LG
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MULTI V™

DEDICATED OUTDOOR AIR SYSTEM ENGINEERING MANUAL

Variable Refrigerant Flow

Dedicated Outdoor Air System (DOAS)

Model ARND20BDAT2

Model ARND20BDAR2 (no preheat)

PROPRIETARY DATA NOTICE

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A summary list of safety precautions is on page 3.

For more technical materials such as submittals, catalogs, installation, owner's, and service manuals, visit www.lghvac.com.

About LG Electronics

LG Electronics is a global leader and technology innovator in consumer electronics, mobile communications, and home appliances. LG Electronics comprises five business units—Home Entertainment, Mobile Communications, Air Conditioning, Business Solutions, and Home Appliance. LG is one of the world's leading producers of flat panel televisions, audio and video products, mobile handsets, air conditioners, and washing machines. LG's commercial air conditioning business unit was established in 1968 and has built its lineup of residential and commercial products to include VRF, multi-zone, duct-free split systems, packaged terminal air conditioners (PTACs), and room air conditioners. In 2011, the air conditioning and energy solutions business unit grew to include LED lighting and solar products. For more information, visit www.lg.com.

Variable Refrigerant Flow (VRF) Technology

In the early 1980s, VRF technology was introduced to the world as an alternative method of cooling and heating in commercial structures designed to minimize energy consumption. VRF systems have become the system of choice for designers internationally because these systems offer better comfort at substantially lower operating costs when compared to traditional HVAC systems. Older systems are being replaced with newer more efficient systems making VRF a viable option. Today, VRF is gaining popularity in the United States. LG air-source systems offer the opportunity to eliminate ductwork in the same configuration. The systems offer zoning without the need for zone damper systems. The advanced controls provide exceptional building dehumidification and temperature control and can rapidly adapt system operating parameters to the ever changing building load.

Quality Commitment

LG is committed to the success of every Multi V project by providing the best industry technical support during project engineering, installation, and commissioning. LG offers a variety of resources designed for engineers, architects, installers, and servicers to ensure that every Multi V installation is completed successfully. Classes are conducted at LG's training centers and in field locations at various times throughout the year and upon special request.

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TABLE OF SYMBOLS

⚠ **DANGER**	*This symbol indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.*
⚠ **WARNING**	*This symbol indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.*
⚠ **CAUTION**	*This symbol indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.*
Note:	*This symbol indicates situations that may result in equipment or property damage accidents only.*
⃠	*This symbol indicates an action should not be completed.*

INTRODUCTION

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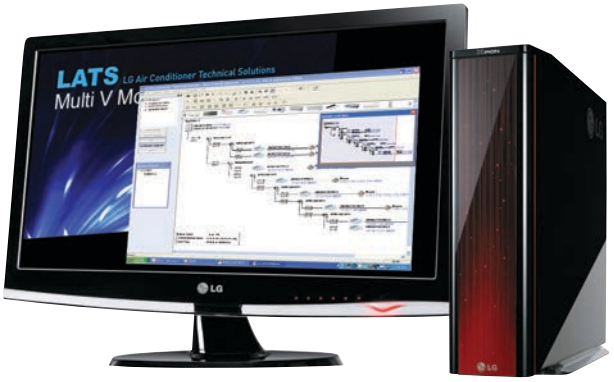
ENGINEER'S ADVANTAGE

