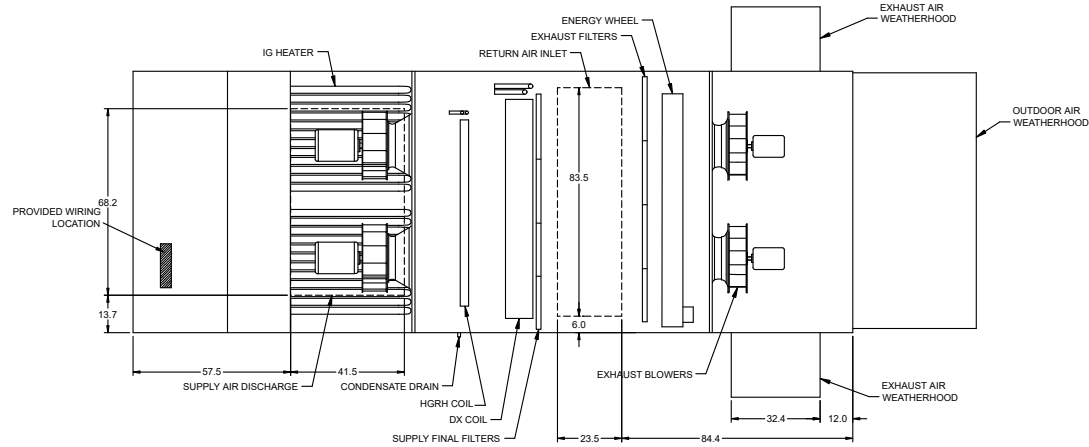


Service Clearances

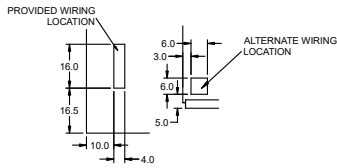


Overview Drawings

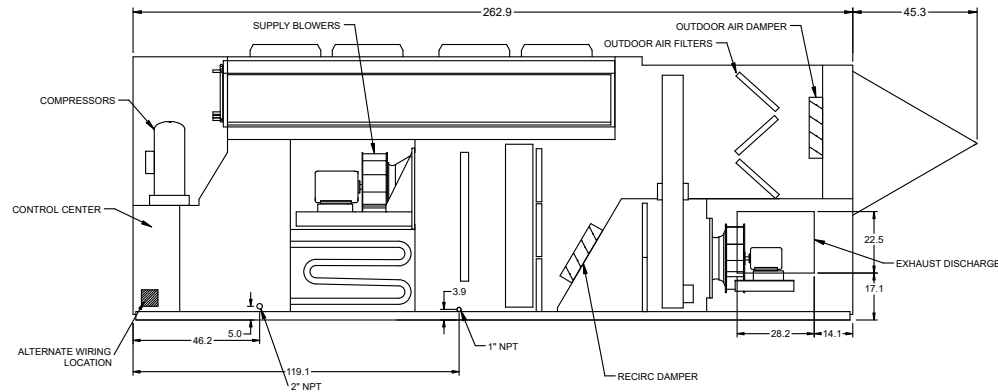
Dimensional Overview



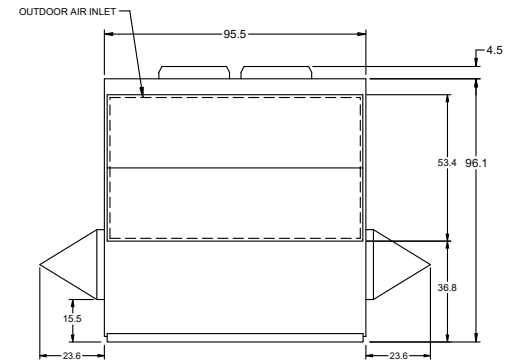
