

# Fieldstone at Chester Springs



320 Granite Run Drive

PO Box 3310

Lancaster, PA 17604-3310

P: 717-581-9900

HorstConstruction.com

**Date:** 8/30/2022

**Subcontractor/Supplier:** DJ Wagner

**Items Being Submitted:**

1. Daikin ERU
2. \_\_\_\_\_
3. \_\_\_\_\_

**Specification Section:** 23.7200

**Drawing Number/Detail:** \_\_\_\_\_

**Installation Location:** \_\_\_\_\_



- REVIEW NOT REQUIRED \_\_\_\_\_
- REVIEWED \_\_\_\_\_
- APPROVED \_\_\_\_\_
- APPROVED ONLY AS NOTED \_\_\_\_\_
- NOT APPROVED, REVISE AND RESUBMIT \_\_\_\_\_
- NOT APPROVED \_\_\_\_\_

Review is for conformance with information given and the design concept expressed in the Contract Documents. Corrections and/or notes made on this submittal and all related submittals during this review do not alter the requirements of the contract documents and governing law. Approval of a specific item does not indicate approval of an assembly of which the item is a component. Our review is not for, and the contractor remains responsible for: determining accuracy and completeness of other information (e.g. dimensions, quantities, installation or performance of equipment/systems); safety precautions; and construction means, methods, techniques, sequences and procedures.

DATE 9/7/2022 REVIEW BY AF



*Submittal Review  
Reviewed for Completeness Only*

Job Name: Fieldstone at Chester Springs Job # 220341  
Submittal # 11 Spec Section: 23.7200

Description: Daikin Energy Recovery Unit

Date: 8/30/2022 Reviewed By: ZW

**MEP Engineer:**

McHugh Engineering Associates, Inc.  
136 Poplar Street  
Ambler, PA 19002

**Contractor:**

Horst Construction  
320 Granite Run Drive  
Lancaster, PA 17604-3310

**DJ Wagner Heating & Air Cond Inc**

30 Cutler Avenue  
Westville, NJ 08093  
Ph : 856-853-6201

**Letter of Transmittal**

**To:** Zach Weil  
Horst Construction  
320 Granite Run Drive  
Lancaster, PA 17604  
Ph: (717)581-9900

**Transmittal #: 1**  
**Date:** 8/25/2022  
**Job:** 1448 Fieldstone @ Chester Springs

**Subject:** Energy Recovery Rooftop Unit

- WE ARE SENDING YOU**
- Attached
  - Under separate cover via the following items:
  - Shop drawings
  - Prints
  - Plans
  - Samples
  - Copy of letter
  - Change order
  - Specifications
  - Submittal

Document Type	Copies	Date	No.	Description
Submittal	1	8/25/22	237214-1 Rev 0	Energy Recovery Rooftop Unit

**THESE ARE TRANSMITTED as checked below:**

- For approval
- For your use
- As requested
- For review and comment
- FOR BIDS DUE
- Approved as submitted
- Approved as noted
- Returned for corrections
- Other
- PRINTS RETURNED AFTER LOAN TO US
- Resubmit \_\_\_ copies for approval
- Submit \_\_\_ copies for distribution
- Return \_\_\_ corrected prints

**Remarks:**

**Copy To:**

**From:** Stacy Grogan (DJ Wagner)

**Signature:** \_\_\_\_\_



Fieldstone @ Chester Springs

**DIVISION 23 HEATING VENTILATING AND AIR CONDITIONING (HVAC)**

Submittal Cover Sheet 23 72 14

Energy Recovery Rooftop Unit



**Date:** August 25, 2022

**Project:** Field Stone @ Chester Springs Assisted Living

**Engineer:** McHugh Engineering Assoc.

**Contractor:** D.J. Wagner

**Manufacturer:** Daikin

**Equipment:** Packaged Rooftop Unit – Rebel

**Quantity:** (1) One

**Submission:** Original

Submitted By: Scott Knecht  
Sales Engineer

**TriState Project Number:** 138-3617



# Submittal Notes

**Date:** 8/25/2022

**Project:** Field Stone @ Chester Springs

**Manufacturer:** Daikin

**Equipment:** Packaged Rooftop Unit

These notes are in addition to the information provided in the submittal technical data:

Daikin Rebel Model DPS Packaged Rooftop Unit with energy recovery wheel:

- VAV discharge air control
- Double wall cabinet construction with R-7 insulation and galvanized steel liner
- Full perimeter base rail
- Ebtron OA airflow measuring station
- 0-100% economizer with comparative enthalpy control
- Powered modulating ECM exhaust fans
- 2/4 filter rack with 2" MERV 8 / 4" MERV 14 filters
- Energy recovery wheel with bypass and purge plate
- Wheel effectiveness control and modulating defrost control
- 410A Inverter scroll compressors
- Airfoil SWSI plenum supply fan
- ECM supply fan motor
- ECM condenser fan motors for proportional control
- V shaped condenser coil for hail guard
- Draw thru evaporator coil with galvanized steel casing
- Integral EEV
- Stainless steel drain pan with overflow switch
- Modulating hot gas reheat coil
- Gas heat with stainless steel tubular heat exchangers and modulating gas valve
- Unit voltage: 460/3/60
- Factory mounted non-fused disconnect
- Field powered GFI receptacle
- Microtech III controller - **Add \$1,105 for BACnet interface**
- Duct mounted humidity sensor (field installed)
- Roof Crb: 14" high, knock-down, insulated w/ 1" duct liner, 1" isolation rails (field assembled, flex duct by others), wind calcs and attachment brackets
- 1 year parts only warranty
- 4 year extended parts only compressor warranty (five years total)
- 9 year heat exchanger parts only warranty (ten years total)
- Start-up

contractor/owner to advise if control integrate is owned for ERU.  
MEA - AF 09/07/2022

TriState HVAC Equipment, LLP

Union Hill Industrial Park • One Resource Drive • West Conshohocken, PA 19428

Phone # 610-825-4770 • Fax # 610-825-6191

NOT INCLUDED: Epoxy coating, Installation, commissioning, labor warranty, in warranty service, power or control wiring, spare/temporary filters.

**NOTE: CURB TO BE PROVIDED IN A SEPARATE SUBMITTAL.**



# SUBMITTAL DATA

for

1383617 - Fieldstone at Chester Springs Assisted Living

D.J. Wagner

Prepared for

Jack Wagner

Job Number: DT8MRX

Customer PO#:

Prepared by

Scott Knecht

8/24/2022

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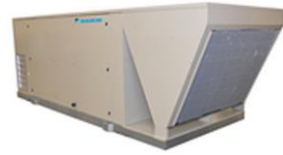
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### General Notes:

MEA - AF - 09/07/2022

1. Install in accordance with the manufacturer's requirements and specifications.
2. Maintain the manufacturer's required service access clearance and code required clearances.
3. Contractor shall coordinate final location of rooftop unit with architect/engineer/owner prior to rough-in.
4. Contractor to coordinate/confirm equipment physical dimensions and configurations with final locations prior to ordering.

