



Quality People. Building Solutions.

Comfort Systems USA (Arkansas), Inc.
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Little Rock, AR 72231
Phone 501-834-3320
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Date: 5/2/2024

Return Request: 5/12/2024

Project: Little Rock West High School

Supplier: Airetech

Manufacturer: Greenheck

Submittal: Dedicated Outdoor Air Units

Submittal Number: 23 74 33-01

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

Baldwin & Shell
1000 W. Capitol Ave.
Little Rock, AR 72201
501-374-8677

MECHANICAL SUBCONTRACTOR

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

Notes:

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chowell@comfortar.com

9924 Landers Rd.
No. Little Rock, AR 72117



SUBMITTAL DATA

EQUIPMENT: Greenheck Packaged Outside Air Units

SPEC SECTION:

TAGS: RTUF-1,2

PROJECT: Little Rock West High School

LOCATION: Little Rock, AR

ENGINEER: **LEWIS
ARCHITECTS
ENGINEERS** 

CONTRACTOR: **COMFORT
SYSTEMS USA**
A R K A N S A S

DATE: 4/15/2024

SUBMITTED BY: Nick Moore
nick.moore@airetechcorp.com

RVE-40-41D-12.5I-G-G1

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	98.0	80.2	17.2	3,000	3,000	-	3,000

Unit Specifications						
Qty	Weight (lb)	Cooling Type	Heating Type	Unit Installation	Unit ETL Listing	Furnace ETL Listing
1	3,242 (+/- 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	10.8	✓
IEER	12.2	18.2	✓
Enthalpy Recovery Ratio (%)	50	66.5	✓

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	98.0	80.2	82.2	69.3	75.0	62.5/50	90.6	75.0	140,400.0
Winter	17.2	14.1	52.7	43.3	72.0	55.8/35	34.9	31.0	115,020.0

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	144.9	92.5	Inverter Scroll	82.2 / 69.2	54.2 / 54.1	93.2	83.0

Heating Specifications								
Type	Gas Type	Input (MBH)	Output (MBH)	Temperature Rise		Turndown	Performance	
				Min (F)	Max (F)		EAT (F)	LAT (F)
Indirect Gas	Natural	200.0	162.0	3.0	50.0	16:1	52.7	102.7

Motor Specifications						
Motor	Qty	Operating Power (hp)	Size (hp)	Enclosure	Efficiency	RPM
Supply	1	2.18	3	ODP	PE	1165
Exhaust	1	1.81	2	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	32.0	45.0	28.0	0.992

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

Construction Features And Accessories

Unit		Accessories	
Unit Installation - Outdoor	Std	Frost Control None - None	
Unit Construction - Double Wall	Std	Outdoor Air Damper - Low Leakage	X
Insulation - 2 inch 2.4# R13 foam	Std	Return Air Damper - Low Leakage	X
Corrosion Resistant Fasteners	Std	Roof Curb - GKD - 45.9/142.9-G14	X
Hinged Access	Std	Supply Air Filters - 2" Merv 8, 4-20x20x2	Std
Factory Wired Non-Fused Disconnect Switch		Service Outlet - Factory mounted and wired	X
Direct Drive Plenum Blower & Motor Assemblies	Std	Piping Vestibule	
Factory Wired VFDs	Std	Service Lights	
Unit Finish - Permatector, Concrete Gray (RAL 7023)	X	Condensate Overflow Switch	X
Stainless Steel Condensate Drain Pan and Connection	Std	Spare Filters	
Condensate Drain Trap	Std	Exhaust Discharge Gravity Backdraft Damper	
Short Circuit Current - 5 kA	Std	ElectroFin Coil Coating	
Energy Recovery Device - Polymer Wheel w/ Silica Gel Desiccant	Std	Motor Shaft Grounding	
Controls		Bipolar Ionization	
Unit Controls - Full Control	Std	Smoke Detector(s)	X
Internally Mounted Control Center with 24 VAC control transformer(s)	Std	Barometric Relief Damper	
BMS Protocol - BACNetIP	X	UV Lights	
BMS Monitoring Points - RAI, ACC, EAW	X	Return Air Filters - 2" Merv 8, 3-16x25x2	Std
Supply Fan Control - By BMS	X	Outdoor Air Filters - 2" Merv 8, 3-16x25x2	Std
Exhaust Fan Control - By BMS	X	Furnace Control - 16:1 Modulating	X
Economizer Control - Temp./Enthalpy	X	Spare Energy Wheel Belt	
Exhaust Fan Only Power		Spare Energy Wheel Segments	
Web-Based User Interface	Std	Energy Wheel Bypass Damper	
Energy Wheel Economizer Control - Stop Wheel	X	Power Venting	Std
Energy Wheel Rotation Sensor	Std	Hail Guards	X
Damper Control - By BMS	X	Warranty Options	
Unoccupied Recirc Mode		Unit Warranty - 2.5 Yrs. (1 Yr. Extended)	X
Control Accessories		Energy Wheel Warranty - 5 Yrs Less Motor	Std
Remote Display		Compressor Warranty - 5.5 Yrs. (4 Yrs. Extended)	X
Dirty Filter Sensor(s) - All	X	Furnace HX Warranty - 25 Yrs.	Std
Airflow Monitor - Outdoor Air, Exhaust Air, Supply Air	X	Standard Option Std Not Included Included X	
Room Thermostat - Space Temp and RH	X		
Phase/Brownout Protection	Std		
Economizer Fault Detection Diagnostics			

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	

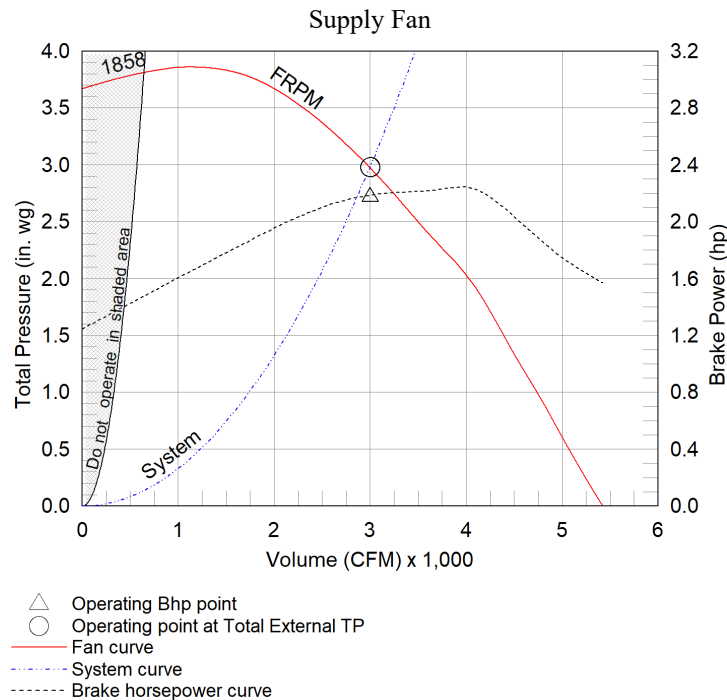
Supply Fan Charts And Performance

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
3,000	1	2.978	1858	N/A	1	3	1	Plenum	Direct

Pressure Drop (in. wg)							
Weatherhood	Filter	Damper	Cooling	Heating	External	Energy Wheel	Total
0.07	0.117	0.03	0.259	0.199	1	1.27	2.978

Sound Performance in Accordance with AMCA									
Sound Power by Octave Band								Lwa	dBA
62.5	125	250	500	1000	2000	4000	8000		
76	80	89	77	72	67	76	64	83	72
									20

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



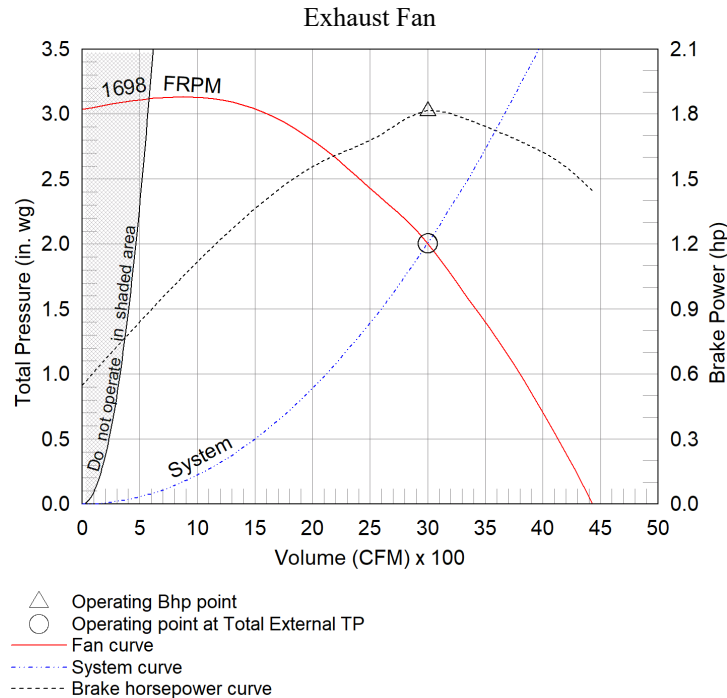
Exhaust Fan Charts And Performance

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	3,000	0.75	2.007	1698	1.81	1	2	1	Plenum	Direct

Pressure Drop (in. wg)								
Mode	Weatherhood	Filter	Damper	Cooling	Heating	External	Energy Wheel	Total
Normal	0.09	-	0.119	-	-	0.75	1.05	2.007

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	82	79	77	71	64	63	65	57	74	62	12

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

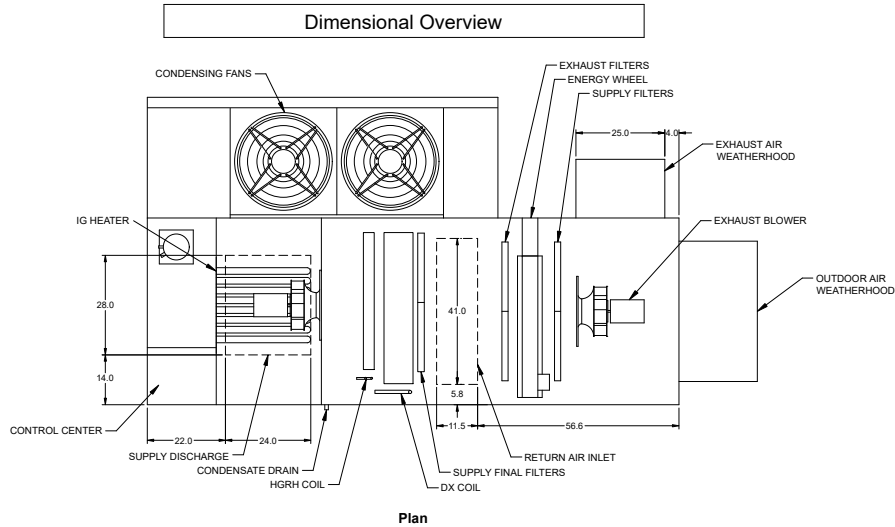


Radiated Sound

Position A

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	86	91	87	91	92	88	83	82	98	95
B	81	84	83	91	86	83	79	77	94	92
C	80	80	74	82	80	75	66	64	87	84
D	78	80	75	78	76	71	67	66	85	80
E	84	88	83	90	86	84	79	78	95	92
Total	90	94	90	96	94	90	86	84	101	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							
Type	Total Capacity (MBH)	Sensible Capacity (MBH)	Lead Compressor Type	Coil (DB/WB)		Reheat	
				EAT (F)	LAT (F)	Capacity (MBH)	LAT (F)
Packaged DX	144.9	92.5	Inverter Scroll	82.2 / 69.2	54.2 / 54.1	93.2	83.0

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)
DR516L06S14-45X42.5-LH	14	6	226	0.259	R-410A	1,033	13.3	51.0

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	15.7	-	NA	-

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	
Multiple low sound condensing fans with Lead ECM condensing fan for modulating head pressure control	
Inverter scroll compressor	
Electronic expansion valve	
Unit cannot be mounted in an enclosed space.	

Important Notes:
This unit will not be available to order with R-410A refrigerant after the August 2024 CAPS release. Replacement R-454B units can currently be selected, but availability is limited based on housing size and/or tonnage. Factory communication will be provided once additional R-454B units are available for selection.

Heating Performance

Heating Specifications								
Type	Gas Type	Input (MBH)	Output (MBH)	Temperature Rise		Turndown	Performance	
				Min (F)	Max (F)		EAT (F)	LAT (F)
Indirect Gas	Natural	200.0	162.0	3.0	50.0	16:1	52.7	102.7

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)	98.0	Dry Bulb (F)	82.2
Wet Bulb (F)	80.2	Wet Bulb (F)	69.3
Specific Humidity (gr/lb)	129	Specific Humidity (gr/lb)	88
Enthalpy (BTU/lb)	43.9	Enthalpy (BTU/lb)	33.5
Exhaust Air		Return Air	
Dry Bulb (F)	90.6	Dry Bulb (F)	75.0
Wet Bulb (F)	75.0	Rel. Humidity (%)	50
Specific Humidity (gr/lb)	106	Specific Humidity (gr/lb)	66
Enthalpy (BTU/lb)	38.4	Enthalpy (BTU/lb)	28.2