Electrical Connections



Plan



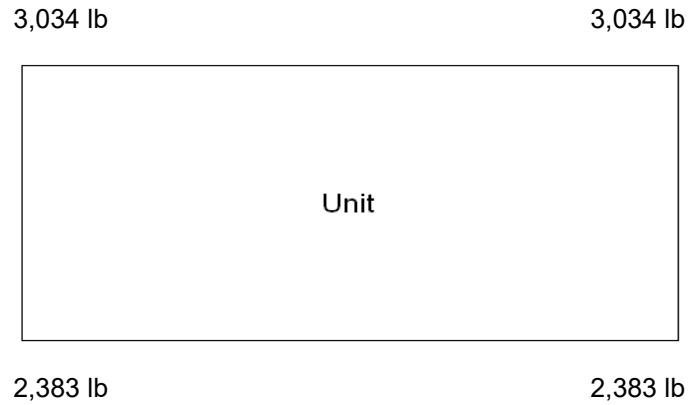
Elevation



Right End

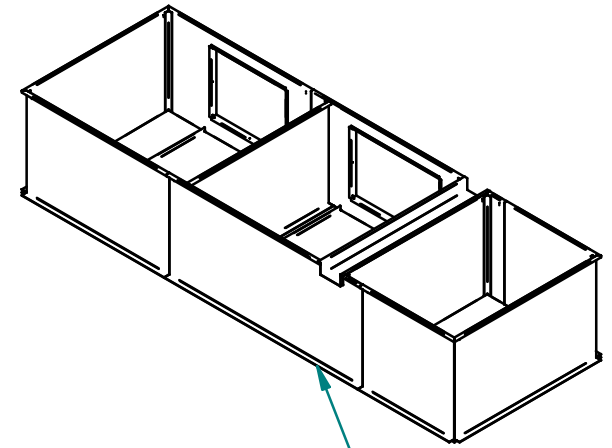
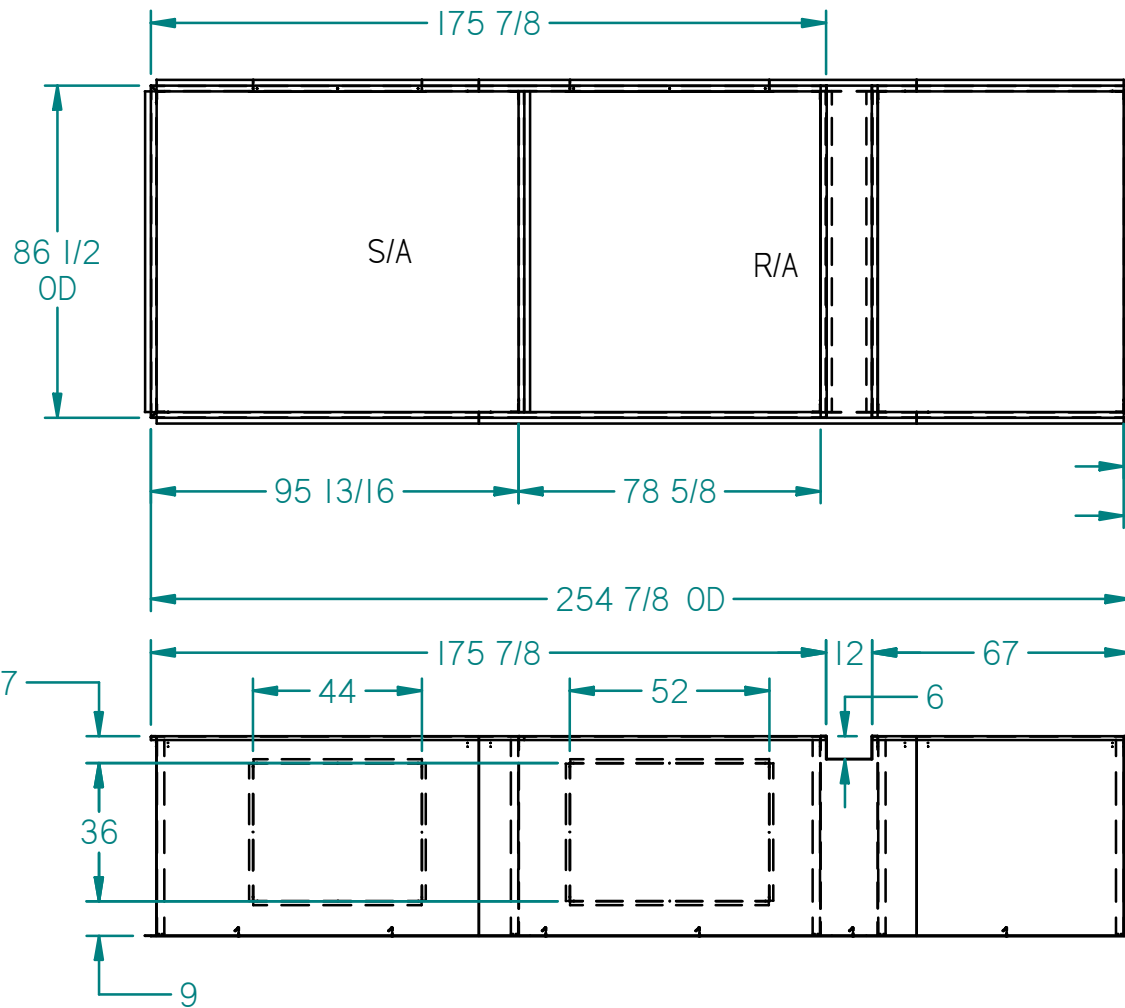
Left End