# Technical Data Sheet for ERU-1



Job Information		Technical Data Sheet
Job Name	1383617 - Fieldstone at Chester Springs Assisted Living	
Date	8/24/2022	
Submitted By	Jeff Korch	
Software Version	10.80	
Unit Tag	ERU-1	

Unit Overview					
Model Number	Voltage V/Hz/Phase	Design Cooling Capacity Btu/hr	AHRI360 Standard Efficiency		ASHRAE 90.1-2016 Compliant
			EER	IEER	
DPS020A	460/60/3	265701	10.4	19.5	ASHRAE 90.1-2016 compliant

Unit	
Model Number:	DPS020A
Model Type:	Cooling
Heat Type:	Gas
Hot Gas Reheat:	MHGRH with Duct Humidity Sensor
Energy Recovery:	ERW-Large Cab-Econ: 5145cfm max, 100% OA: 8820 cfm max
Application:	Variable Air Volume, Single Zone (Mixed Air or 100% OA)
Controls:	Microtech III
Outside Air:	0-100% Economizer with Comparative Enthalpy Control
Altitude:	0 ft
Approval	cETLus

Physical				
Dimensions and Weight				
Length	Height*	Width	Weight*	
182.3 in	82.5 in	76.5 in	4333 lb	
Corner Weights				
L1	L2	L3	L4	
1282 lb	1007 lb	899 lb	1145 lb	
Construction				
Exterior	Insulation and Liners	Air Opening Location		
		Return	Supply	
Painted Galvanized Steel	2" Injected Foam, R13, Galvanized Steel Liner	Bottom	Bottom	

Electrical				
Unit FLA	MCA	MROPD	SCCR	
57.2 A	64.7 A	90 A	10 kAIC	
Note:	Use only copper supply wires with ampacity based on 75° C conductor rating. Connections to terminals must be made with copper lugs and copper wire.			

# Technical Data Sheet for ERU-1

Return/Outside/Exhaust Air			
Outside Air Option			
Type	Damper Pressure Drop	Exhaust Air Type	
90.1 and California Title 24 Compliant Economizer	0.20 inH <sub>2</sub> O	Airfoil Power Exhaust Fan	
Type	Drive Type	Wheel Diameter	
SWSI AF	Direct Drive	14 in	
Motor			
(Qty) Horsepower	Type	Efficiency	Full Load Current (Each)
(2) 4.0 HP	ECM - Series II	Premium	4.7 A
Performance			
Air Flow CFM	External Static Pressure inH <sub>2</sub> O	Fan Speed RPM	Brake Horsepower HP
7350	1.50	2855	4.05

Energy Recovery										
Design OA Volume		Design Exhaust Volume		Wheel Pressure Drop		Motor HP		Motor FLA		
1500 CFM		1500 CFM		0.35 inH <sub>2</sub> O		0.17 HP		0.4 A		
Summer Conditions										
Temperature								Recovered Capacity Btu/hr	Effectiveness	
Outside Air		Return Air		Wheel Leaving		Mixed Air			Total	Sensible
Dry Bulb °F	Wet Bulb °F	Dry Bulb °F	Wet Bulb °F	Dry Bulb °F	Wet Bulb °F	Dry Bulb °F	Wet Bulb °F			
90.0	74.0	75.0	62.5	77.7	65.2	75.6	63.1	46652	0.75	0.79
Winter Conditions										
Temperature								Recovered Capacity Btu/hr	Effectiveness	
Outside Air		Return Air		Wheel Leaving		Mixed Air			Total	Sensible
Dry Bulb °F	Wet Bulb °F	Dry Bulb °F	Wet Bulb °F	Dry Bulb °F	Wet Bulb °F	Dry Bulb °F	Wet Bulb °F			
14.0	11.3	70.0	54.4	59.2	47.6	67.5	52.9	96759	0.77	0.80
Bypass Damper:		Yes								
Energy Recovery Filters										
Efficiency	Quantity/Size			Face Area		Face Velocity		Air Pressure Drop		
	Outdoor	Exhaust		Outdoor ft <sup>2</sup>	Exhaust ft <sup>2</sup>	Outdoor ft/min	Exhaust ft/min	Outdoor inH <sub>2</sub> O	Exhaust inH <sub>2</sub> O	
2 in. MERV 8	(2) 18 in. X 24 in.	(2) 18 in. X 24 in.		6.0	6.0	250.0	250.0	0.07	0.07	
Combined Efficiency Factor										
Application Specific CEF:		9.2								

Filter Section				
Physical				
Type	Quantity / Size	Face Area	Face Velocity	Air Pressure Drop
COMBO RACK-2" MERV8 & 4" MERV14 from factory	9 / 18 in x 24 in x 2 in & 9 / 18 in x 24 in x 4 in	27.0 ft <sup>2</sup>	237.8 ft/min	0.20

# Technical Data Sheet for ERU-1

## DX Cooling Coil

Physical								
Coil Type	Refrigerant Type	Fins per Inch	Rows	Face Area	Face Velocity	Air Pressure drop	Drain Pan Material	
Cu Tube/ Al Fin	R410A	15	4	21.4 ft <sup>2</sup>	300.0 ft/min	0.32 inH <sub>2</sub> O	Stainless Steel	
Cooling Performance								
Capacity			Indoor Air Temperature					Ambient air Temperature °F
Total Btu/hr	Sensible Btu/hr	Moisture Removal lb/h	Entering		Leaving			
			Dry Bulb °F	Wet Bulb °F	Dry Bulb °F	Wet Bulb °F	Dewpoint °F	
265701	186189	68.3	81.0	67.7	54.5	54.4	54.4	90.0
Condensate Connection Size:		1.0 in. Male NPT						

## Hot Gas Reheat Coil Section

Type	Face Area	Air Pressure Drop	Total Capacity	Leaving Air Temperature	
				Dry Bulb	Wet Bulb
Aluminum Tube Micro-Channel	21.6 ft <sup>2</sup>	0.05 inH <sub>2</sub> O	133893 Btu/hr	73.7 °F	61.5 °F

## Fan Section

Fan				
Type	Fan Wheel Diameter	Fan Isolation		
SWSI AF	20 in	Spring Isolation		
Performance				
Airflow	Total Static Pressure	Fan Speed	Brake Horsepower	Altitude
6420 CFM	4.0 inH <sub>2</sub> O	2346 rpm	7.45 HP	0 ft
Motor				Drive
Type	Horsepower	Efficiency	FLA	Type
Premium Eff Induction Motor	10.0	Premium	12.5 A	Direct Drive

## Gas Heat Section

Physical						
Airflow	Max Allowable Burner Temp Rise	Size	Connection (Qty) Size	Heat Exchanger Material		
6420 CFM	60.0 °F	450 MBH	(2) 0.75 in. Female NPT	Stainless Steel		
Performance						
Capacity Btu/hr	Air Temperature Dry Bulb		Air Pressure Drop inH <sub>2</sub> O	Gas Pressure		Modulation
	Entering °F	Leaving °F		Minimum inH <sub>2</sub> O	Maximum inH <sub>2</sub> O	
360000	47.7	99.4	0.20	5	14	Modulating 12:1 Turndown
: Two gas connections inside the unit. Single pipe enters unit and splits to two manifolds. Refer to IM 1125 for details on piping.						