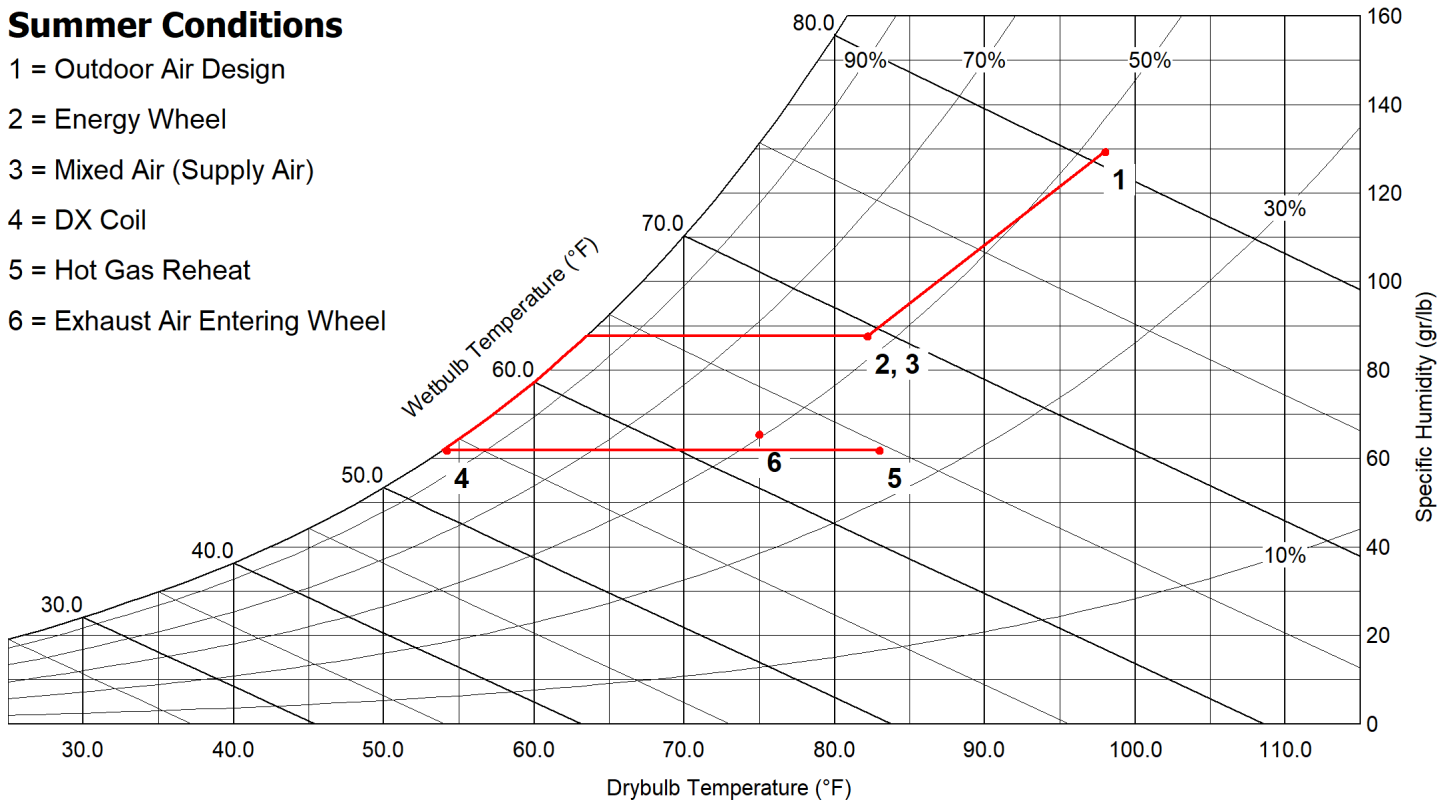
Mixed Air Conditions			
Dry-bulb (F)	Wet-bulb (F)	Specific Humidity (gr/lb)	Enthalpy (BTU/lb)
82.2	69.2	88	33.5

Design Air Flow Conditions			
OA Volume (CFM)	ASHRAE 90.1 OA Enthalpy Recovery Ratio	EA Volume (CFM)	EA Wheel Effectiveness
3,000	66.5	3,000	65.2

Outdoor Air Cooling Reduction				
OA Load w/o Energy Recovery		OA Load with Energy Recovery		Equipment Reduction (tons)
(BTU/h)	(tons)	(BTU/h)	(tons)	
211,950.0	17.66	71,550.0	5.96	11.70

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)	17.2	Dry Bulb (F)	52.7
Wet Bulb (F)	14.1	Wet Bulb (F)	43.3
Specific Humidity (gr/lb)	7	Specific Humidity (gr/lb)	27
Enthalpy (BTU/lb)	5.1	Enthalpy (BTU/lb)	16.8
Exhaust Air		Return Air	
Dry Bulb (F)	34.9	Dry Bulb (F)	72.0
Wet Bulb (F)	31.0	Rel. Humidity (%)	35
Specific Humidity (gr/lb)	20	Specific Humidity (gr/lb)	41
Enthalpy (BTU/lb)	11.4	Enthalpy (BTU/lb)	23.7

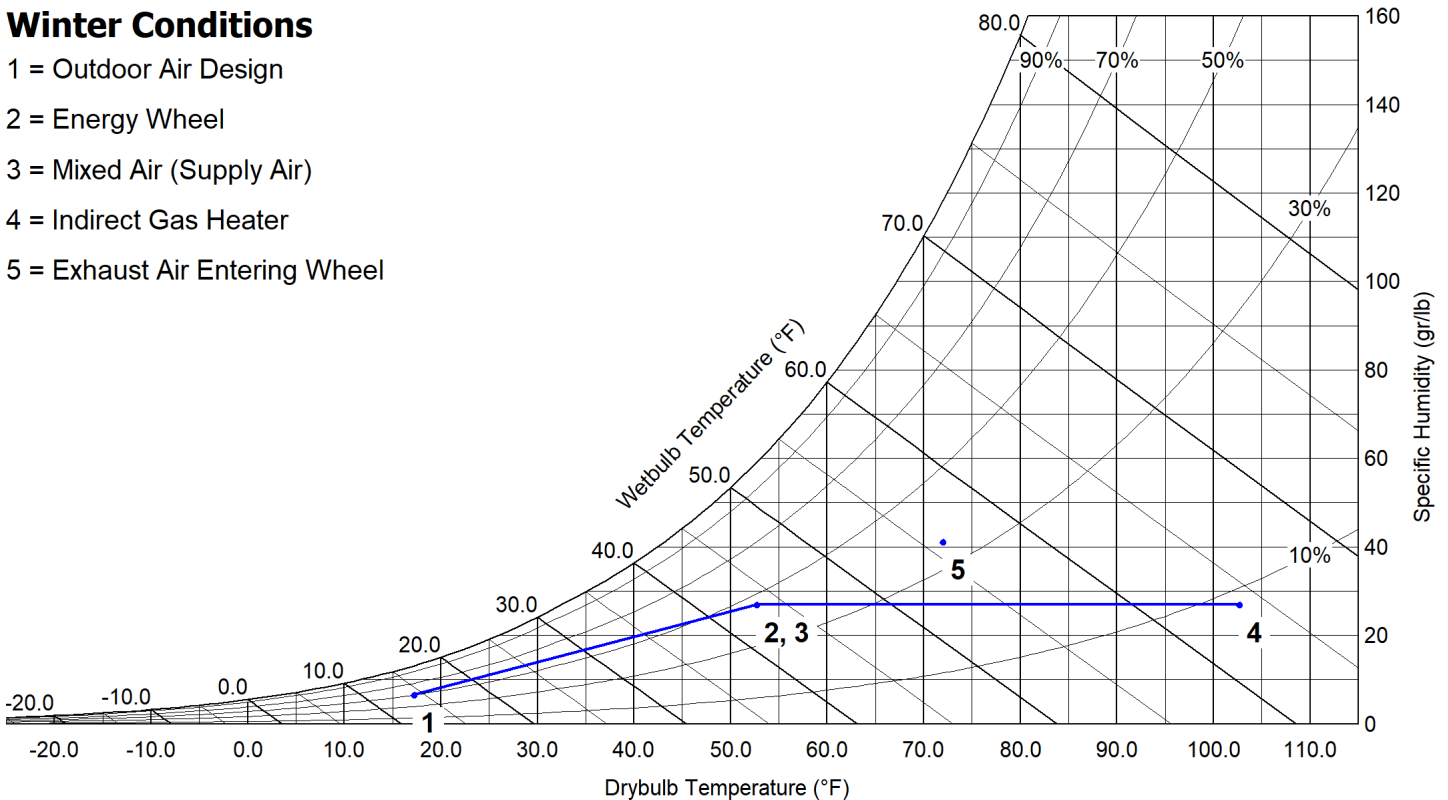
Mixed Air Conditions			
Dry-bulb (F)	Wet-bulb (F)	Specific Humidity (gr/lb)	Enthalpy (BTU/lb)
82.2	69.2	88	33.5

Design Air Flow Conditions			
OA Volume (CFM)	ASHRAE 90.1 OA Enthalpy Recovery Ratio	EA Volume (CFM)	EA Wheel Effectiveness
3,000	63	3,000	65.3

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 (%)
177,552.0	62,532.0	115,020.0	67.2

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

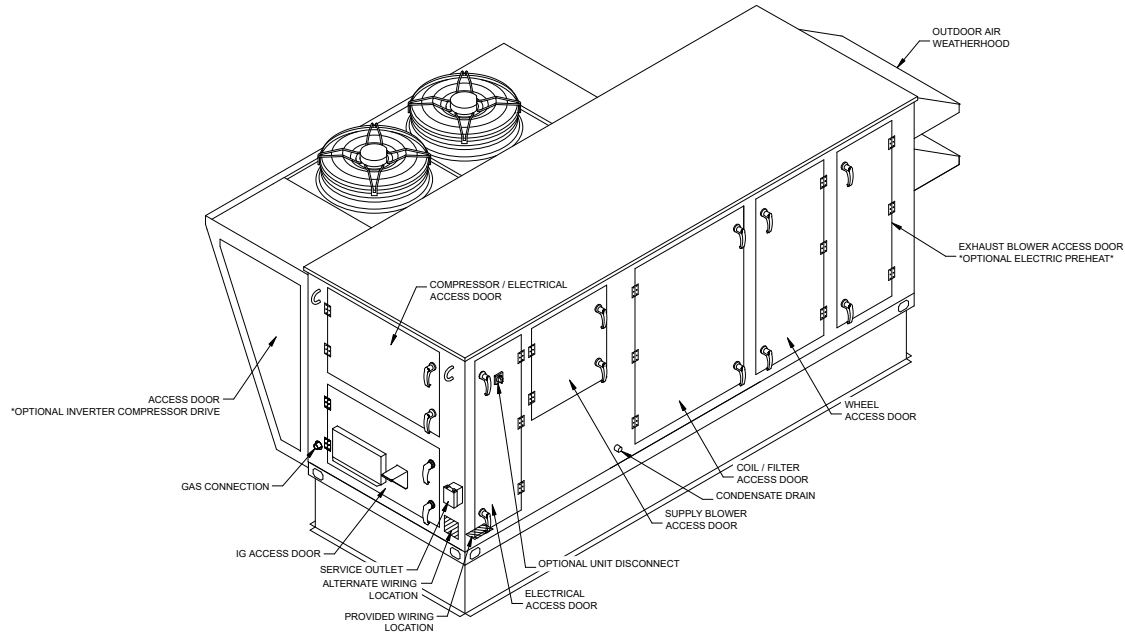
Energy Recovery Performance Rating in accordance with AHRI Standard 1060 (I-P)							
Rated Airflow (SCFM)		Net Supply Airflow (SCFM)	EATR (%)	OACF	Pressure Drop (in. wg)		Purge Angle (degrees)
Leaving Supply	Entering Exhaust				Supply	Exhaust	
3,015	3091	3091	2.9	1.03	0.80	0.79	0

Thermal Effectiveness Ratings							
Enthalpy Recovery		Sensible Effectiveness		Latent Effectiveness		Total Effectiveness	
Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
66.5	63	67.7	67.2	63.5	61.3	65.2	65.3

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

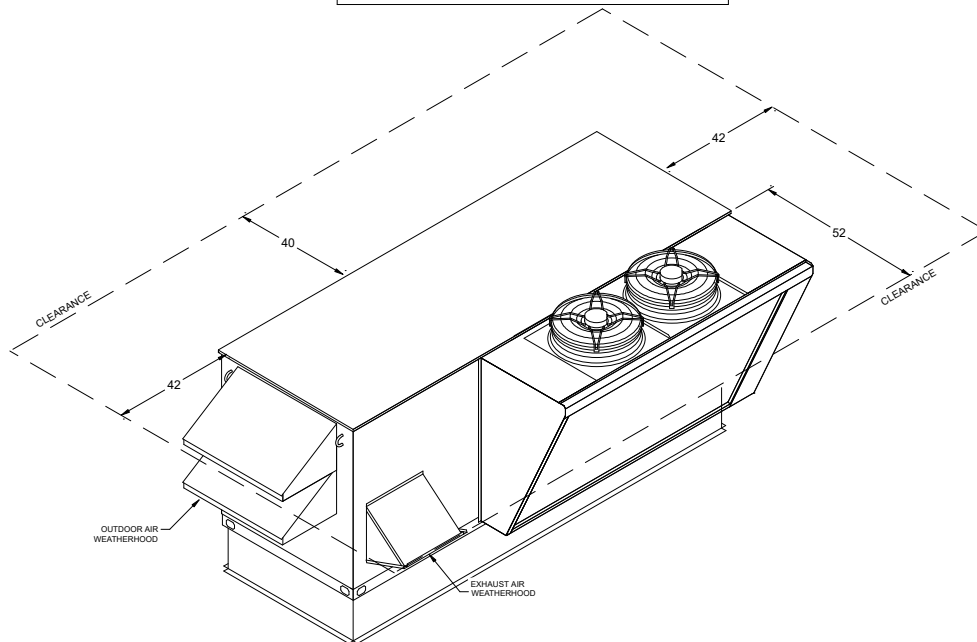
Isometric Drawings

Component Layout



Back Right Isometric

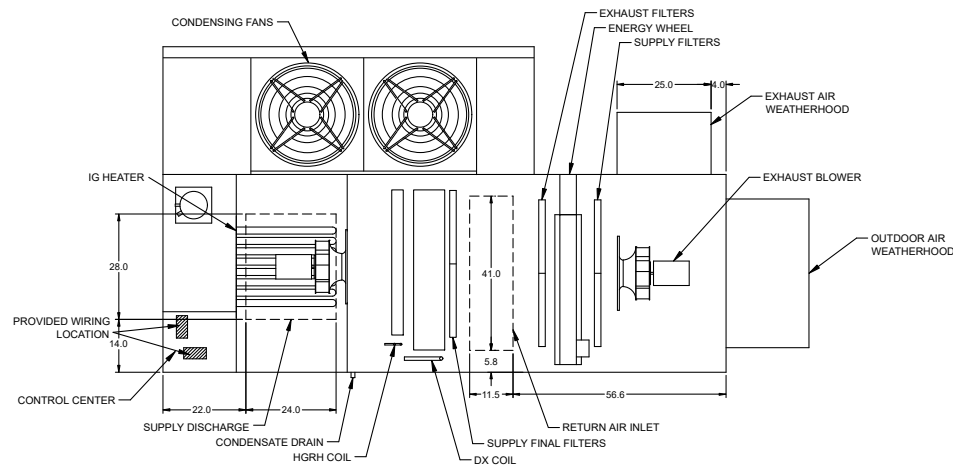
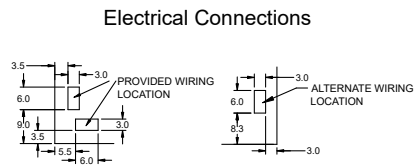
Service Clearances