Unit Corner Weights



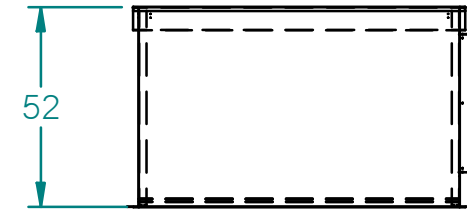
Note

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.



1628.490 lbm

3 TYP. BOTTOM FLANGE
1 1/2 TYP. TOP FLANGE



APPROX. WEIGHT
1800 LBS

NOTES:

1. CURB SHIPPED WELDED, ON PIECE
2. CURB MUST BE INSTALLED SQUARE AND LEVEL
3. MATERIAL IS GALVANIZED 14ga STEEL
4. FACTORY INSTALLED P.T. 1x4 WOOD NAILER
5. SUPPLIED WITH 1-1/2x1/4" CLOSED CELL NEOPRENE GASKET
6. INSULATED WITH 1"x1.5# DENSITY DUCT LINER



QUANTITY: 1
DIMENSIONS: INCHES

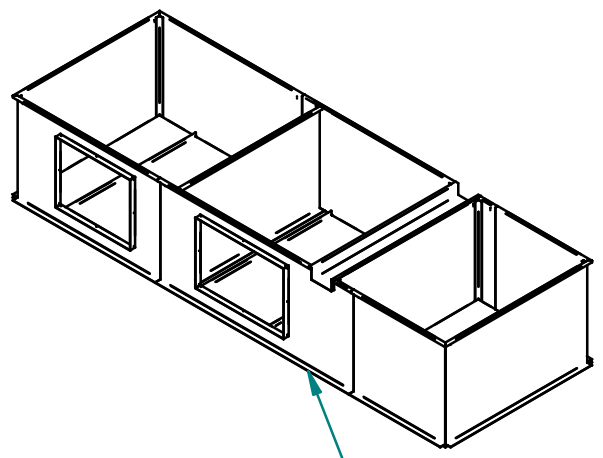
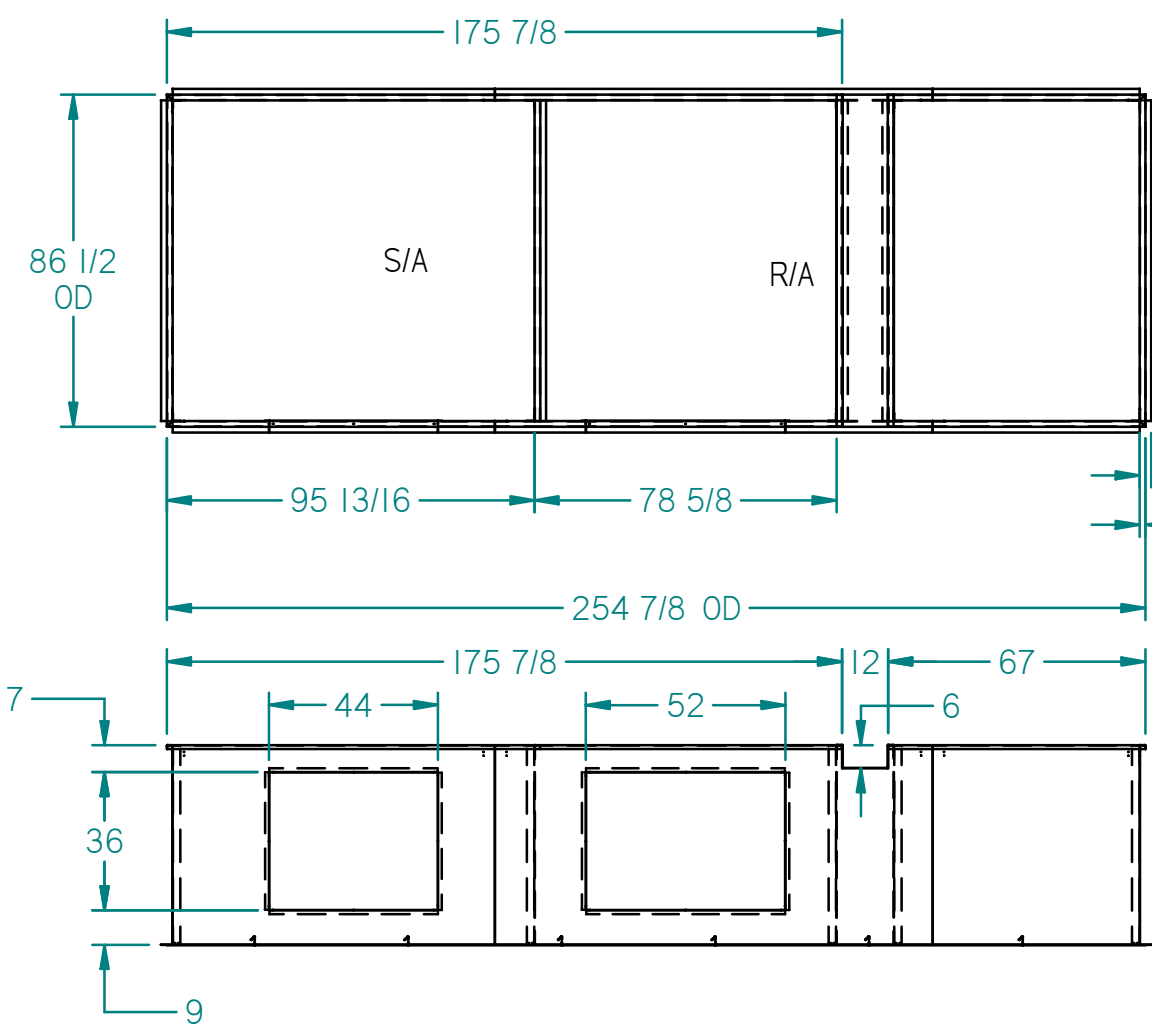
DRAWN BY JAS