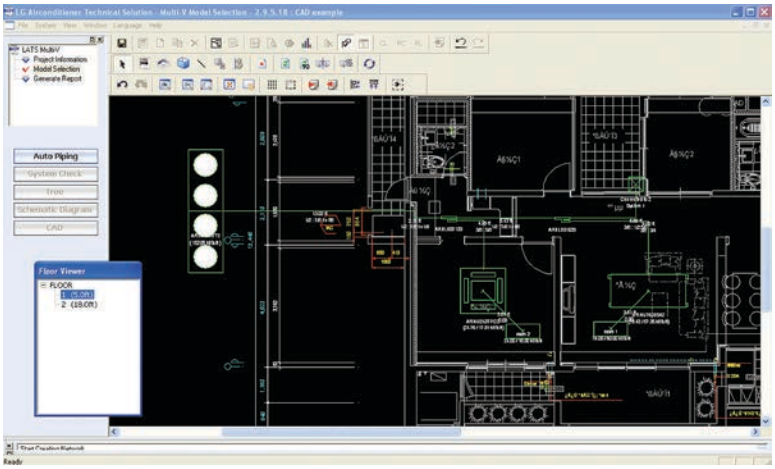
MULTI V™

Intuitive Design

The LG Air Conditioning Technical Solution (LATS) Multi V design and layout software provides an intuitive, quick, and simple method to design a Multi V refrigerant pipe system. LATS Multi V checks piping length elevations and it assists with the sizing of indoor and outdoor units by calculating component capacity based on design conditions.

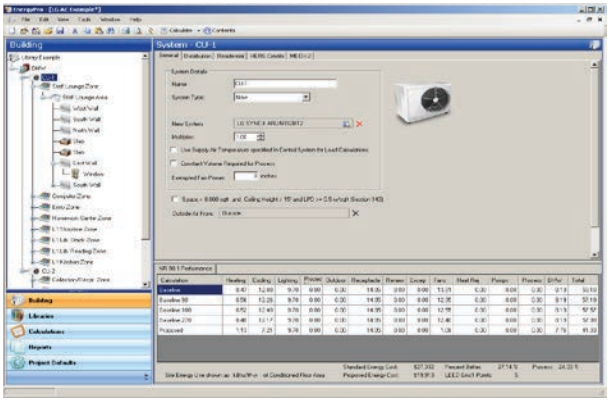
LATS Multi V is the industry's only VRF modeling software that can import AutoCAD® drawings and lay out the Multi V system to scale. When the designer finishes the AutoCAD® system layout, all of the piping lengths will be calculated, and a drawing file with the Multi V system will be available for export and integration into the building drawing set.

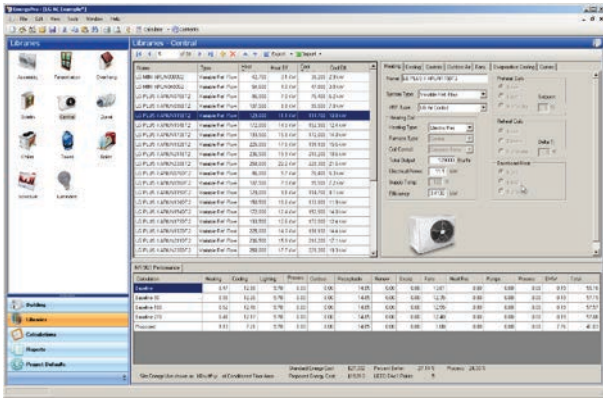




Energy Modeling

LG stands behind efficiency and performance. You will find Multi V equipment libraries available for conducting building energy modeling using Trane TRACE 700™, eQUEST®, and Energy Pro™ so you can generate the necessary documentation to compare your building design against the ASHRAE 90.1 baseline model. Use the results to see how Multi V VRF stacks up against traditional systems, making it easier to earn LEED® Energy and Atmosphere (EAc-1) credits.





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PRODUCT DATA

FEATURES AND BENEFITS

The Dedicated Outdoor Air System (DOAS) optimizes energy savings and performance. The DOAS provides numerous benefits including:

- Airflow rate variable from 400 to 2000 CFM
- Air handler controller senses high outdoor air humidity and provides dehumidification mode
- Reheat coil allows heating of dehumidified air to room neutral temperatures
- Flexible design allows matching of outdoor unit to meet local outdoor air design conditions
- Web access to air handler controller
- Air handler controller connects to laptop computer without special software
- Varying outdoor air temperatures can be conditioned using energy efficient LG VRF technology
- Available in two models - with electric preheat coil or without electric preheat coil

Figure 1: DOAS Applications — Two Outdoor Units; One Using Main Coil and the Other Using Reheat Coil