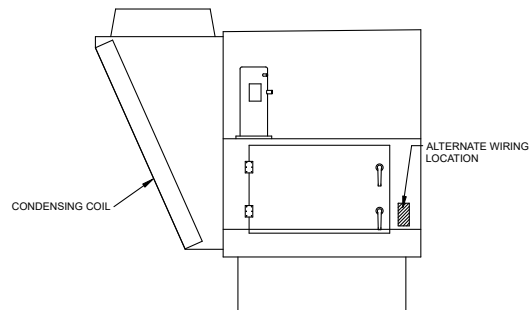
Front Left Isometric

Overview Drawings

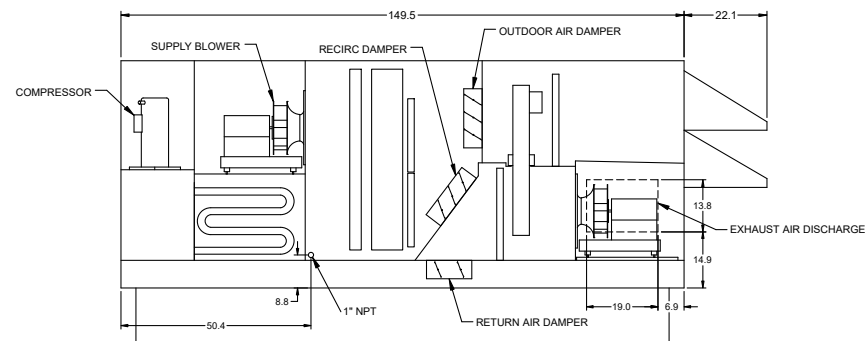
Dimensional Overview



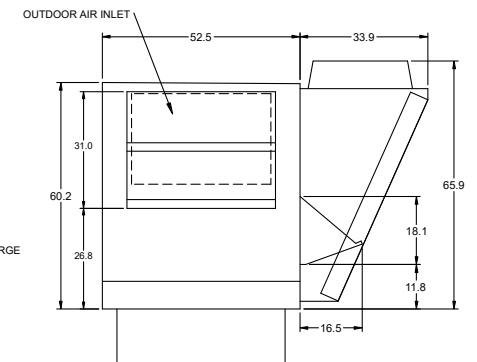
Plan



Left End

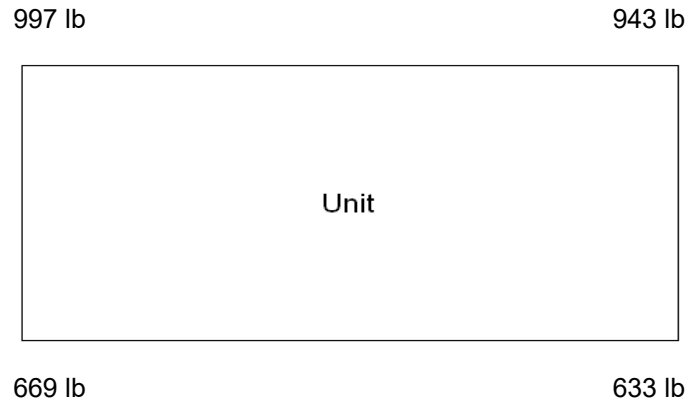


Elevation



Right End

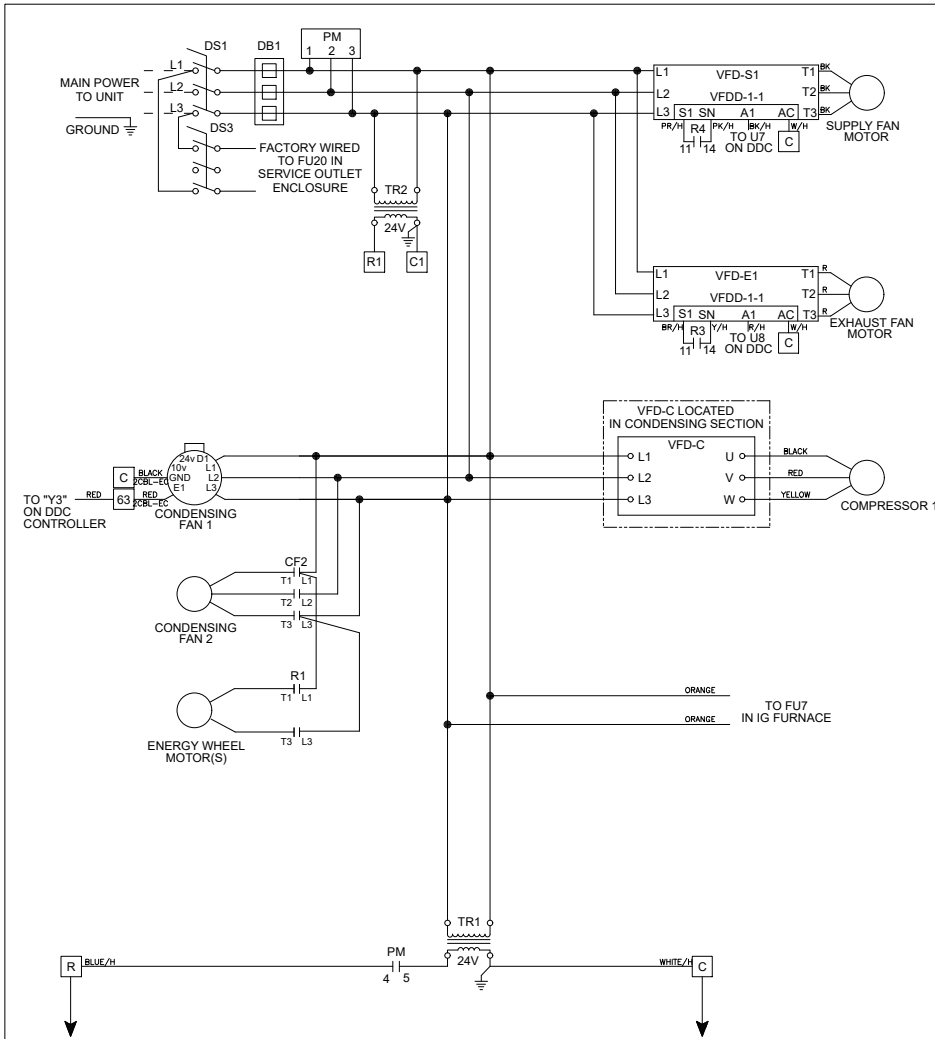
Unit Corner Weights



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



GREENHECK
Building Value in Air.

Wiring Diagram Code:

G22Q1C1CM50C65X07HH23H0430EH30

CAUTION

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

NOTES

USE COPPER CONDUCTORS ONLY
60° C FOR TERMINALS RATED LESS THAN 100 AMPS.
75° C FOR TERMINALS RATED 100 AMPS OR MORE.
FIELD CONTROL WIRING RESISTANCE SHOULD NOT EXCEED 0.75 OHM.

FIELD WIRED - - - - -
FACTORY SUPPLIED AND WIRED - - - - -

WIRE COLOR CODE

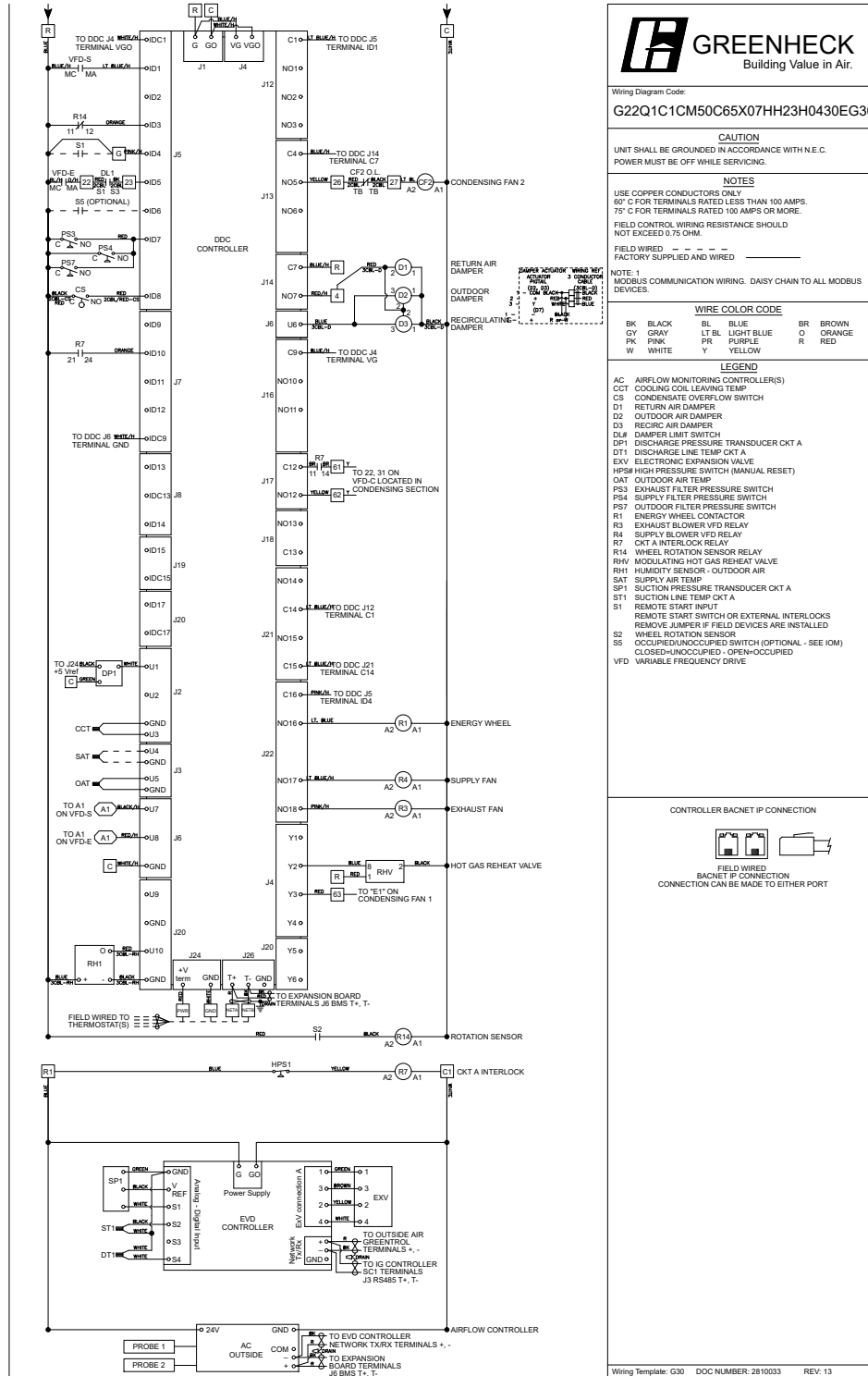
BK	BLACK	BL	BLUE	BR	BROWN
GY	GRAY	LT BL	LIGHT BLUE	O	ORANGE
PK	PINK	PR	PURPLE	R	RED
W	WHITE	Y	YELLOW		

LEGEND

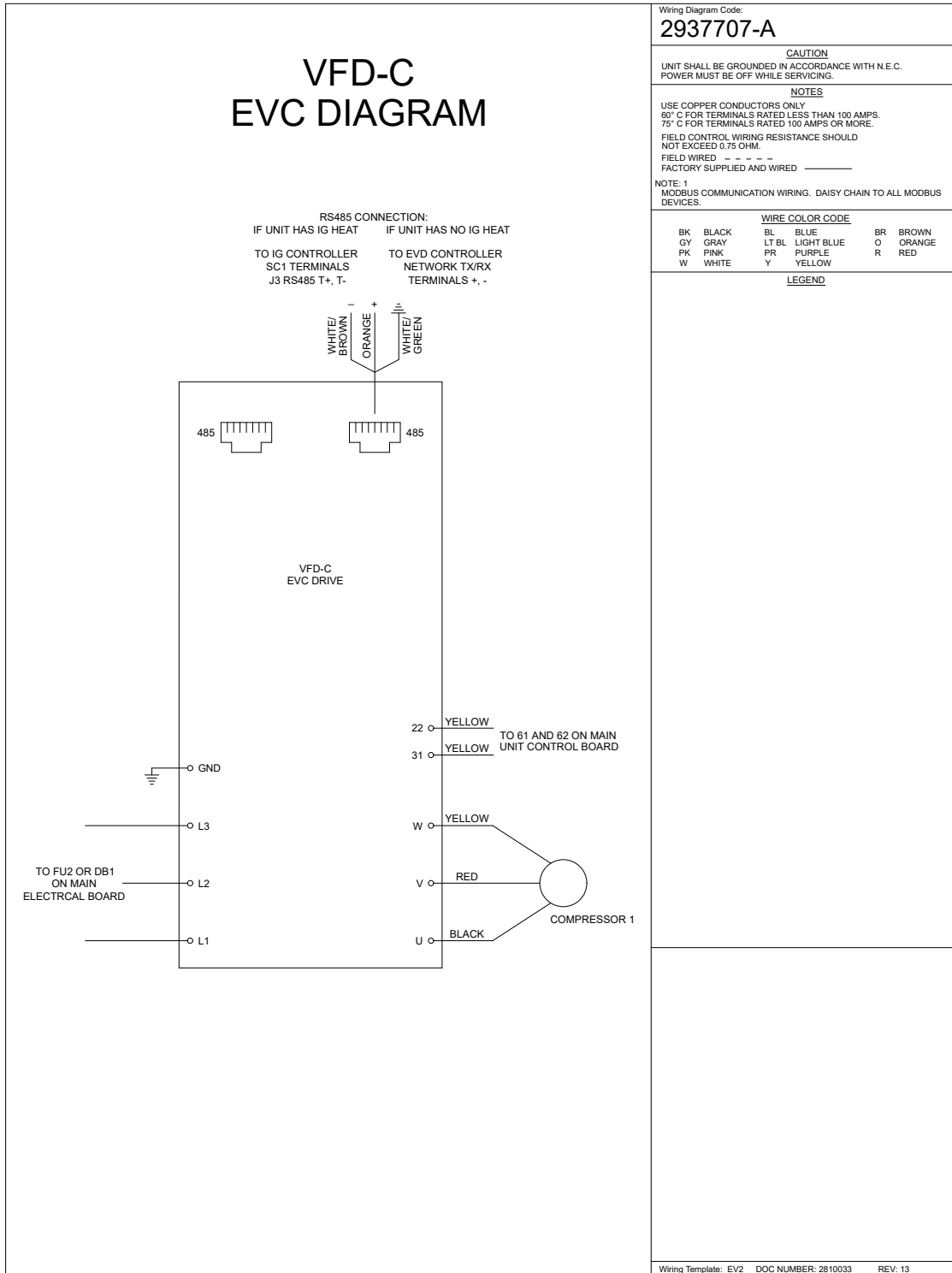
DB#	POWER DISTRIBUTION BLOCK
DS	DISCONNECT SWITCH
DT1	DISCHARGE LINE TEMP CKT A
PM	PHASE VOLTAGE MONITOR
R1	ENERGY WHEEL CONTACTOR
R3	EXHAUST BLOWER VFD RELAY
R4	SUPPLY BLOWER VFD RELAY
TR#	TRANSFORMER
VFD	VARIABLE FREQUENCY DRIVE