## Unit Discharge Conditions

Air Temperature				
Motor Heat Btu/hr	Moisture Removal lb/h	Unit Leaving Dry Bulb °F	Unit Leaving Wet Bulb °F	Unit Leaving Dewpoint °F
21504	68.3	57.6	55.5	54.4
Minimum Airflows				
Notes:		Refer to fan curve for applicability of approximate airflows		

# Technical Data Sheet for ERU-1

## Condensing Section

Compressor					
Type	Quantity	Refrigerant Charge lb	Total Power	Capacity Control	Compressor Isolation
Inverter Scroll	1	32.9	17.02 kW	Mod Control with Inverter Compressor	Rubber in Shear
Compressor Amps:					
Compressor 1			30.1 A		
Condenser Coil					
Type	Fins per Inch		Fin Material		
Aluminum Microchannel	23		Aluminum		
Condenser Fan Motors					
Number of Motors*			Full Load Current (Total)		
1 or 2			5.2 A		
AHRI 360 Certified Data at AHRI 360 Standard Conditions					
Net Capacity	EER	IEER	ASHRAE 90.1		
242000 Btu/hr	10.4	19.5	ASHRAE 90.1-2016 compliant		

## Internal Pressure Drop Calculation

External Static Pressure:	1.50 inH <sub>2</sub> O
Filter:	0.20 inH <sub>2</sub> O
Outside Air:	0.20 inH <sub>2</sub> O
DX Coil:	0.32 inH <sub>2</sub> O
Hot Gas Reheat:	0.05 inH <sub>2</sub> O
Gas Heat:	0.20 inH <sub>2</sub> O
<b>Total Static Pressure:</b>	<b>3.98 inH<sub>2</sub>O</b>

## Sound

Frequency	Sound Power (db)							
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Inlet	82	81	89	81	76	75	70	67
Discharge	88	87	92	87	85	82	77	72
Radiated*	51	62	71	73	74	67	61	52

## Options

Unit	
Smoke Detectors:	Return Air Smoke Detector
Ventilation Controls:	Outdoor Air Monitor
Electrical	
Field Connection:	Non-Fused Disconnect Switch
Powered Receptacle:	Field powered 115V GFI outlet
Power Options:	Phase Failure Monitor
Controls	
Communication Card:	BACnet/MSTP card, Factory installed

## Technical Data Sheet for ERU-1

### Factory Installed Sensors

Leaving Coil/Entering Fan Temperature Sensor
Duct High Limit Switch
BACnet/MSTP Card
Return Air Temperature Sensor
Discharge Air Temperature sensor – Wired in unit, mounted in supply duct
Outside Air Temperature Sensor
Return Air Enthalpy Sensor
Outside Air Enthalpy Sensor
Dirty Filter On/Off Switch
Supply Fan Air Proving Via Modbus
Building Static Pressure Sensor
Condensate Overflow Switch
Ebtron Airflow Station
Supply Leaving Wheel Temperature Sensor
Exhaust Leaving Wheel Temperature Sensor
Return Air Relative Humidity Sensor
Energy Wheel VFD

### Warranty

<b>Parts:</b>	Standard One Year
<b>Compressor:</b>	Additional Four Year, Five Year Total
<b>Gas Heat Exchanger:</b>	Extended Nine Year, Ten Year Total

### AHRI Certification



All equipment is rated and certified in accordance with AHRI 360.

### Notes

\* TWO CONDENSER FAN SOLUTIONS ARE DESIGNED FOR THIS UNIT TO PREVENT DELAYS IN SHIPMENTS RELATED TO GLOBAL SUPPLY CHAIN. ONE DESIGN USES TWO SMALLER CONDENSER FANS, THE OTHER USES ONE LARGER FAN. THERE ARE SUBTLE DIFFERENCES, BUT SUBMITTAL DATA PROVIDED HERE APPLIES TO BOTH DESIGNS BY ENSURING THE FOLLOWING:

- UNIT ELECTRICAL (TOTAL UNIT FLA, MCA, AND MROPD) ARE IDENTICAL ACROSS BOTH DESIGNS (I.E. NO CHANGE ACROSS DESIGNS)
- AHRI EFFICIENCY (EER/IEER) ARE IDENTICAL ACROSS BOTH DESIGNS (NO CHANGE ACROSS DESIGNS)
- CONDENSER DECK HEIGHT DOES CHANGE, BUT HEIGHT DIMENSION PROVIDED HERE THE LARGER OF THE TWO, SO THE UNIT WILL BE AT OR LESS IN HEIGHT OF DIMENSION SHOWN. (ONE DESIGN'S HEIGHT IS 82.5", THE OTHER IS 70.5")
- THE TWO FAN DESIGN IS 52 LBS HEAVIER THAN THE OTHER DESIGN, BUT DOES NOT IMPACT UNIT COG, AND LARGER VALUE IS WHAT IS DISPLAYED IN SUBMITTAL.
- RADIATED SOUND FOR THE SINGLE FAN DESIGN IS SLIGHTLY HIGHER, BUT THE HIGHER VALUE IS DISPLAYED ON THE SUBMITTAL
- BOTH DESIGNS MATCH THE CONDENSER FAN MECHANICAL SPECIFICATION PROVIDED

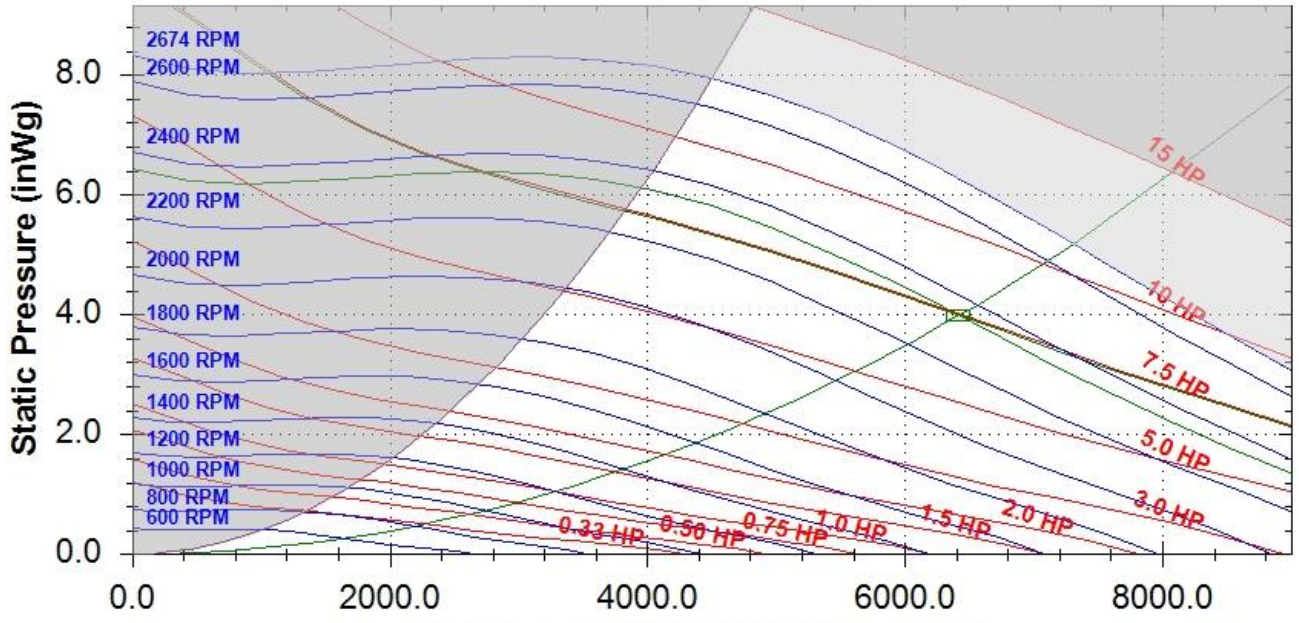
Unit is to be lifted with proper rigging practices outlined in IOM. Forklifting the unit is not allowed.