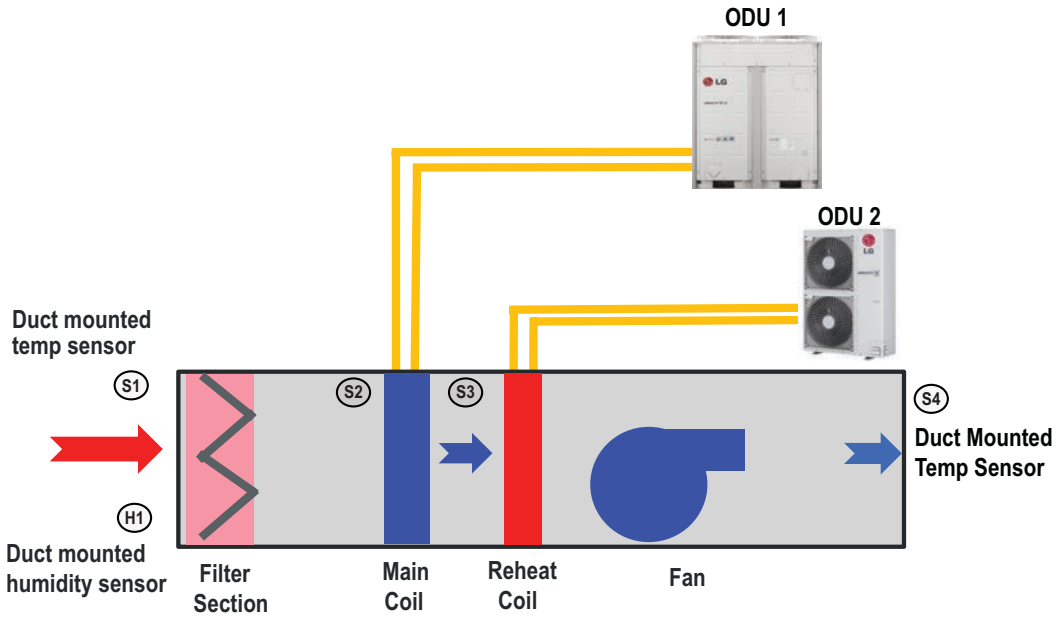


Figure 2: DOAS Applications — One Outdoor Unit Using Main Coil (Reheat Coil Not Used)

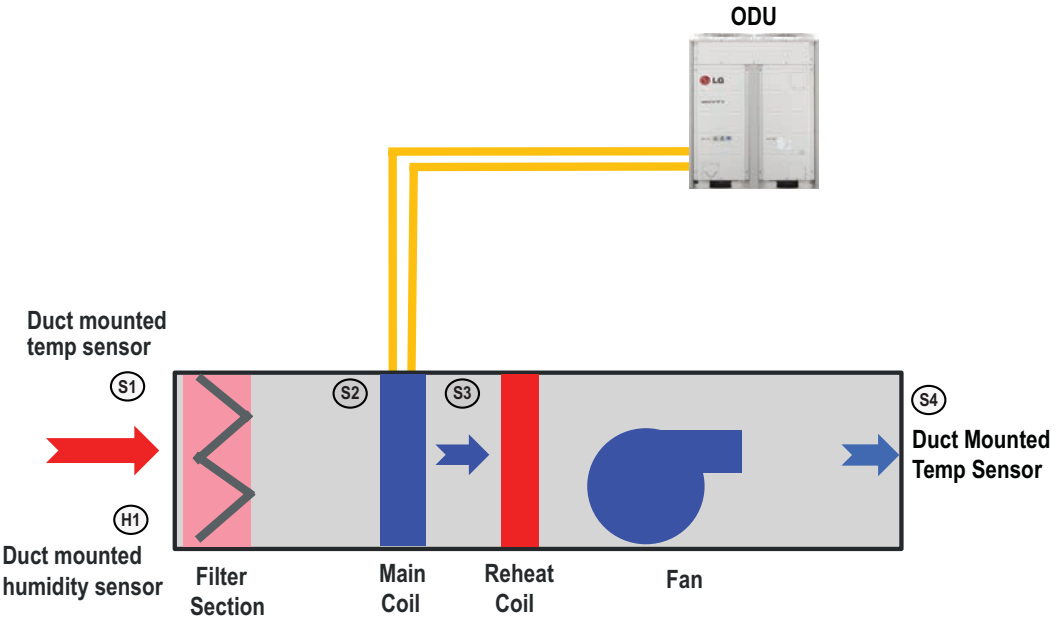


Figure 3: DOAS Applications — Two DOAS Units with Two Outdoor Units. One Outdoor Unit Using the Main Coils, the Other Outdoor Unit Using the Reheat Coils (Both DOAS Units Must Run at the Same Time)