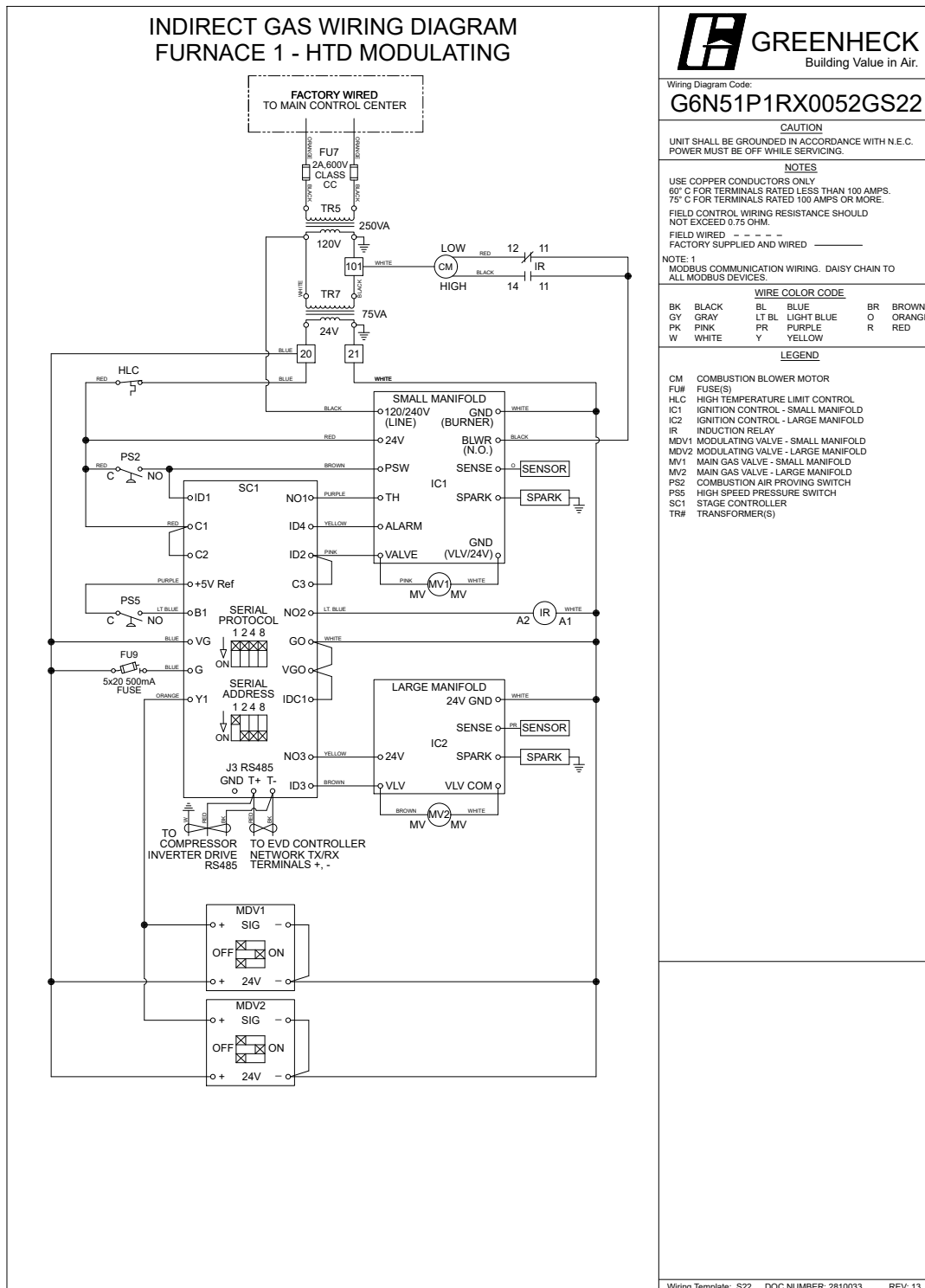
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Wiring Diagram 2

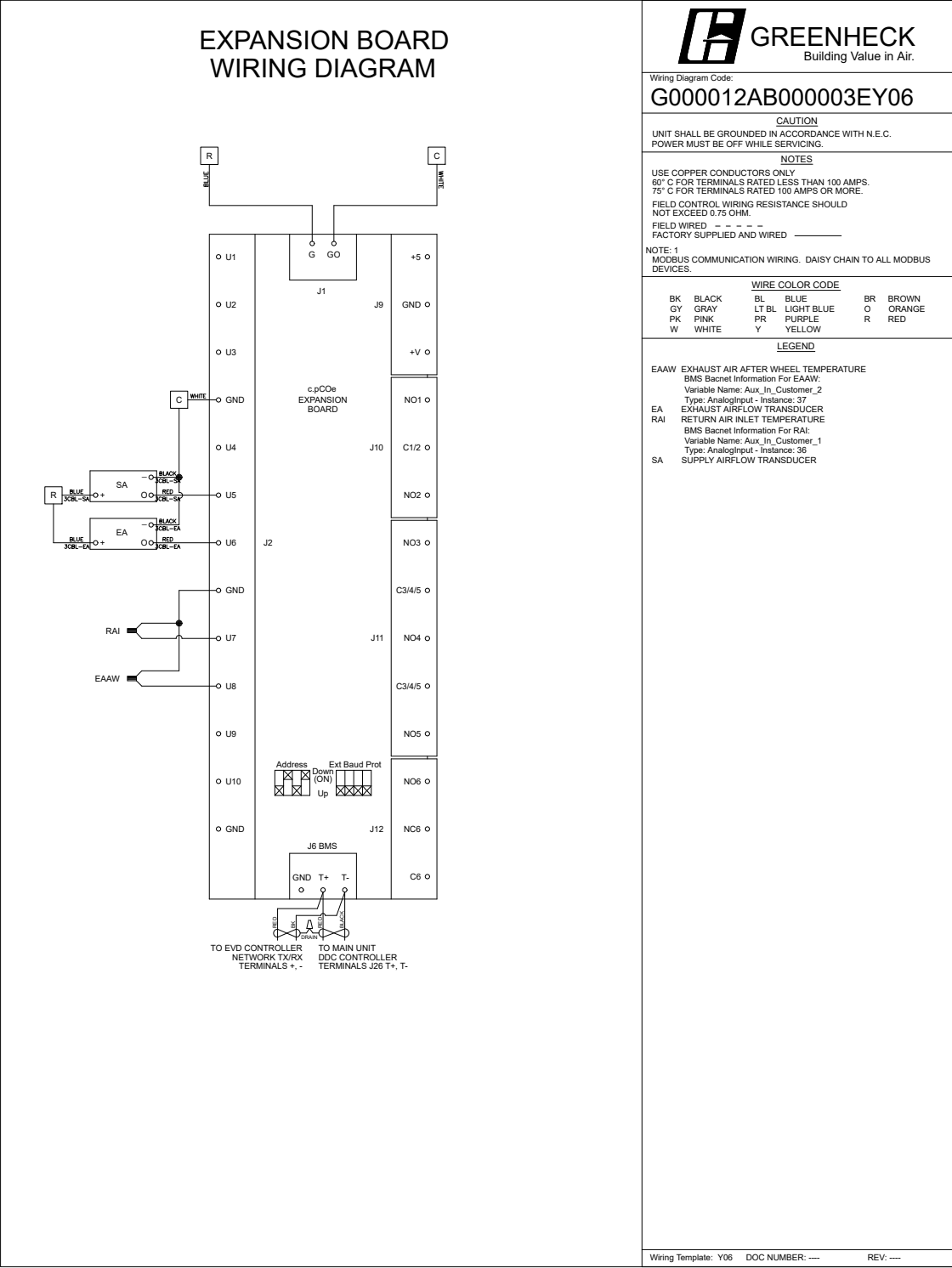


Wiring Diagram 3

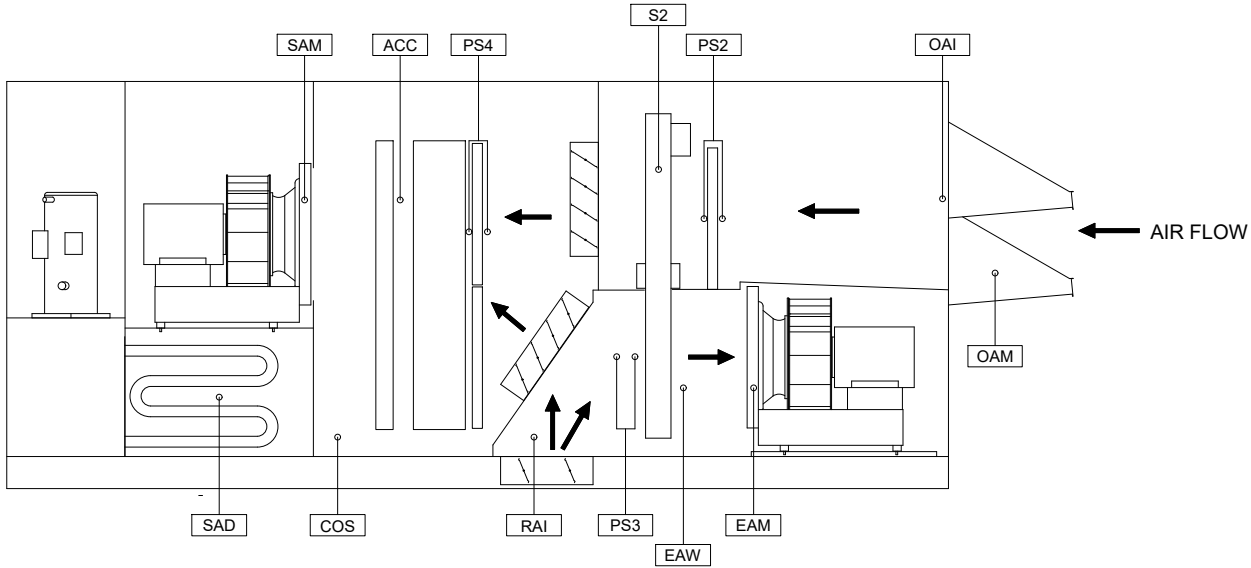




Monitoring Points Wiring Diagram



BMS Monitoring Points



Item	Description	Type
OAI	Outdoor Air Intake Temperature Sensor	10K Ohm NTC (Carel)
SAD	Supply Air Discharge Temperature Sensor	10K Ohm NTC (Carel)
ACC	After Cooling Coil Temperature Sensor	10K Ohm NTC (Carel)
PS2	Supply Dirty Filter Pressure Switch	Contact
PS3	Exhaust Dirty Filter Pressure Switch	Contact
PS4	Final Dirty Filter Pressure Switch	Contact
S2	Wheel Rotation Sensor	Contact
EAW	Exhaust Air After Wheel Temperature Sensor	10K Ohm NTC (Carel)
RAI	Return Air Intake Temperature Sensor	10K Ohm NTC (Carel)

*Shipped loose sensor.

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		
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	%		X
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		X
Aux_In_Customer_2	Customer defined auxiliary input	AI-37	30074	R	selectable		X
Aux_In_Customer_3	Customer defined auxiliary input	AI-38	30076	R	selectable		X
Aux_In_Customer_4	Customer defined auxiliary input	AI-39	30078	R	selectable		X
Aux_In_Customer_5	Customer defined auxiliary input	AI-40	30080	R	selectable		X
Aux_In_Customer_6	Customer defined auxiliary input	AI-41	30082	R	selectable		X
Aux_In_Customer_7	Customer defined auxiliary input	AI-42	30084	R	selectable		X
Aux_In_Customer_8	Customer defined auxiliary input	AI-43	30086	R	selectable		X
Aux_In_Customer_9	Customer defined auxiliary input	AI-44	30088	R	selectable		X
Aux_In_Customer_10	Customer defined auxiliary input	AI-45	30090	R	selectable		X
Temperature_Setpoint	Main Temperature Set point Supply, Space, or Return target temperature	AV-1	40002	RW	°F		X
Temperature_Heat_Cool_Deadband	Heat/Cool Spt Deadband when Room or Return control is active Clg Spt = Deadband /2 + Temp Spt Htg Spt = Deadband /2 - Temp Spt	AV-2	40004	RW	Delta in °F		X
Temperature_Setpoint_Unoccupied	Main Temperature Set point Supply, Space, or Return target temperature	AV-3	40006	RW	°F		
Temperature_Heat_Cool_Deadband_Unoccupied	Heat/Cool Spt Deadband when Room or Return control is active Clg Spt = Deadband /2 + Temp Spt Htg Spt = Deadband /2 - Temp Spt	AV-4	40008	RW	Delta in °F		
Cooling_Coil_Setpoint_Min	Cooling Coil Leaving Air Setpoint	AV-5	40010	RW	°F		X
Cooling_Coil_Setpoint_Max	Maximum Coil Leaving Setpoint	AV-6	40012	RW	°F		X
Dehumidification_Setpoint	Dehumidification Setpoint %RH for Space or Return control	AV-7	40014	RW	%		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		
Supply_Duct_Static_Pressure_Setpoint	Supply Duct Static Pressure Setpoint	AV-23	40046	RW	"wc		
Space_CO2_Setpoint	Space CO2 Setpoint	AV-24	40048	RW	ppm		
Outside_Air_Damper_Minimum_Setpoint_Occ	Outside Air Damper Minimum Setpoint	AV-24	40050	RW	%		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	%		
Outside_Dewpoint	Outside Dewpoint	AV-54	30120	R	°F		
Outside_Enthalpy	Outside Enthalpy	AV-55	30122	R	btu/lb		
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		
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

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	
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	
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 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	

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.
- 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 (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.

BMS Control: The exhaust blower is modulated based upon a command from the Building Management System. (This sequence must be field configured.)

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

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

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

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

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.

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

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.

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. The supply and exhaust fans will each have an airflow monitoring pressure tap on the inlet cone. The differential pressure across the fan cone is converted to an airflow reading by using the energy conservation principle and the fan wheel K-factor. The airflow can be monitored via the LCD and BAS.