### Accessories

Mandatory	
Part Number	Description
910190890	HUMIDITY SENSOR, DUCT MOUNTED, 0-5VDC

Fan Curve - Supply for ERU-1

### Daikin Fan Selection



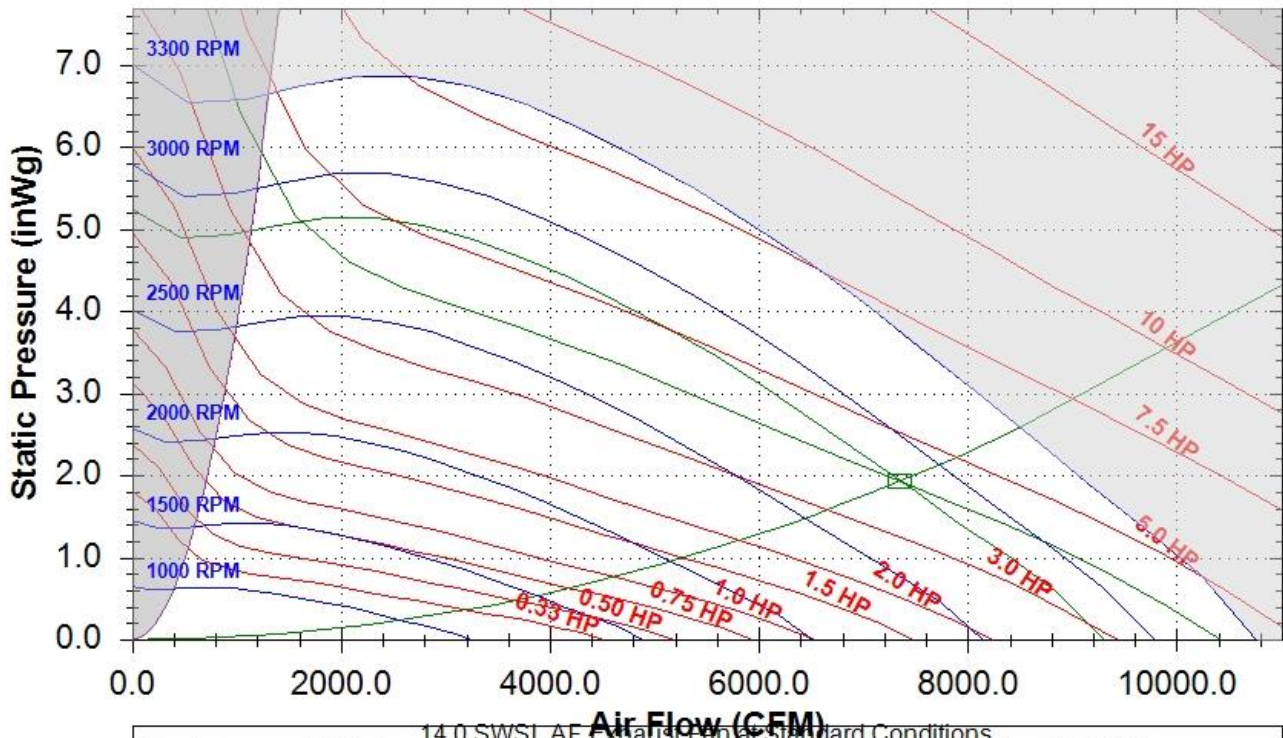
20.0 SWSI - Plenum Supply at Standard Conditions

Base Tag	ERU-1			Date	Aug 24 2022			
Job Name	1383617 - Fieldstone at Chester S...			Time	3:48 PM			
Air Volume	6420	CFM		Fan Speed	2346	RPM		
Total Static	3.98	inWg		Max Speed	2674	RPM		
Brake Horsepower	7.45	HP		Efficiency	54	%		
Unit Sound Power	63hz	125hz	250hz	500hz	1000hz	2000hz	4000hz	8000hz
Inlet Sound Power	82	81	89	81	76	75	70	67
Outlet Sound Power	88	87	92	87	85	82	77	72
Radiated Sound Power	51	62	71	73	74	67	61	52