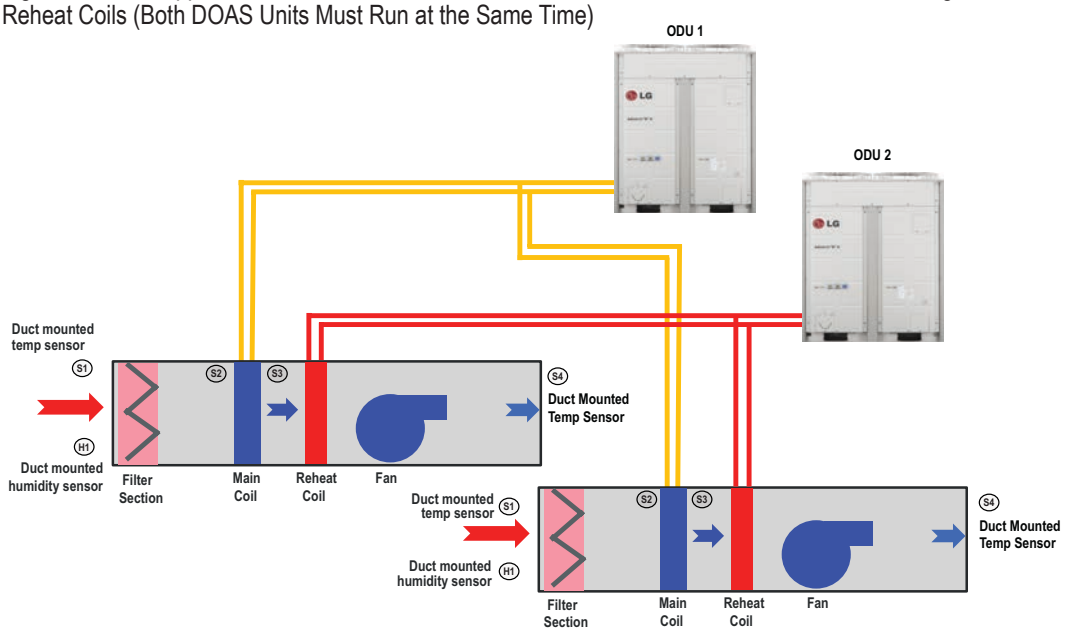


Figure 4: DOAS Applications — Two DOAS Units with One Outdoor Unit. One Outdoor Unit Using the Main Coils, the Reheat Coils are Not Used (Both DOAS Units Must Run at the Same Time)