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.

GKD Roof Curb

Model: GKD-45.9/142.9-G14

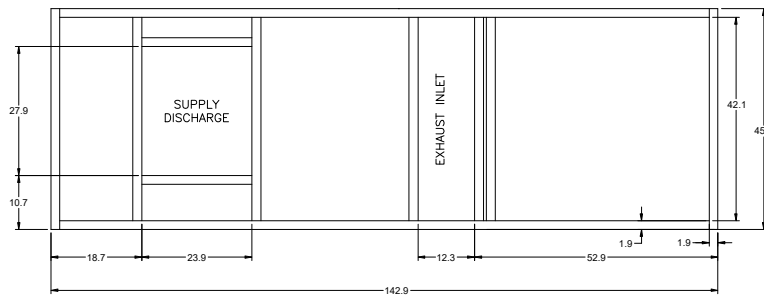
Curb Height (in.)	Curb Length (in.)	Curb Width (in.)	Material	Finish Type	Duct Adapter	Curb Weight (lb)
14	142.9	45.9	Galvanized	Galvanized	Yes	223

Standard Construction Features:

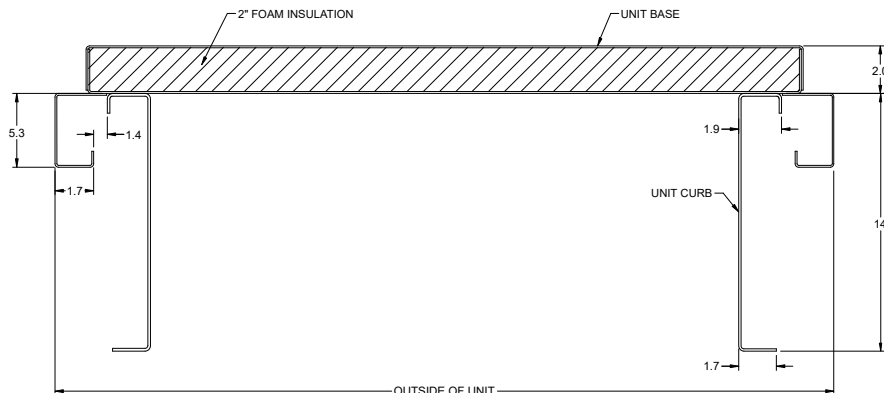
All dimensions shown are actual and in units of in.'s
If unit is selected with side or end discharge/return, there will not be bottom connections supplied with the curb.
14 gauge galvanized steel (perimeter channels).
14 gauge galvanized steel (interior channels).
Ships knocked down for field assembly.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

Curb Detail

Top View of Curb



Cross-Section View of Unit on Curb



RVE-40-36D-7I-C-G1

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	98.0	80.2	17.2	2,050	2,050	-	2,050

Unit Specifications						
Qty	Weight (lb)	Cooling Type	Heating Type	Unit Installation	Unit ETL Listing	Furnace ETL Listing
1	2,955 (+/- 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	11	11	✓
IEER	12.7	18.7	✓
Enthalpy Recovery Ratio (%)	50	70.4	✓

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	98.0	80.2	81.4	68.6	75.0	62.5/50	91.5	75.7	101,475.0
Winter	17.2	14.1	54.8	44.8	72.0	55.8/35	32.7	29.2	83,246.0

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	86.0	58.2	Inverter Scroll	81.4 / 68.5	55.6 / 55.4	62.9	84.0

Heating Specifications								
Type	Gas Type	Input (MBH)	Output (MBH)	Temperature Rise		Turndown	Performance	
				Min (F)	Max (F)		EAT (F)	LAT (F)
Indirect Gas	Natural	100.0	81.0	2.0	37.0	16:1	54.8	91.3

Motor Specifications						
Motor	Qty	Operating Power (hp)	Size (hp)	Enclosure	Efficiency	RPM
Supply	1	1.24	3	ODP	PE	1165
Exhaust	1	0.87	1	ODP	PE	1150

Electrical Specifications					
Power Supply	Rating (V/C/P)	MCA (A)	MOP (A)	FLA (A)	Fan Power (W/CFM)*
Unit	460/60/3	20.8	25.0	18.7	0.768

*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	
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)	Std
BMS Protocol - BACNetIP	X
BMS Monitoring Points - RAI, ACC, EAW	X
Supply Fan Control - By BMS	X
Exhaust Fan Control - By BMS	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 - By BMS	X
Unoccupied Recirc Mode	X
Control Accessories	
Remote Display	
Dirty Filter Sensor(s) - All	X
Airflow Monitor - Outdoor Air, Exhaust Air, Supply Air	X
Room Thermostat - Space Temp and RH	X
Phase/Brownout Protection	Std
Economizer Fault Detection Diagnostics	

Accessories	
Frost Control None - None	
Outdoor Air Damper - Low Leakage	X
Return Air Damper	
Roof Curb - GKD - 45.9/142.9-G14	X
Supply Air Filters - 2" Merv 8, 4-20x20x2	Std
Service Outlet - Factory mounted and wired	X
Piping Vestibule	
Service Lights	
Condensate Overflow Switch	X
Spare Filters	
Exhaust Discharge Gravity Backdraft Damper	
ElectroFin Coil Coating	
Motor Shaft Grounding	
Bipolar Ionization	
Smoke Detector(s)	X
Barometric Relief Damper	
UV Lights	
Return Air Filters - 2" Merv 8, 2-20x25x2	Std
Outdoor Air Filters - 2" Merv 8, 2-20x25x2	Std
Furnace Control - 16:1 Modulating	X
Spare Energy Wheel Belt	
Spare Energy Wheel Segments	
Energy Wheel Bypass Damper	X
Power Venting	Std
Hail Guards	X
Warranty Options	
Unit Warranty - 3.5 Yrs. (2 Yrs. 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/ft² @ 1 in. wg), Class 1A

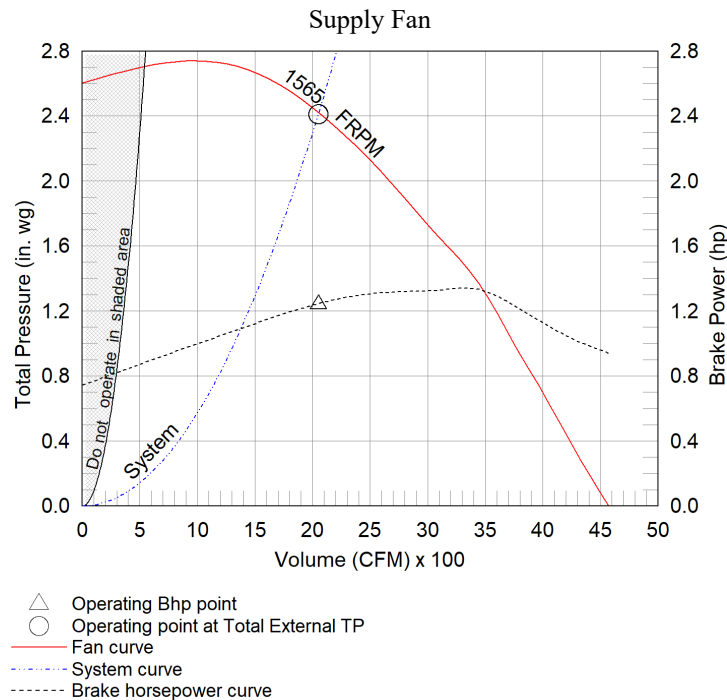
Supply Fan Charts And Performance

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
2,050	1	2.41	1565	N/A	1	3	1	Plenum	Direct

Pressure Drop (in. wg)							
Weatherhood	Filter	Damper	Cooling	Heating	External	Energy Wheel	Total
0.03	0.055	0.02	0.118	0.354	1	0.82	2.41

Sound Performance in Accordance with AMCA									
Sound Power by Octave Band								Lwa	dBA
62.5	125	250	500	1000	2000	4000	8000		
75	79	85	73	68	64	75	62	80	69
								Sones	
								17	

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



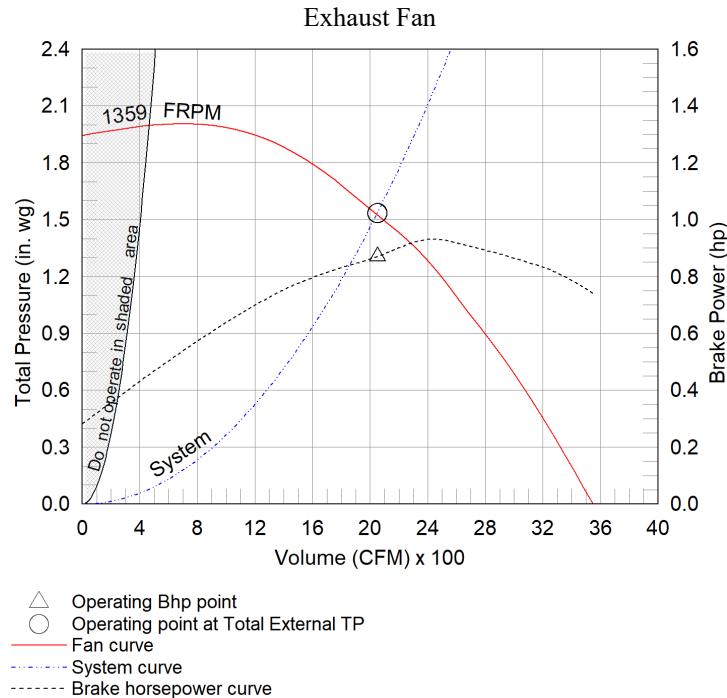
Exhaust Fan Charts And Performance

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	2,050	0.75	1.536	1359	0.87	1	1	1	Plenum	Direct

Pressure Drop (in. wg)								
Mode	Weatherhood	Filter	Damper	Cooling	Heating	External	Energy Wheel	Total
Normal	0.04	-	-	-	-	0.75	0.74	1.536

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	78	75	68	62	58	56	63	54	68	57	9

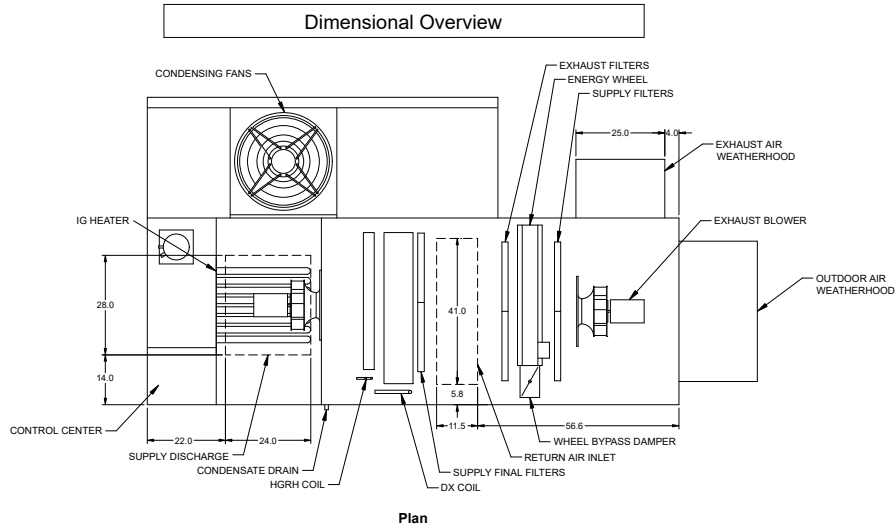
*Energy Wheel pressure drop shown in above table also accounts for pressure drop across MERV8 return air filter



Radiated Sound

Position A

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	86	91	87	91	92	88	83	82	98	95
B	81	84	83	91	86	83	79	77	94	92
C	80	80	74	82	80	75	66	64	87	84
D	78	80	75	78	76	71	67	66	85	80
E	84	88	83	90	86	84	79	78	95	92
Total	90	94	90	96	94	90	86	84	101	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							
Type	Total Capacity (MBH)	Sensible Capacity (MBH)	Lead Compressor Type	Coil (DB/WB)		Reheat	
				EAT (F)	LAT (F)	Capacity (MBH)	LAT (F)
Packaged DX	86.0	58.2	Inverter Scroll	81.4 / 68.5	55.6 / 55.4	62.9	84.0

Coil Information								
PDX Coil Model	Fins Per Inch	Rows Deep	Face Vel. (ft/min)	Coil PD (in. wg)	Refrigerant	Refrig. Velocity (ft/min)	Face Area (ft2)	Suction Temp (F)
DX516L04S14-40X42.5-LH	14	4	174	0.118	R-410A	1,082	11.8	51.1

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	8.3	-	NA	-

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
Low sound condensing fan with EC motor for modulating head pressure control.
Inverter scroll compressor
Electronic expansion valve
Unit cannot be mounted in an enclosed space.