CURB TECHNOLOGIES™

PROJECT: Southside HS & JHS (230523-TGI4)
UNIT TAG: RTU-12

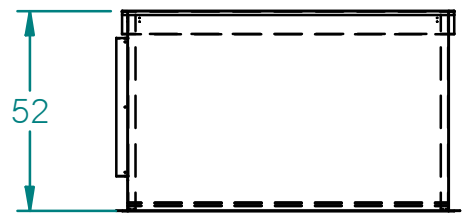
MODEL: VALENT VPRC-352

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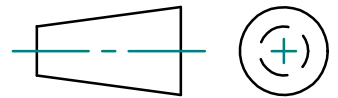
3 TYP. BOTTOM FLANGE
 1 1/2 TYP. TOP FLANGE

1628.490 lbm



APPROX. WEIGHT
 1800 LBS

- NOTES:
1. CURB SHIPPED WELDED, ON PIECE
 2. CURB MUST BE INSTALLED SQUARE AND LEVEL
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CURB TECHNOLOGIES™

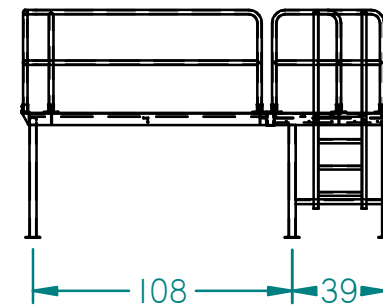
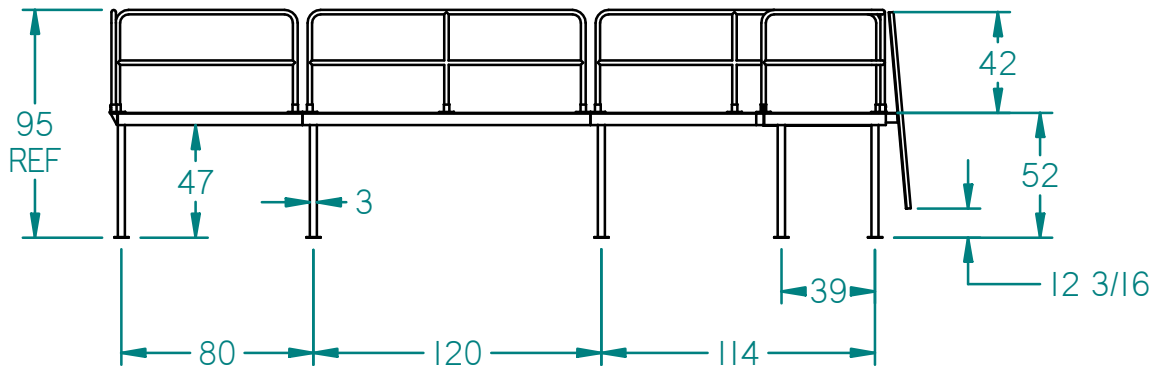
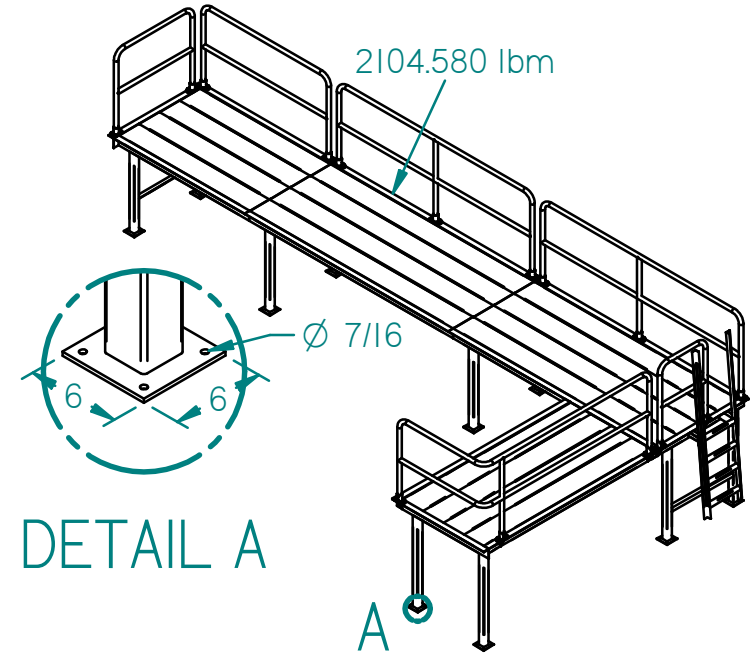
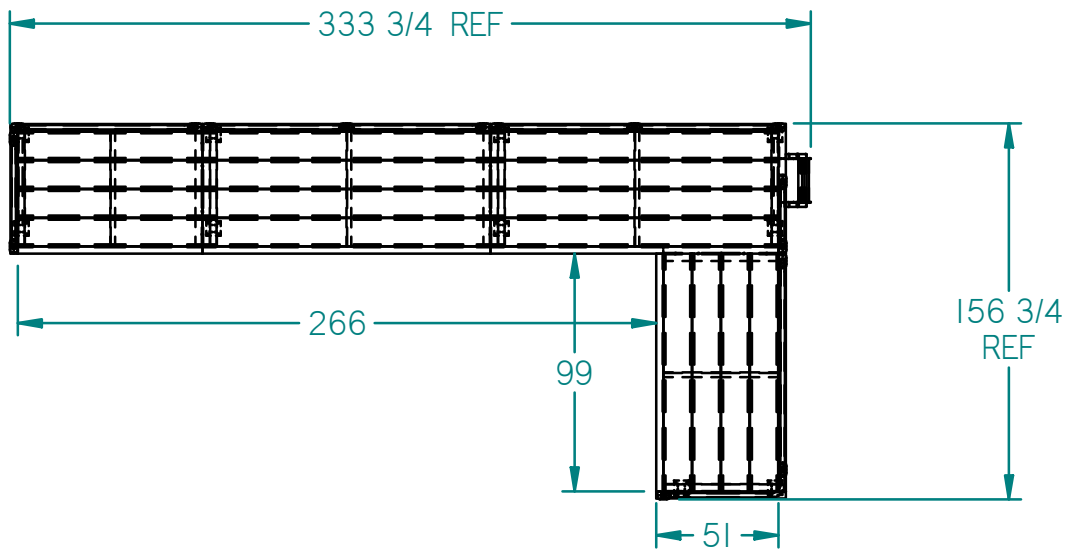
QUANTITY: 1
 DIMENSIONS: INCHES