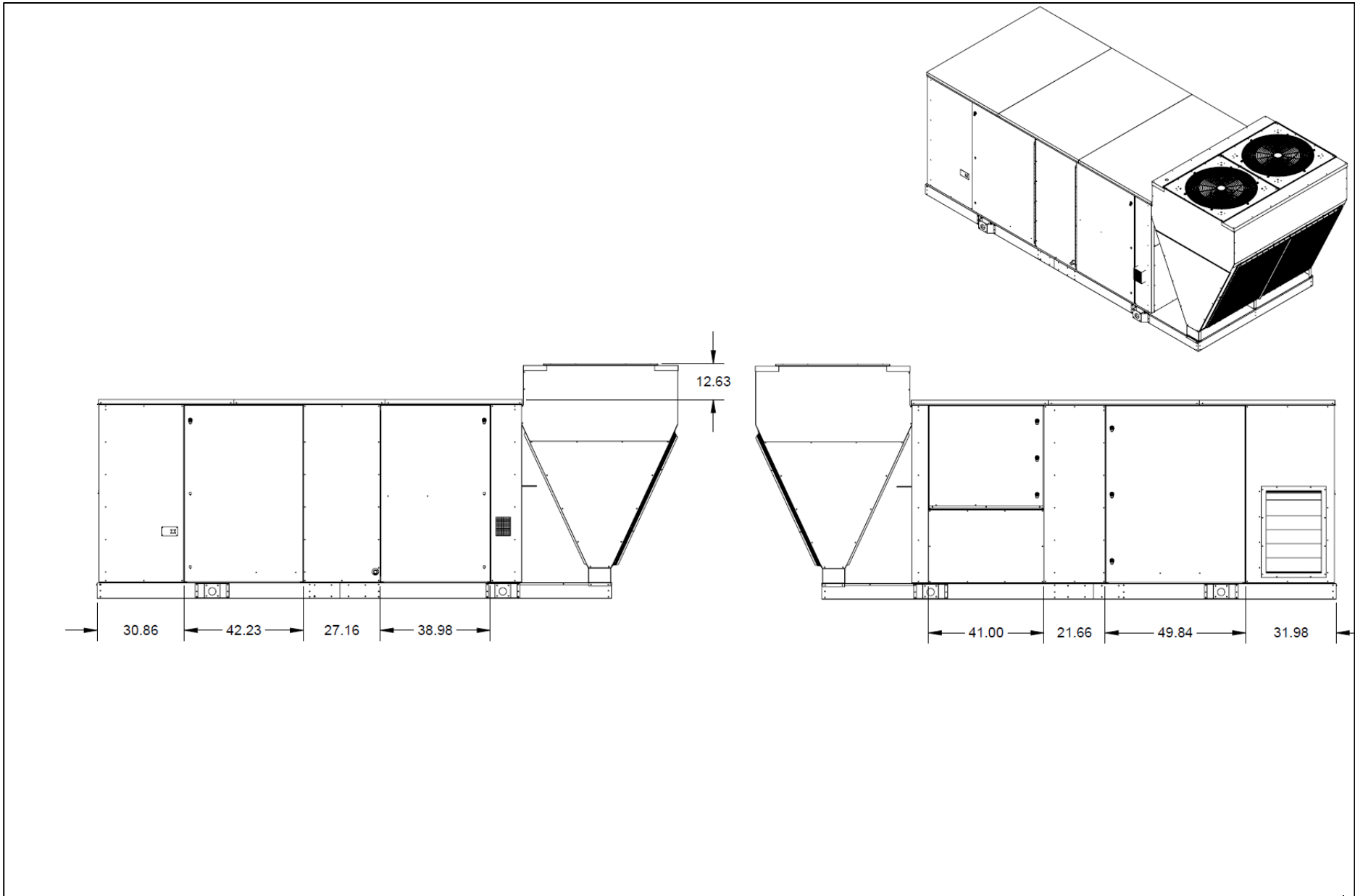
**DAIKIN**


Fan Curve - Exhaust for ERU-1

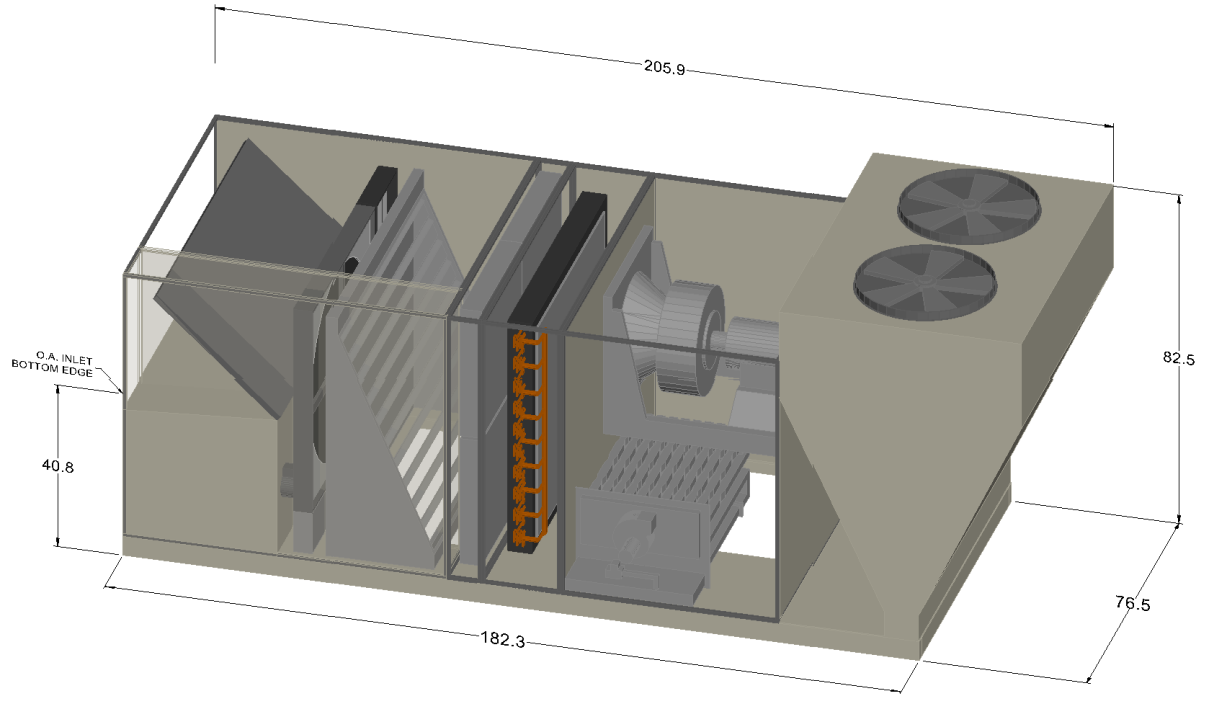
### Daikin Fan Selection




14.0 SWST AF Exhaust Fan at Standard Conditions			
Base Tag	ERU-1	Date	Aug-24-2022
Job Name	1383617 - Fieldstone at Chester S...	Time	3:48 PM
Air Volume	7350 CFM	Fan Speed	2855 RPM
Total Static	1.9 inWg	Max Speed	3300 RPM
Brake Horsepower	4.05 HP	Efficiency	55 %



<b>Product Drawing</b>	Unit Tag: ERU-1	Sales Office: TriState HVAC Equipment, LLP (Phil.)				 13600 Industrial Park Blvd. Minneapolis, MN 55441 <a href="http://www.DaikinApplied.com">www.DaikinApplied.com</a> Software Version: 10.80
Product:	Project Name: 1383617 - Fieldstone at	Sales Engineer:				
Model: DPS020A	Aug. 24, 2022	Ver/Rev:	Sheet: 1 of 1	Scale: NTS	Tolerance: +/- 0.25"	
No change to this drawing may be made unless approved in writing by Daikin Applied. Purchaser must determine that the equipment is fit and sufficient for the job specifications.						