Important Notes:
This unit will not be available to order with R-410A refrigerant after the August 2024 CAPS release. Replacement R-454B units can currently be selected, but availability is limited based on housing size and/or tonnage. Factory communication will be provided once additional R-454B units are available for 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	100.0	81.0	2.0	37.0	16:1	54.8	91.3

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)	98.0	Dry Bulb (F)	81.4
Wet Bulb (F)	80.2	Wet Bulb (F)	68.6
Specific Humidity (gr/lb)	129	Specific Humidity (gr/lb)	85
Enthalpy (BTU/lb)	43.9	Enthalpy (BTU/lb)	32.9
Exhaust Air		Return Air	
Dry Bulb (F)	91.5	Dry Bulb (F)	75.0
Wet Bulb (F)	75.7	Rel. Humidity (%)	50
Specific Humidity (gr/lb)	109	Specific Humidity (gr/lb)	66
Enthalpy (BTU/lb)	39.1	Enthalpy (BTU/lb)	28.2

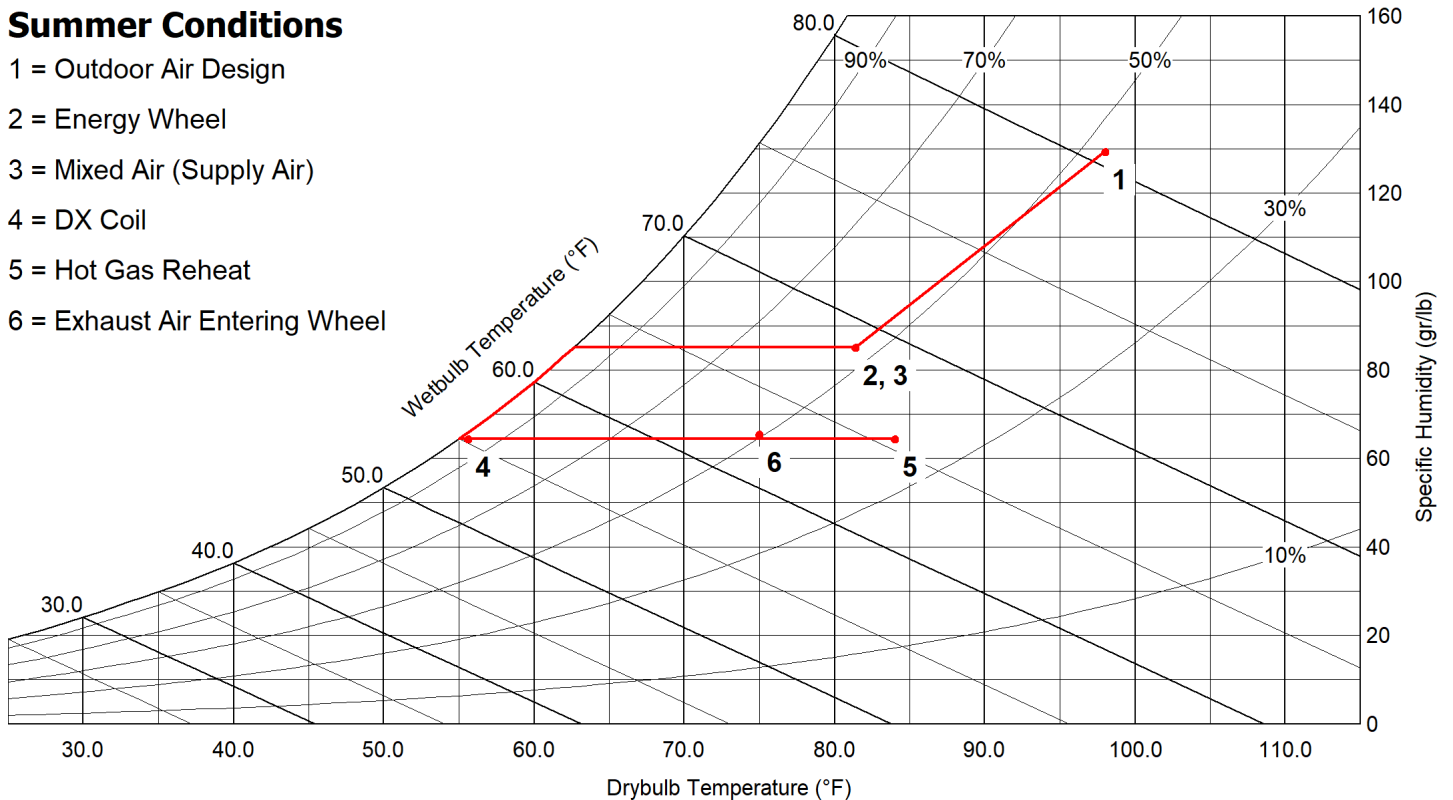
Mixed Air Conditions			
Dry-bulb (F)	Wet-bulb (F)	Specific Humidity (gr/lb)	Enthalpy (BTU/lb)
81.4	68.5	85	32.9

Design Air Flow Conditions			
OA Volume (CFM)	ASHRAE 90.1 OA Enthalpy Recovery Ratio	EA Volume (CFM)	EA Wheel Effectiveness
2,050	70.4	2,050	69.6

Outdoor Air Cooling Reduction				
OA Load w/o Energy Recovery		OA Load with Energy Recovery		Equipment Reduction (tons)
(BTU/h)	(tons)	(BTU/h)	(tons)	
144,832.0	12.07	43,357.0	3.61	8.46

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)	17.2	Dry Bulb (F)	54.8
Wet Bulb (F)	14.1	Wet Bulb (F)	44.8
Specific Humidity (gr/lb)	7	Specific Humidity (gr/lb)	29
Enthalpy (BTU/lb)	5.1	Enthalpy (BTU/lb)	17.6
Exhaust Air		Return Air	
Dry Bulb (F)	32.7	Dry Bulb (F)	72.0
Wet Bulb (F)	29.2	Rel. Humidity (%)	35
Specific Humidity (gr/lb)	18	Specific Humidity (gr/lb)	41
Enthalpy (BTU/lb)	10.6	Enthalpy (BTU/lb)	23.7

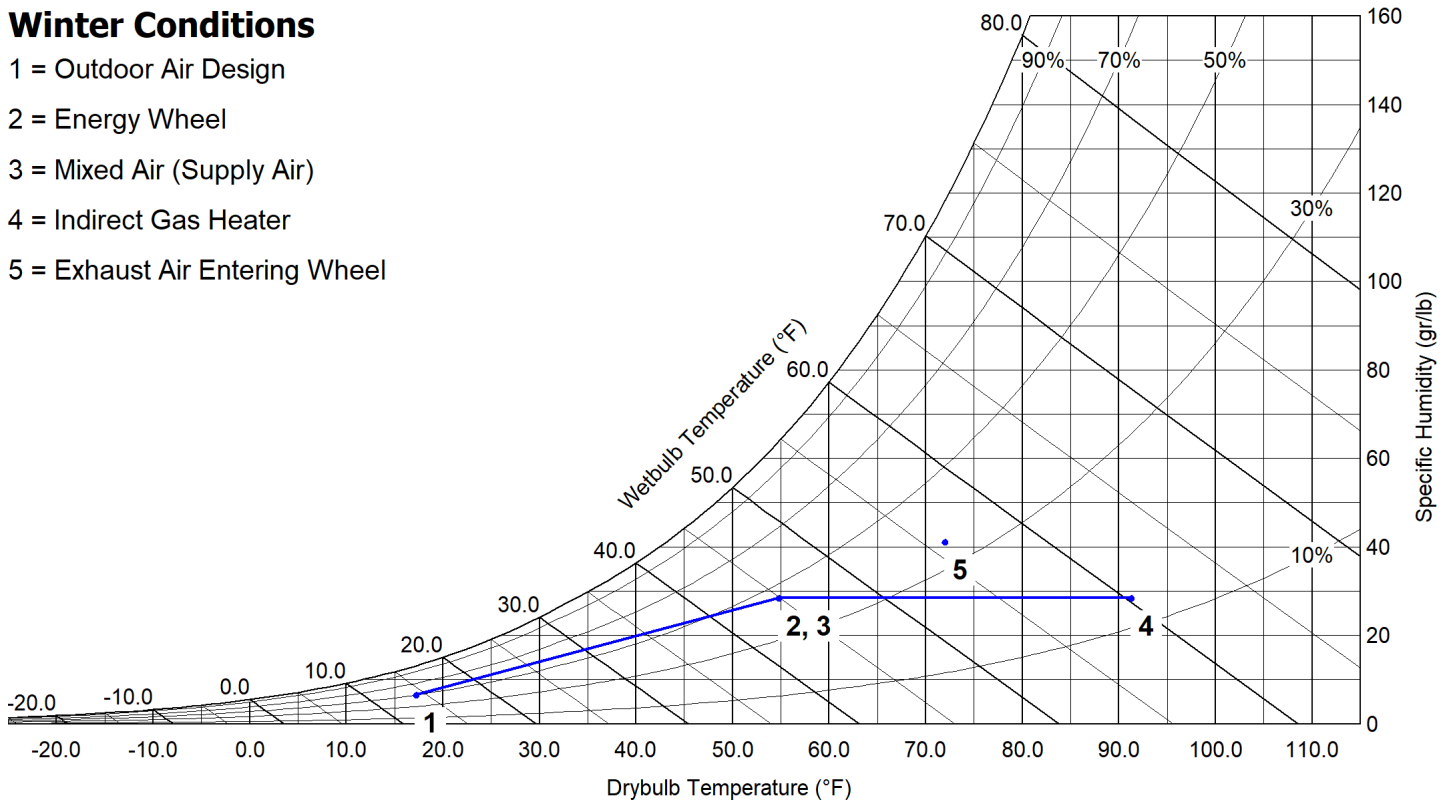
Mixed Air Conditions			
Dry-bulb (F)	Wet-bulb (F)	Specific Humidity (gr/lb)	Enthalpy (BTU/lb)
81.4	68.5	85	32.9

Design Air Flow Conditions			
OA Volume (CFM)	ASHRAE 90.1 OA Enthalpy Recovery Ratio	EA Volume (CFM)	EA Wheel Effectiveness
2,050	66.9	2,050	69.7

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 (%)
121,327.0	38,081.0	83,246.0	71.3

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

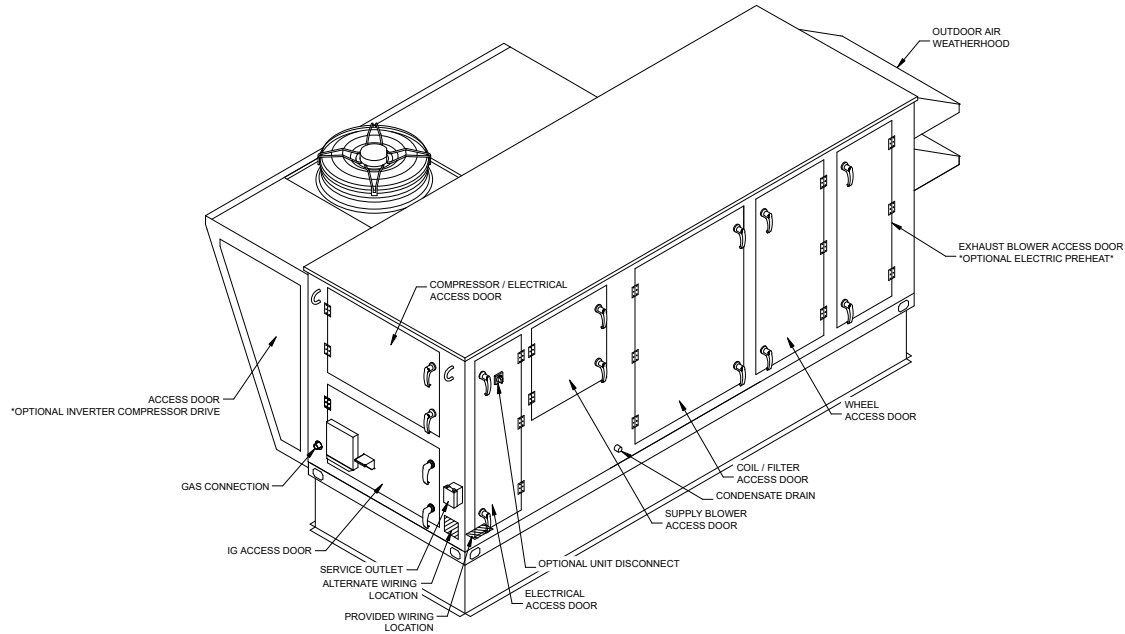
Energy Recovery Performance Rating in accordance with AHRI Standard 1060 (I-P)							
Rated Airflow (SCFM)		Net Supply Airflow (SCFM)	EATR (%)	OACF	Pressure Drop (in. wg)		Purge Angle (degrees)
Leaving Supply	Entering Exhaust				Supply	Exhaust	
2,060	2083	2083	1.6	1.08	0.66	0.65	0

Thermal Effectiveness Ratings							
Enthalpy Recovery		Sensible Effectiveness		Latent Effectiveness		Total Effectiveness	
Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
70.4	66.9	71.7	71.3	68.1	66.2	69.6	69.7

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

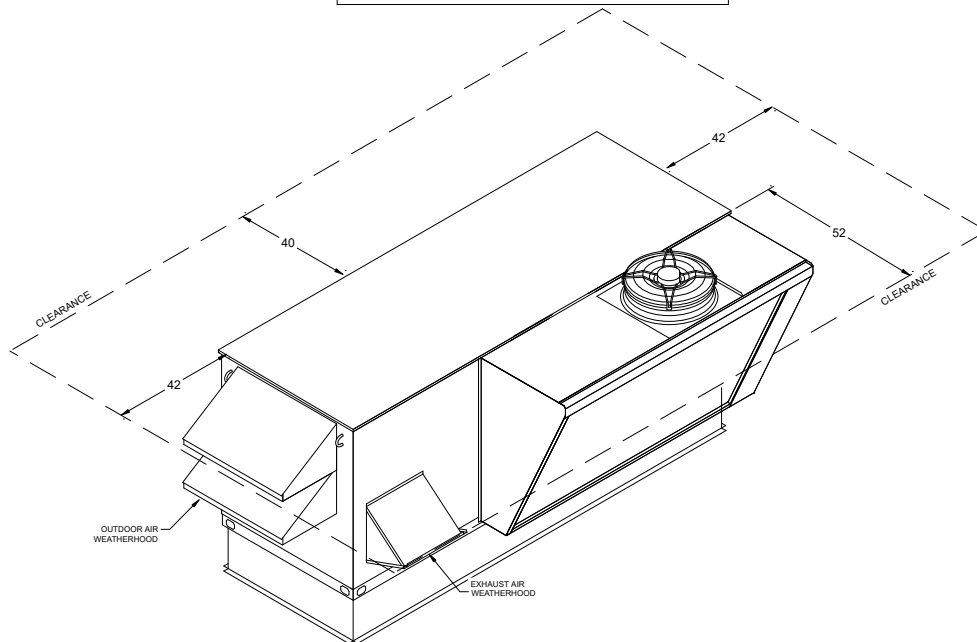
Isometric Drawings

Component Layout



Back Right Isometric

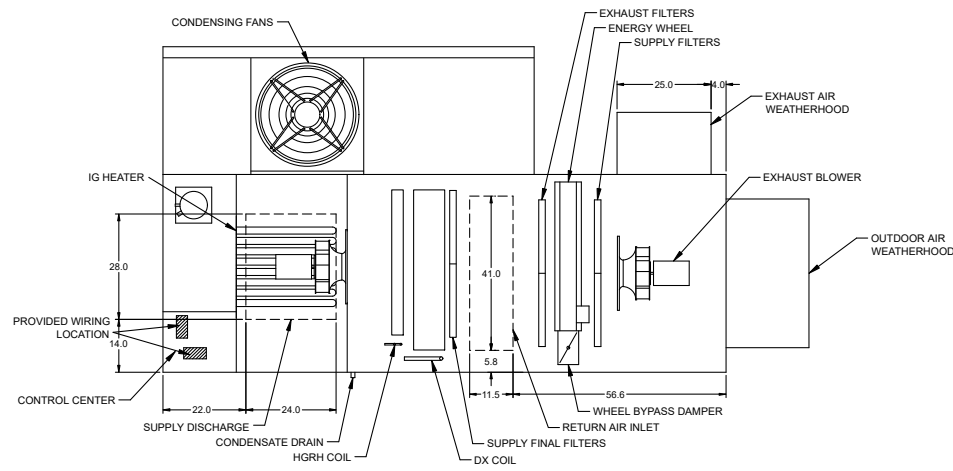
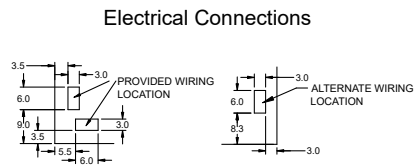
Service Clearances