PROJECT: Southside HS & JHS (230523-TGI4)
 UNIT TAG: RTU-13

DRAWN BY JAS

MODEL: VALENT VPRC-352

Rev. 00 | 7/28/23



APPROX. WEIGHT: 2200 LBS

NOTES:

1. PLATFORM SHIPPED IN WELDED SECTOINS FOR FIELD ASSEMBLY
2. PLATFORM CAN BE BOLTED OR WELDED TO ROOF STRUCTURE
3. MATERIAL IS STEEL, PRIMER COAT ONLY. FIELD APPLIED TOP COAT PAINT IS RECOMMENDED
4. WALKING SURFACE IS GALVANIZED GRIP STRUT
5. HAND RAILS ARE GALVANIZED 1-1/2"xSCH.40 PIPE
6. HANDRAILS & LADDER ARE REMOVABLE

	CURB TECHNOLOGIES™			
QUANTITY: 2 DIMENSIONS: INCHES	PROJECT: Southside HS & JHS (230525-TG19) UNIT TAG: RTU-12,13			
DRAWN BY JAS	MODEL: LTCW-1	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">Rev. 00</td> <td style="width: 50%;">7/28/23</td> </tr> </table>	Rev. 00	7/28/23
Rev. 00	7/28/23			

Greenheck 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	X
Supply_Temp_Analog_Input	Supply Temperature	AI-2	30004	R		°F	X
Outside_Air_Temp_Analog_Input	Outside Air Temperature	AI-3	30006	R		°F	X
Mixed_Temp_Analog_Input	Mixed Temperature	AI-4	30008	R		°F	X
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	X
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	X
Return_CO2_Analog_Input	Return CO2 ppm	AI-17	30034	R		ppm	
Circuit_A_Discharge_Temp_Analog_Input	Circuit A Discharge Temperature	AI-20	30040	R		°F	X
Circuit_A_Suction_Temp_Analog_Input	Circuit A Suction Temperature	AI-21	30042	R		°F	X
Circuit_B_Discharge_Temp_Analog_Input	Circuit B Discharge Temperature	AI-22	30044	R		°F	X
Circuit_B_Suction_Temp_Analog_Input	Circuit B Suction Temperature	AI-23	30046	R		°F	X
Circuit_A_Discharge_Pressure_Analog_Input	Circuit A Discharge Pressure	AI-28	30056	R		psig	X
Circuit_A_Suction_Pressure_Analog_Input	Circuit A Suction Pressure	AI-29	30058	R		psig	X
Circuit_B_Discharge_Pressure_Analog_Input	Circuit B Discharge Pressure	AI-30	30060	R		psig	X
Circuit_B_Suction_Pressure_Analog_Input	Circuit B Suction Pressure	AI-31	30062	R		psig	X
Aux_In_Customer_1	Customer defined auxiliary input	AI-36	30072	R		selectable	
Aux_In_Customer_2	Customer defined auxiliary input	AI-37	30074	R		selectable	
Aux_In_Customer_3	Customer defined auxiliary input	AI-38	30076	R		selectable	
Aux_In_Customer_4	Customer defined auxiliary input	AI-39	30078	R		selectable	
Aux_In_Customer_5	Customer defined auxiliary input	AI-40	30080	R		selectable	
Aux_In_Customer_6	Customer defined auxiliary input	AI-41	30082	R		selectable	
Aux_In_Customer_7	Customer defined auxiliary input	AI-42	30084	R		selectable	
Aux_In_Customer_8	Customer defined auxiliary input	AI-43	30086	R		selectable	
Aux_In_Customer_9	Customer defined auxiliary input	AI-44	30088	R		selectable	
Aux_In_Customer_10	Customer defined auxiliary input	AI-45	30090	R		selectable	
Temperature_Setpoint	Main Temperature Set point Supply, Space, or Return target temperature	AV-1	40002	RW		°F	X
Temperature_Heat_Cool_Deadband	Heat/Cool Spt Deadband when Room or Return control is active Clg Spt = Deadband /2 + Temp Spt Htg Spt = Deadband /2 - Temp Spt	AV-2	40004	RW		Delta in °F	X
Temperature_Setpoint_Unoccupied	Main Temperature Set point Supply, Space, or Return target temperature	AV-3	40006	RW		°F	X
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	X
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		%	X
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	X
Unocc_Indoor_Dewpoint_Setpoint	Unoccupied Indoor Dewpoint Dehumidification Trigger	AV-10	40020	RW		°F	X
Unoccupied_Dehumidification_Setpoint	Unoccupied Dehumidification %RH Setpoint	AV-11	40022	RW		°F	X
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	X
Supply_Duct_Static_Pressure_Setpoint	Supply Duct Static Pressure Setpoint	AV-23	40046	RW		"wc	
Space_CO2_Setpoint	Space CO2 Setpoint	AV-24	40048	RW		ppm	X
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