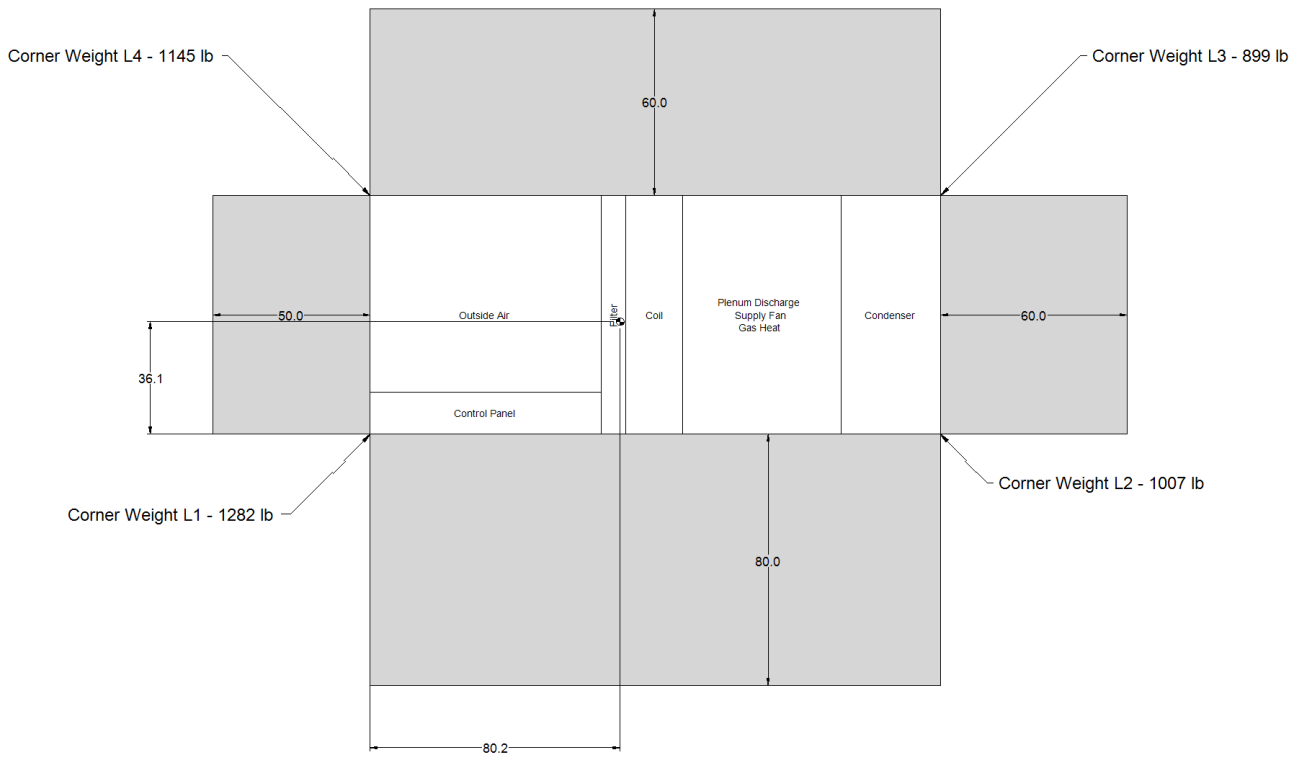


- Notes:
- (1) Recommended location for optional field cut side power connection.
  - (2) Horizontal gas connection only. Gas pipe routing within the roofcurb is not available.

<b>Product Drawing</b>	<b>Unit Tag: ERU-1</b>	<b>Sales Office: TriState HVAC Equipment, LLP (Phil.)</b>				 13600 Industrial Park Blvd. Minneapolis, MN 55441 www.DaikinApplied.com Software Version: 10.80
Product:	Project Name: 1383617 - Fieldstone at	Sales Engineer: SalesEngineer				
Model: DPS020A	Aug. 24, 2022	Ver/Rev:	Sheet: 1 of 1	Scale: NTS	Tolerance: +/- 0.25" Dwg Units: in [mm]	


No change to this drawing may be made unless approved in writing by Daikin Applied. Purchaser must determine that the equipment is fit and sufficient for the job specifications.





PLAN VIEW - CG, CORNER WEIGHTS, SERVICE CLEARANCE

- Notes:  
 (1) Center of Gravity Height = 34.5  
 (2) Total Weight = 4333 lb

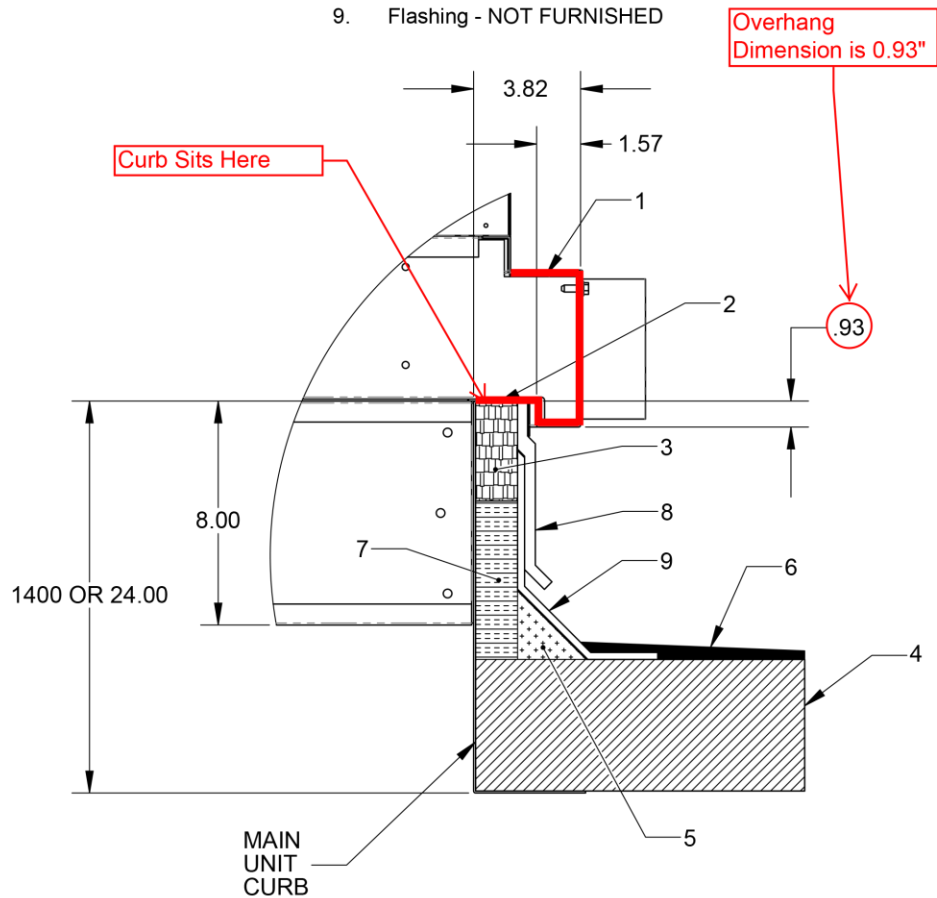
<b>Product Drawing</b>	Unit Tag: ERU-1	Sales Office: TriState HVAC Equipment, LLP (Phil.)				 13600 Industrial Park Blvd. Minneapolis, MN 55441 www.DaikinApplied.com Software Version: 10.80
Product:	Project Name: 1383617 - Fieldstone at	Sales Engineer: SalesEngineer				
Model: DPS020A	Aug. 24, 2022	Ver/Rev:	Sheet: 1 of 1	Scale: NTS	Tolerance: +/- 0.25" Dwg Units: in [mm]	


No change to this drawing may be made unless approved in writing by Daikin Applied. Purchaser must determine that the equipment is fit and sufficient for the job specifications.