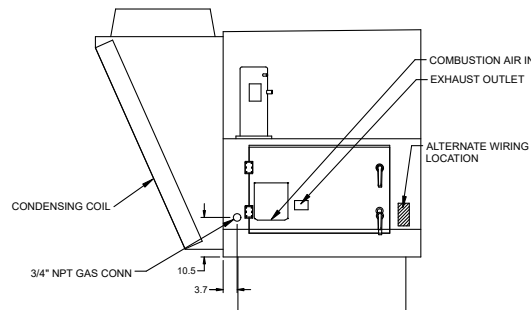
Front Left Isometric

Overview Drawings

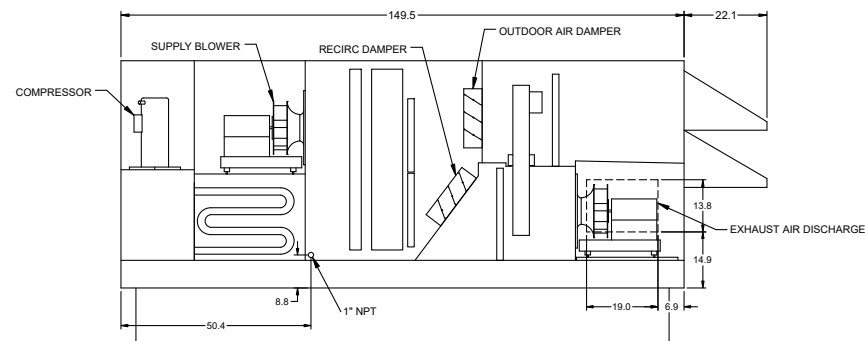
Dimensional Overview



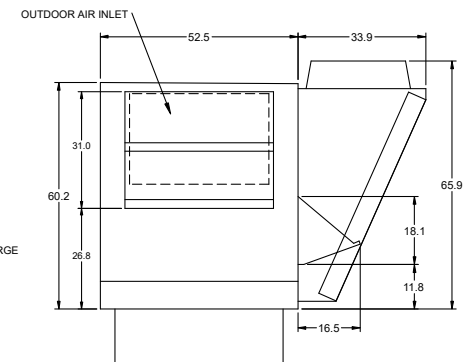
Plan



Left End

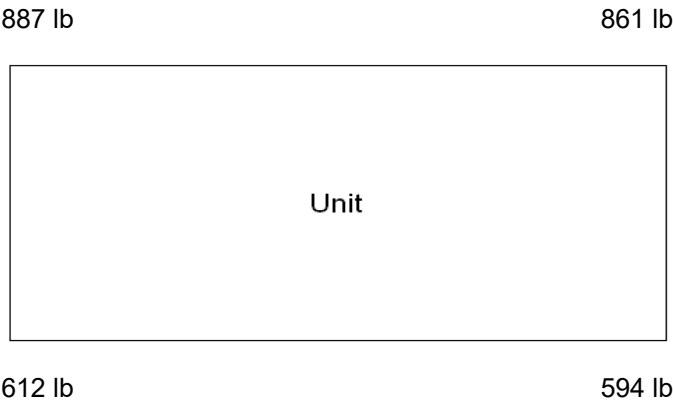


Elevation



Right End

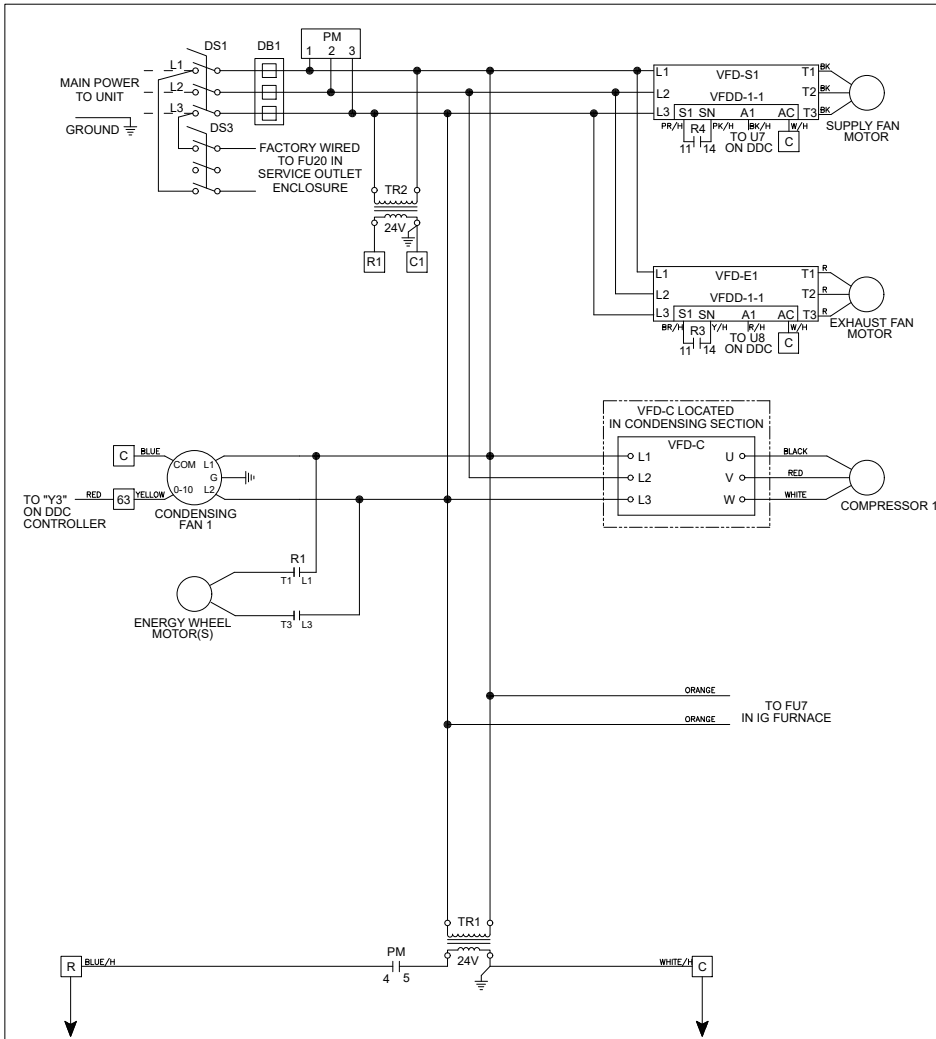
Unit Corner Weights



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



Wiring Diagram Code:

G22Q1C1CK50D45X07HC23H0430EH30

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

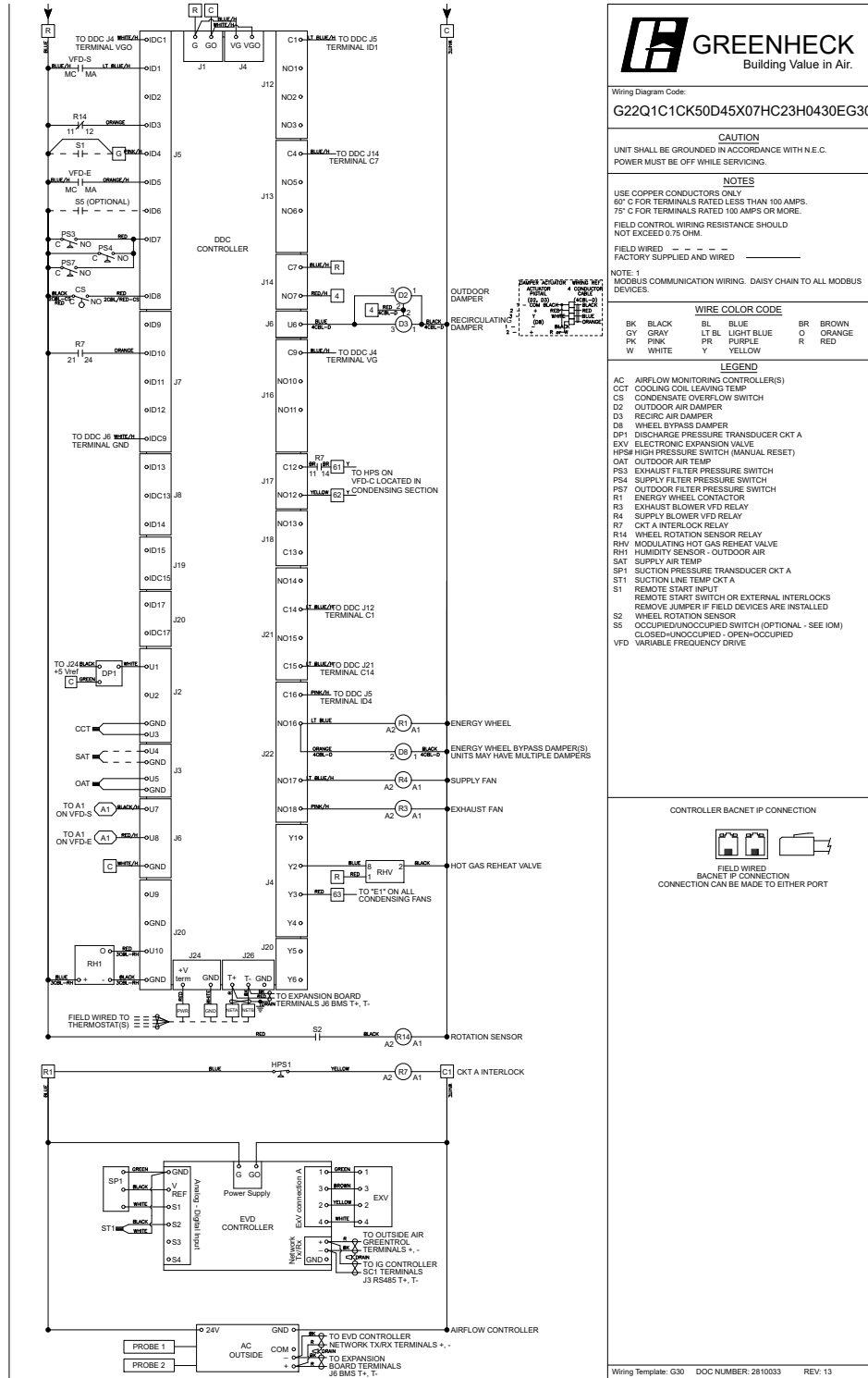
BK	BLACK	BL	BLUE	BR	BROWN
GY	GRAY	LT BL	LIGHT BLUE	O	ORANGE
PK	PINK	PR	PURPLE	R	RED
W	WHITE	Y	YELLOW		

LEGEND

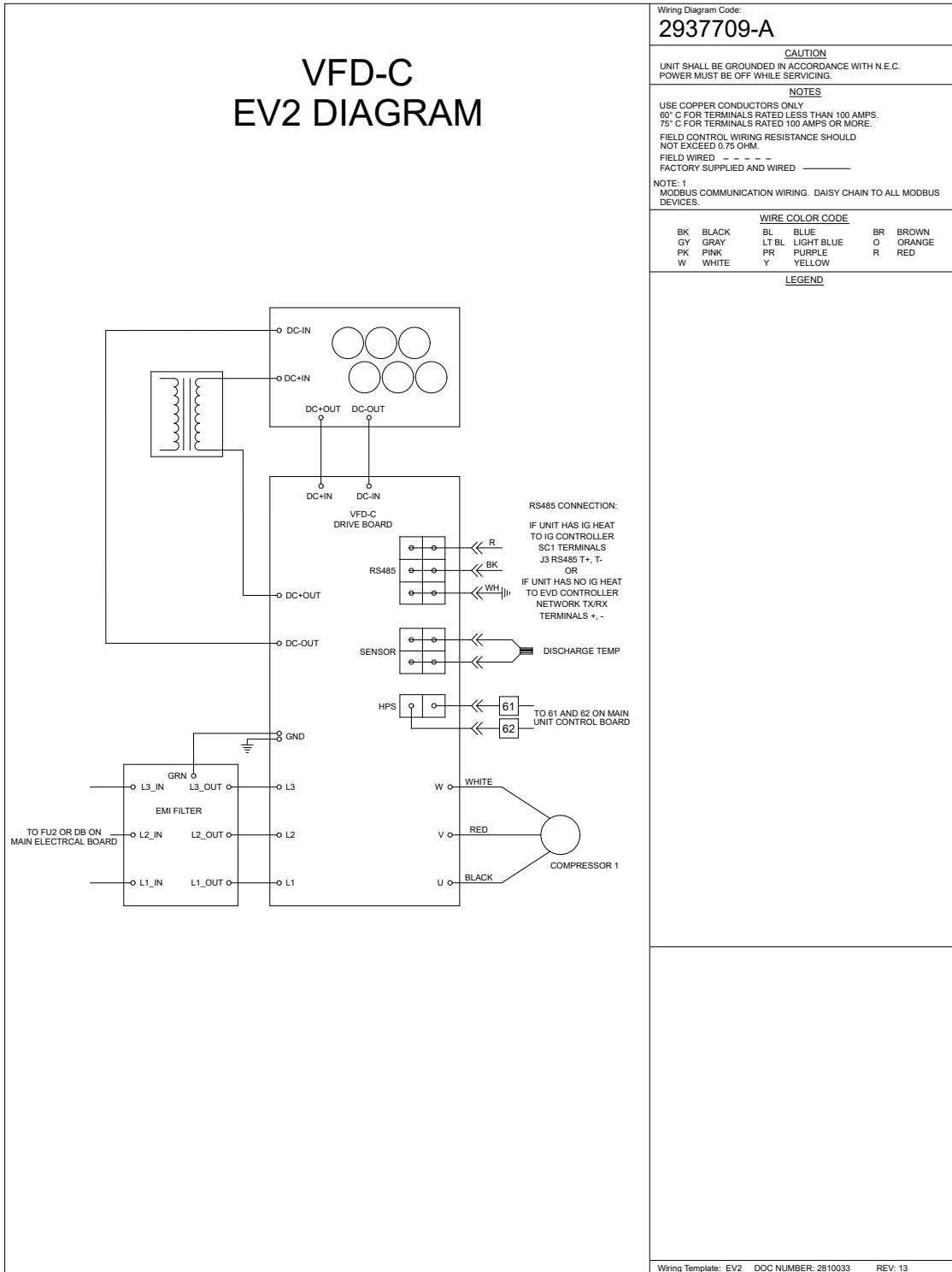
DB#	POWER DISTRIBUTION BLOCK
DS	DISCONNECT SWITCH
PM	PHASE VOLTAGE MONITOR
R1	ENERGY WHEEL CONTACTOR
R3	EXHAUST BLOWER VFD RELAY
R4	SUPPLY BLOWER VFD RELAY
TR#	TRANSFORMER
VFD	VARIABLE FREQUENCY DRIVE