Greenheck 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 auxiliary 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		%	X
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	X
Space_Enthalpy	Space Enthalpy	AV-59	30130	R		btu/lb	X
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		%	
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 Suction Temperature	AV-86	30184	R		°F	X
Circuit_B_Sat_Suction_Temperature	Circuit B Saturated Suction 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	X
Unoccupied_Heating_Setpoint	Active Heating Setpoint - Unoccupied	AV-92	30196	R		°F	X
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	X
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	X
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_Inpu	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

Greenheck Network Interface v8 Modbus/BACnet Points List

Variable	Description	BACnet Object	ModBus Object	Read or Write	Text or Unit of M		Included
					Active	Inactive	
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
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	Emergency Exhaust Mode Command	BV-5	6	RW	Enable	Disable	
Pressurization_Only_Mode_BMS_Cmd	Emergency 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	X
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 auxiliary digital output	BV-20	21	RW	Active	Inactive	
Aux_BMS_Digital_Output_2	BMS Commanded auxiliary 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 Filter
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	

Unit Status Word Table (IV-11)	
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	Dehumidifying 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	Pressurization 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 (Cycle on Room Temp): The unit will cycle to maintain unoccupied room set points if there is a call for unoccupied heating, cooling or dehumidification.

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

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.

Single Zone VAV: The controller will use a space mounted temperature sensor modulate the supply blower speed to maintain the room-air temperature set point.

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 by the following sequence.

CO2 Sensor: The damper position is modulated based upon the signal from a CO2 Sensor. The controller will modulate the OA/RA dampers based upon a comparison of the CO2 set point (adj.) to the actual CO2 levels reported from the sensor. As the CO2 level rises, the outdoor air damper will be proportionally modulated from the minimum damper setting (adj.) to the maximum damper setting (adj.).

EXHAUST BLOWER SEQUENCE: The exhaust blower is provided with a factory mounted variable frequency drive. The exhaust blower speed will be controlled with the following sequence.

Space Pressure by Factory: The exhaust blower is modulated based upon the signal from a space pressure sensor. The controller will modulate the exhaust fan based upon a comparison of the space static pressure set point (adj.) and the space static pressure level reported from the sensor. **This sequence is not recommended for critical space pressure applications.**

Building Static Pressure Sensor: The exhaust blower is modulated based upon the signal from a building static pressure sensor (factory provided, field mounted and wired). The microprocessor controller will modulate the exhaust fan based upon a comparison of the building static pressure set point (adjustable) to the actual building static pressure level reported from the sensor.

Space Pressure by Factory: The exhaust blower is modulated based upon the signal from a building pressure sensor. The controller will modulate the exhaust fan based upon a comparison of the building static pressure set point (adj.) and the building static pressure level reported from the sensor.

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

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

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

Space Set Point Control (Room RH): When in dehumidification mode the controller will adjust the cold coil leaving air temperature set point between the minimum (adj.) and the maximum (adj.) limits, to satisfy the desired room relative humidity set point. Adjustable locally or by BMS.

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

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

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

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

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

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

Space Setpoint Control: The supply setpoint will adjust between minimum (adj.) and maximum (adj.) limits, to satisfy the desired space temperature setpoint. 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.)

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.

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.

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.

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.

DDC Remote Interface: Factory provided, field mounted interface panel that will be wired to the main controller for monitoring and remote adjustments of set points.

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

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

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

Greenheck 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 Greenheck.

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

Greenheck 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

Greenheck 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 Greenheck's sole option when returned to our factory, transportation prepaid. All warranties do not include labor costs associated with troubleshooting, removal, or installation. Greenheck will not be liable for any consequential, punitive, or incidental damages resulting from use, repair, or operation of any Greenheck 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, Greenheck reserves the right to change specifications without notice.