# Large Cabinet Rebel Base Rail for ERU-1

## ROOFING DETAIL "A"

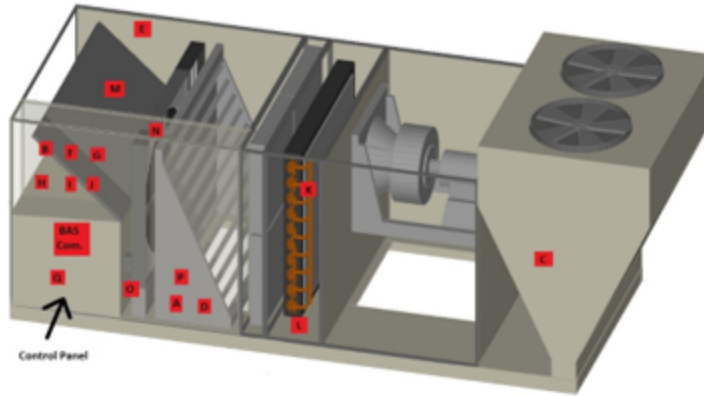
1. Unit Base
2. Curb gasketing
3. 2 x 4 nailer strip
4. Galvanized curb
5. Cant strip - NOT FURNISHED
6. Roofing material - NOT FURNISHED
7. Rigid insulation - NOT FURNISHED
8. Counter flashing - NOT FURNISHED
9. Flashing - NOT FURNISHED



<b>Product Drawing</b>		Unit Tag: ERU-1		 13600 Industrial Park Blvd. Minneapolis, MN 55441 www.DaikinApplied.com Software Version: 10.80		
Product:		Project Name: 1383617 - Fieldstone at				
Model: DPS020A		Sales Office: TriState HVAC Equipment,		Scale: NTS	Tolerance: +/-0.25"	Dwg Units: in [mm]
Sales Engineer:		Aug. 24, 2022	Ver/Rev:	Sheet 1 of 1		
No change to this drawing may be made unless approved in writing by Daikin Applied. Purchaser must determine that the equipment is fit and sufficient for the job specifications.						

# Cabinet C Sensor Locations for ERU-1


Rebel 16-28 Tons Factory Installed Sensor Locations <sup>1</sup>



Only applies to units with factory mounted controls

SENSOR DESCRIPTION	LABEL
Return Air Temp Sensor	A
Discharge Air Temp Sensor - Wired in unit, mounted in supply duct	B
Outside Air Temp Sensor	C
Return Air Enthalpy Sensor	D
Outside Air Enthalpy Sensor	E
Dirty Filter On/Off Switch	F
Supply Fan Air Proving via Modbus	G
Duct High Limit Switch	H
Duct Static Pressure Sensor	I
Building static pressure sensor	J
Leaving Coil/Entering Fan Temp Sensor	K
BACnet/IP card	BAS Comm.
LON card	
Daikin Intelligent Systems Card	
DIII Gateway Card (VRV communication)	
Condensate Overflow Switch	L
Ebtron Airflow Station	M
Supply Leaving Wheel Temp Sensor	N
Exhaust Leaving Wheel Temp Sensor	O
Return Air Relative Humidity Sensor	P
Energy Wheel VFD	Q

1) Sensors provided are based on unit selection. Refer to unit specific technical data sheet for selection specific sensor list

<b>Product Drawing</b>	Unit Tag: ERU-1			 13600 Industrial Park Blvd. Minneapolis, MN 55441 www.DaikinApplied.com Software Version: 10.80		
Product:	Project Name: 1383617 - Fieldstone at					
Model: DPS020A	Sales Office: TriState HVAC Equipment,			Scale: NTS	Tolerance: +/-0.25"	Dwg Units: in [mm]
Sales Engineer:	Aug. 24, 2022	Ver/Rev:	Sheet 1 of 1			
No change to this drawing may be made unless approved in writing by Daikin Applied. Purchaser must determine that the equipment is fit and sufficient for the job specifications.						

## SeqOfOperation Doc C for ERU-1

Sequence of Operation Specifications:

### ONLY APPLIES TO UNITS WITH FACTORY MOUNTED CONTROLS

- UNIT CONTROLS:
  - Building Automation System (BAS) interface: The factory unit controller will interface with BACnet MSTP, IP and LON BAS systems (requires optional communication card).
  - Head Pressure Control: The condenser head pressure will be monitored by the unit controller to maintain head pressure and the compressor operating envelope at all times to avoid high pressure trips on high load days. Condenser fans with ECM motors shall be provided as well as factory sensors to provide this protection.
  - Compressor Envelope Control: The unit controller will continually monitor the suction and discharge pressure and temperature conditions during compressor operation. The unit will modulate the compressor, condenser head pressure, and electronic expansion valve to maintain a safe compressor operating conditions to add reliability, and limit unit shut down during fringe operating conditions
- CHANGE OVER SETPOINTS: The unit change over source temperature is the variable, Outdoor air temperature (OAT), Return air temperature (RAT), or space temperature (ST), that drives the change of unit states. The unit state will change from cooling, fan only or heating based on the changeover heating or cooling setpoints.
- SUPPLY FAN: The RTU will be factory supplied with a direct drive supply fan.
  - Single Zone VAV: The supply fan will operate continuously between a specified minimum and maximum speed. The unit will modulate the supply fan between the minimum and maximum based on how near or far the control temperature (typically space or return temp) is away from setpoint.
- OUTSIDE AIR DAMPER CONTROL:
  - Proportional damper reset: The unit controller will proportionally modulate the outside air dampers open and closed as the supply fan speed changes to provide a constant volume of fresh outside air.
  - Outdoor air monitor: The unit controller will modulate the outside air damper as required to maintain the outside air cfm setpoint as measured by the factory provided flow station (Requires Optional OA Monitor).
  - DCV: A space or duct mounted CO2 sensor will supply a PPM reading to the unit controller. The unit controller will open the OA damper to provide more ventilation air as required by the CO2 PPM reading (Requires Optional CO2 Sensor)
  - External Reset: An external 0-10 VDC or 4-20 mA signal can be wired to the unit controller to control the OA damper position by a third party.
- COOLING:
  - Discharge Air Control: In the cooling mode, the unit capacity will modulate the variable speed compressor to maintain the unit cooling discharge air set point. The cooling DAT set point will be

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adjustable at the unit controller. Unit capacity will be modulated by the variable speed compressor operation.

- Cooling DAT reset: The cooling DAT setpoint may be reset by the space temp, return temp, OAT or external Voltage/mA signals. A linear relationship between the DAT and the reset variable will be created for the minimum and maximum DAT setpoints. As the reset variable changes the DAT will adjust according to the relationship.
- ECONOMIZER: A comparative dry bulb (standard option) or comparative enthalpy (selectable option) shall be engaged whenever the outdoor enthalpy or dry bulb is less than the return air enthalpy or dry bulb to utilize outside air for cooling. Outside air and return air dampers shall modulate to maintain supply air temperature set point.
- EXHAUST FAN CONTROL: If the optional exhaust fans are provided they will be direct drive electrically commutated motor(s) (ECM). If powered exhaust is not provided barometric relief dampers are standard. Powered exhaust control options are as follows:
  - Building pressure Control: A differential pressure transducer shall compare the indoor building pressure to ambient atmospheric pressure. The exhaust fan(s) shall modulate to maintain the building pressure set point.
  - Speed Control: The exhaust fan(s) will run at a constant speed.
  - Network Control: Exhaust fan speed is commanded from the building automation system.
  - Outdoor Air Damper Tracking: The exhaust fan(s) will activate based on the outside air damper position and will modulate between an adjustable minimum and maximum as the OA damper opens to provide relief.