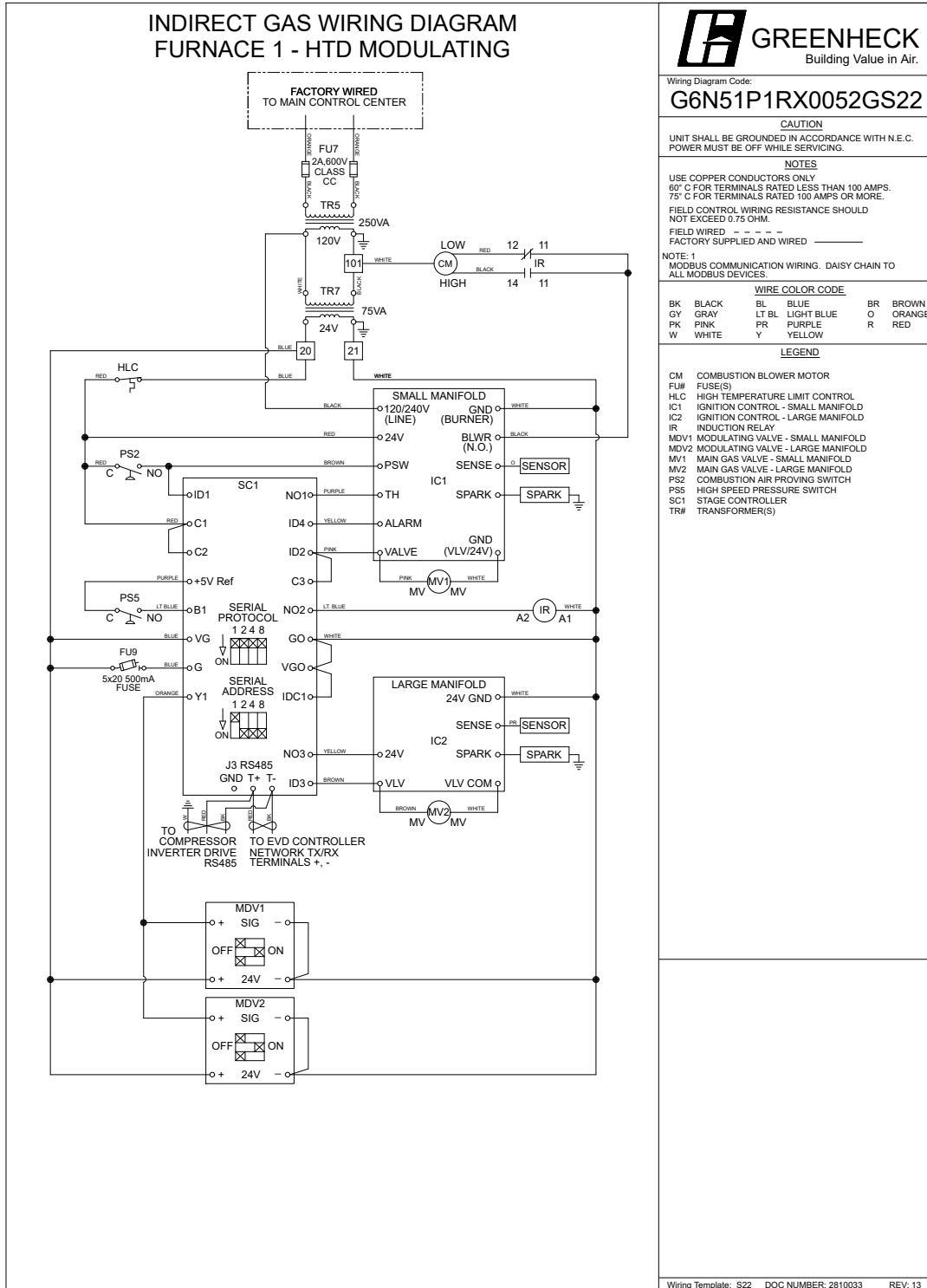
Wiring Template: H30 DOC NUMBER: 2810033 REV: 13

Wiring Diagram 2

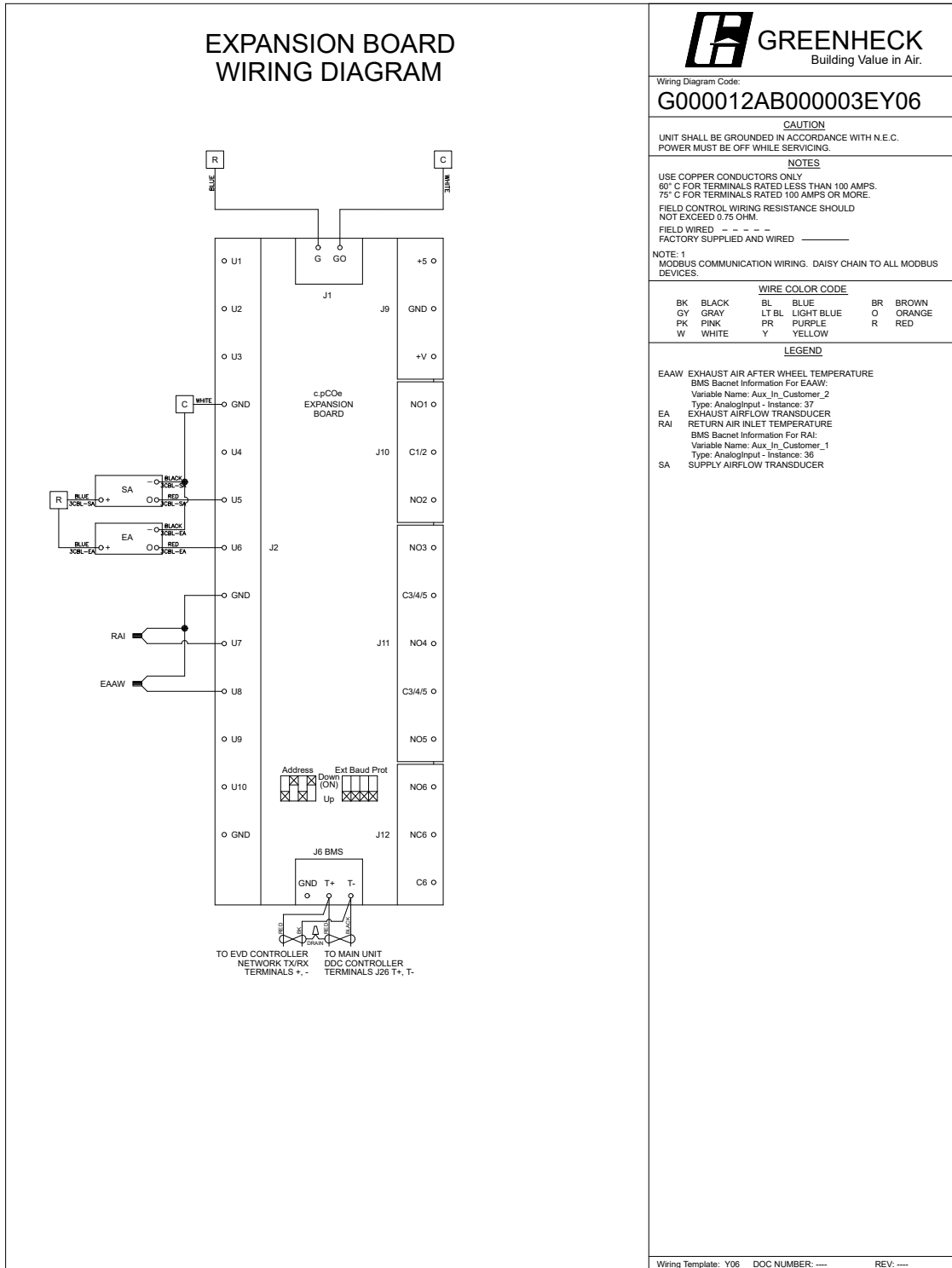


Wiring Diagram 3

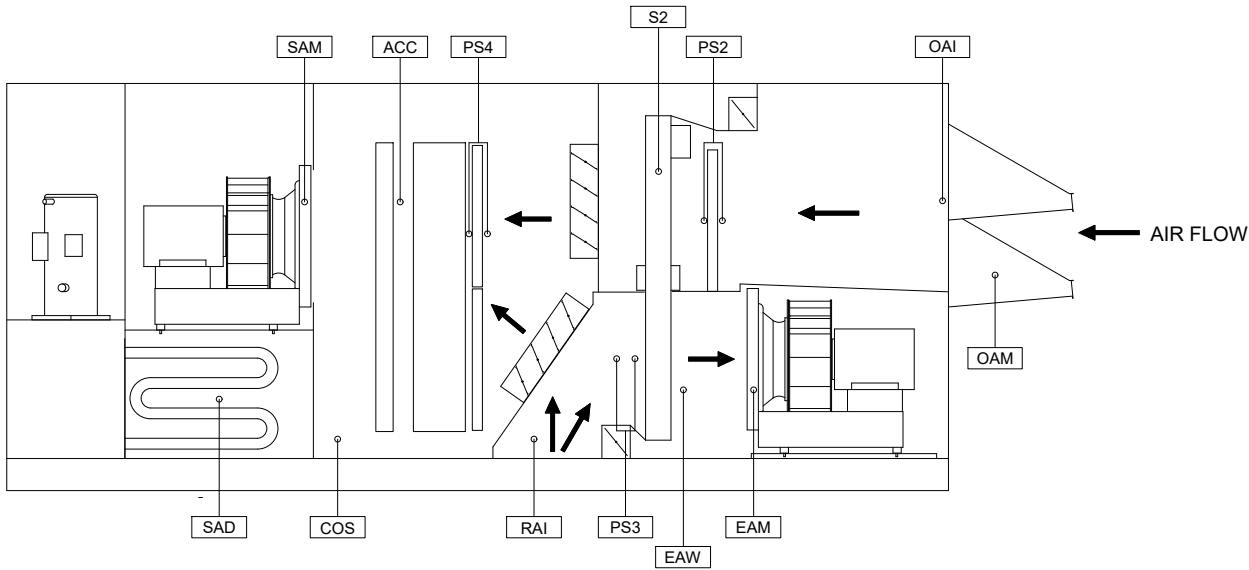




Monitoring Points Wiring Diagram



BMS Monitoring Points



Item	Description	Type
OAI	Outdoor Air Intake Temperature Sensor	10K Ohm NTC (Carel)
SAD	Supply Air Discharge Temperature Sensor	10K Ohm NTC (Carel)
ACC	After Cooling Coil Temperature Sensor	10K Ohm NTC (Carel)
PS2	Supply Dirty Filter Pressure Switch	Contact
PS3	Exhaust Dirty Filter Pressure Switch	Contact
PS4	Final Dirty Filter Pressure Switch	Contact
S2	Wheel Rotation Sensor	Contact
EAW	Exhaust Air After Wheel Temperature Sensor	10K Ohm NTC (Carel)
RAI	Return Air Intake Temperature Sensor	10K Ohm NTC (Carel)

*Shipped loose sensor.

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		
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	%		X
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		X
Aux_In_Customer_2	Customer defined auxiliary input	AI-37	30074	R	selectable		X
Aux_In_Customer_3	Customer defined auxiliary input	AI-38	30076	R	selectable		X
Aux_In_Customer_4	Customer defined auxiliary input	AI-39	30078	R	selectable		X
Aux_In_Customer_5	Customer defined auxiliary input	AI-40	30080	R	selectable		X
Aux_In_Customer_6	Customer defined auxiliary input	AI-41	30082	R	selectable		X
Aux_In_Customer_7	Customer defined auxiliary input	AI-42	30084	R	selectable		X
Aux_In_Customer_8	Customer defined auxiliary input	AI-43	30086	R	selectable		X
Aux_In_Customer_9	Customer defined auxiliary input	AI-44	30088	R	selectable		X
Aux_In_Customer_10	Customer defined auxiliary input	AI-45	30090	R	selectable		X
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		
Supply_Duct_Static_Pressure_Setpoint	Supply Duct Static Pressure Setpoint	AV-23	40046	RW	"wc		
Space_CO2_Setpoint	Space CO2 Setpoint	AV-24	40048	RW	ppm		
Outside_Air_Damper_Minimum_Setpoint_Occ	Outside Air Damper Minimum Setpoint	AV-24	40050	RW	%		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	%		
Outside_Dewpoint	Outside Dewpoint	AV-54	30120	R	°F		
Outside_Enthalpy	Outside Enthalpy	AV-55	30122	R	btu/lb		
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_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

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	
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	
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 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	

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	
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22	
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24	
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26	
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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	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.

BMS Control: The exhaust blower is modulated based upon a command from the Building Management System. (This sequence must be field configured.)

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

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

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

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

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.

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

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.

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.

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.

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. The supply and exhaust fans will each have an airflow monitoring pressure tap on the inlet cone. The differential pressure across the fan cone

is converted to an airflow reading by using the energy conservation principle and the fan wheel K-factor. The airflow can be monitored via the LCD and BAS.

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 42 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.

GKD Roof Curb

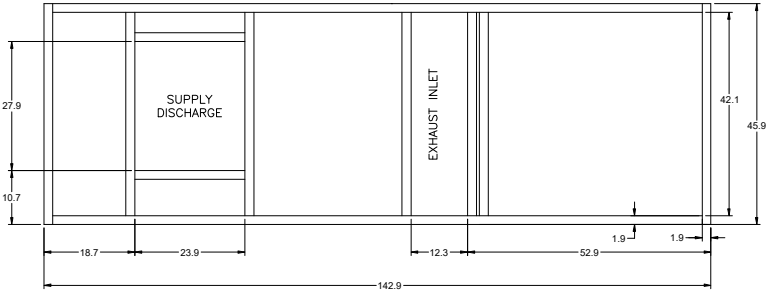
Model: GKD-45.9/142.9-G14

Curb Height (in.)	Curb Length (in.)	Curb Width (in.)	Material	Finish Type	Duct Adapter	Curb Weight (lb)
14	142.9	45.9	Galvanized	Galvanized	Yes	223

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

Curb Detail

Top View
of Curb



Cross-Section
View of Unit
on Curb