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## Sequence of Operations

### ONLY APPLIES TO UNITS WITH FACTORY MOUNTED CONTROLS

#### ENERGY RECOVERY WHEEL:

Wheel Control: The enthalpy wheel is turned on whenever the exhaust fan is running and the outdoor air dampers are at the minimum position (i.e. the unit is not in the economizer operating state). The wheel is shut off if the exhaust fan ever turns off or if the unit enters the economizer operating state.

- Bypass Dampers<sup>1,2</sup>: On economizer units (not 100% outside air units) the wheel is equipped with bypass dampers. Bypass dampers are opened when the unit enters the economizer operating state. Otherwise the bypass dampers remain closed.
- Wheel Effectiveness Control: The energy recovery wheel will start/stop or modulate its speed (if equipped with the optional VFD) to meet the discharge air temperature set point using factory mounted temperature sensors. The energy wheel is the first form of heating or cooling when active. Compressors or heat will only be active when the energy recovery wheel cannot satisfy the DAT.
- On/Off Defrost Control (standard option) – When the outside air temp is below an adjustable frost temperature (default 32F) the wheel is stopped for an adjustable period of time (default 5 minutes) once every 60 minutes (adjustable).
- Frost Prevention Control (selectable option) – The unit will monitor return air temperature and humidity, outside air temperature, and exhaust air temperature. Assuming an outdoor air relative humidity of 95% the unit will calculate the point at which condensate will develop in the exhaust air<sup>3</sup> (see the intersection point in figure 1 below). When the exhaust air reaches this temperature the wheel will begin to start/stop (no VFD is included) or modulate (VFD is included) to reduce the effectiveness of the wheel and avoid frost buildup. This allows the wheel to remain on at these frost prevention times and still recover some energy.

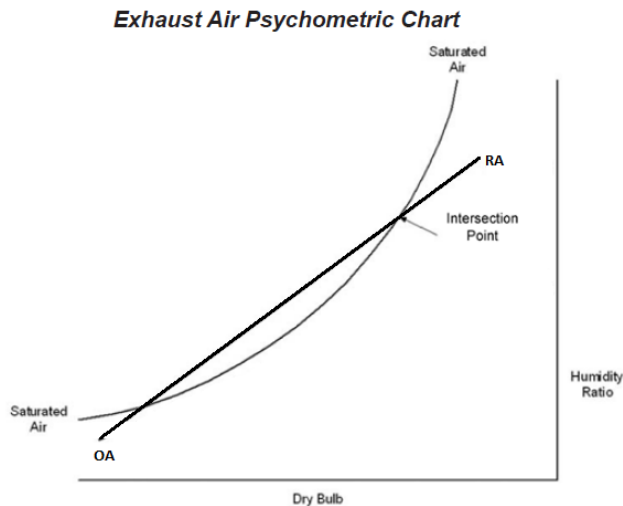


Figure 1: Exhaust Air Temperature Intersection Point

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### Notes

- 1) Bypass dampers are not provided on 100% OA units. On these units bypass dampers are omitted to allow for the installation of a larger energy wheel. 100% outside air units require conditioning of the air at most if not all times of the year, so a larger wheel without bypass dampers is provided instead.
- 2) Wheel bypass dampers are not required for 100% recirculation morning warmup/precool/night setback control. The standard set of dampers downstream of the energy wheel allow for this on both economizer and 100% outside air units.
- 3) Outside air must also be below an adjustable frost temperature (default 32F)

EXHAUST FAN CONTROL: Exhaust fans are direct drive electrically commutated motor(s) (ECM). Powered exhaust control options are as follows:

- i. Building pressure Control: A differential pressure transducer shall compare the indoor building pressure to ambient atmospheric pressure. The exhaust fan(s) shall modulate to maintain the building pressure set point.
- ii. Speed Control: The exhaust fan(s) will run at a constant speed.
- iii. Network Control: Exhaust fan speed is commanded from the building automation system.
- iv. Outdoor Air Damper Tracking (Mixed air units only): The exhaust fan(s) will activate based on the outside air damper position and will modulate between an adjustable minimum and maximum as the OA damper opens to provide relief.

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Sequence of Operation Specifications:

### ONLY APPLIES TO UNITS WITH FACTORY MOUNTED CONTROLS

- MODULATING HOT GAS REHEAT
  - The unit is provided with fully modulating, sub cooling, hot gas reheat coil. The control sequence used for dehumidification in a Rebel unit uses two separate points of control. The first point is the leaving coil temperature sensor (LCT), and the second point is the discharge air temperature sensor (DAT). During dehumidification the refrigeration circuit controls the compressor(s) to maintain the LCT setpoint (adjustable) and the reheat coil is controlled to maintain the supply air reheat setpoint. The supply air reheat setpoint changes based on the whether there is a call for both cooling and dehumidification or a call for dehumidification only. When a call for both cooling and dehumidification is made the reheat setpoint is set as the cooling DAT setpoint. During a call for dehumidification only the reheat setpoint is reset in a linear manner between two endpoints referred to as the min and max reheat setpoints (adjustable). This reset is based on the cooling and heating setpoints for the RTU. This logic will send warmer supply air when the space is approaching the heating changeover setpoint and cooler supply air when the space is approaching cooling changeover setpoint. This logic prevents unnecessary fluctuations between cooling and heating states.
  - Rebel's dehumidification controls allow the unit to cool and dehumidify simultaneously or just dehumidify if no cooling is needed.
  - To enable the dehumidification sequence the following options are available:
    - Relative Humidity (Requires a relative humidity sensor) - Dehumidification will be activated when the relative humidity in the return duct, space, or outdoor air rises above the dehumidification set point.
    - Dew Point (Requires a relative humidity sensor<sup>1,3</sup>)- Dehumidification will be activated when the dew point in the return duct, space, or outdoor air rises above the dehumidification set point.
    - Reheat Always (no humidity sensor required<sup>2,3</sup>): The unit will always overcool the air to the LCT setpoint and reheat it to the reheat setpoint unless the unit is in the heating state.

Notes –

- 1) The option for dew point dehumidification uses a relative humidity sensor. The user must define the location of the sensor in the unit controller as Space, OAT, or RAT. The unit controller will reference the temperature sensor in the specified location and calculate the dew point based on that temperature and the reading from the relative humidity sensor.
- 2) This is the most commonly used option for 100% outside air units used to provide neutral air.
- 3) Enabling dehumidification based on outside air dew point is the second most common option for 100% outside air units.

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Sequence of Operations

**ONLY APPLIES TO UNITS WITH FACTORY MOUNTED CONTROLS**

### GAS HEAT

The unit is provided with staged or modulating gas heat.

- Modulating Gas Heat: The modulating gas heat will be modulated by the unit controller to maintain the heating DAT set point.
- Staged Gas Heat: The staged gas heat will increase or decrease stages based on the stage timer and whether the DAT is greater or less than the effective DAT setpoint.

Heating DAT reset: The heating DAT setpoint may be reset by space, return, OAT, Network or external Voltage/mA signals. A linear relationship between the DAT and the reset variable will be created for the minimum and maximum DAT setpoints. As the reset variable changes the DAT will adjust according to the relationship.

## Document Summary Page