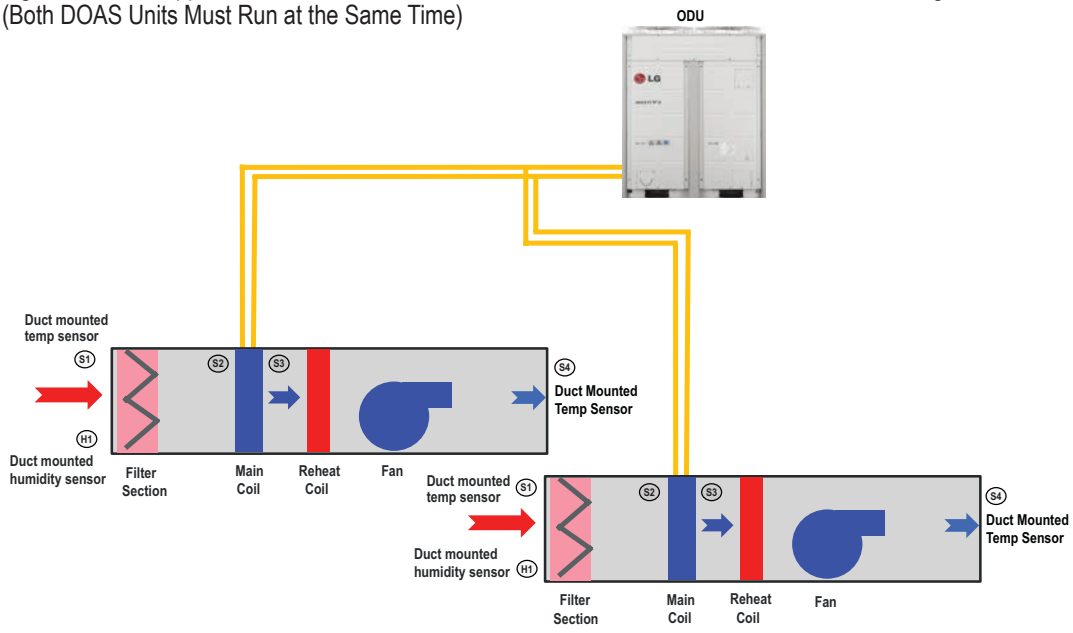
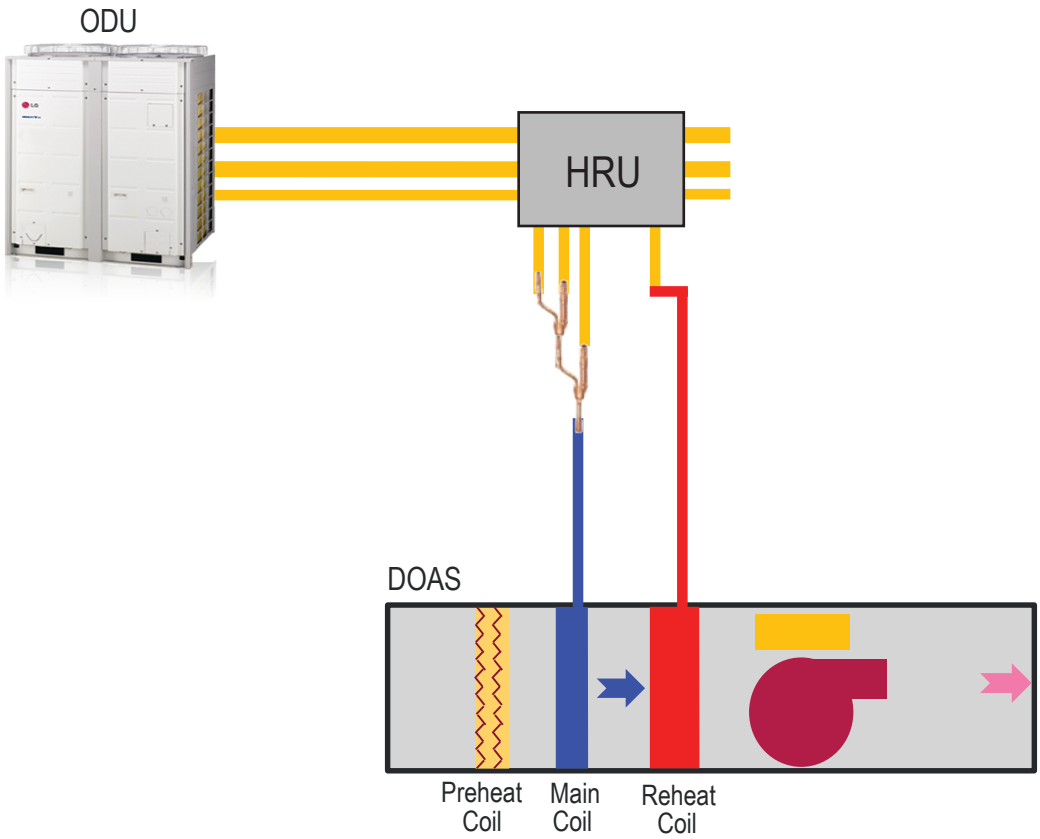
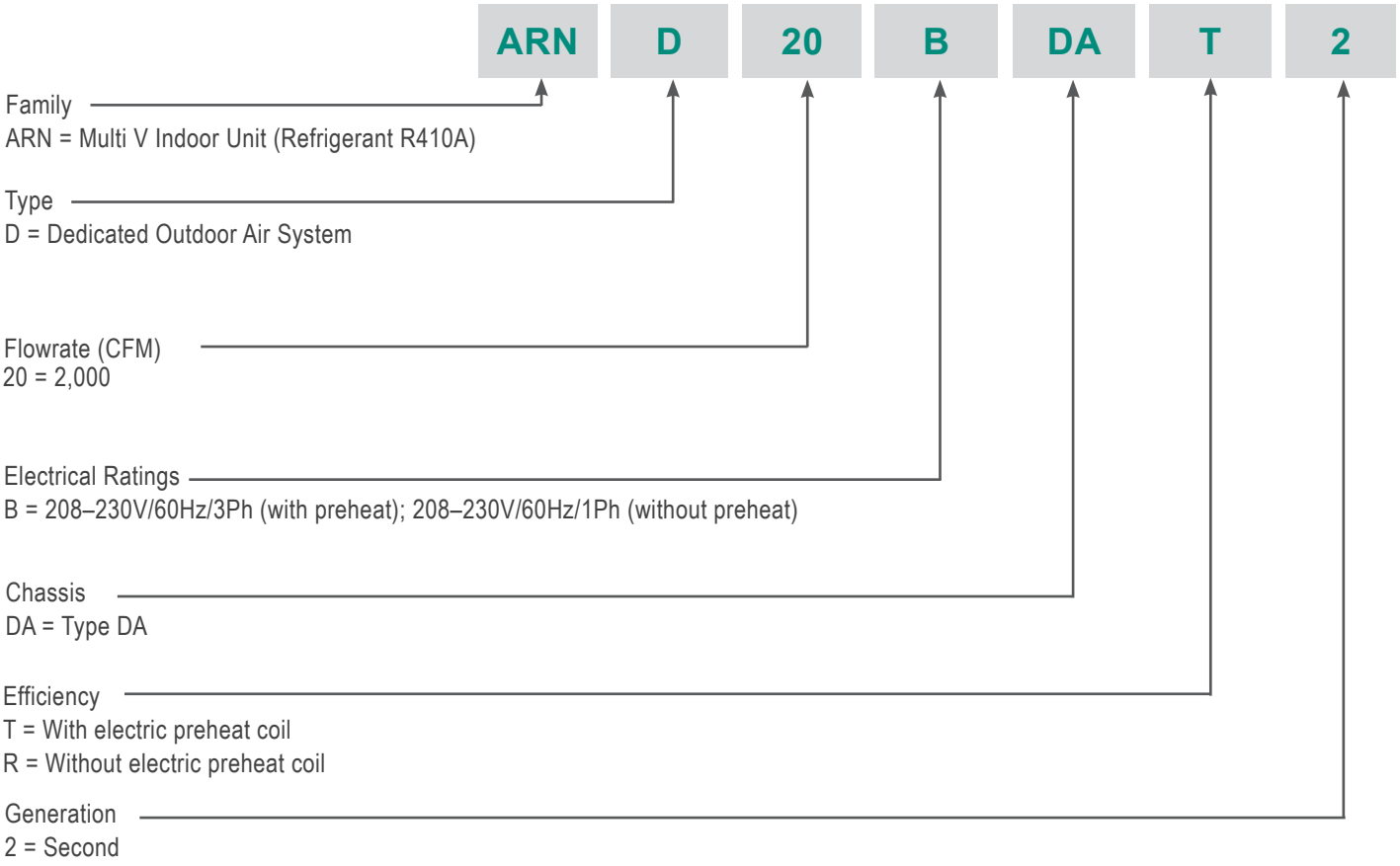


Figure 5: DOAS Applications — DOAS Unit in a Heat Recovery System



UNIT NOMENCLATURE



GENERAL DATA

MULTI V™

Dedicated Outdoor Air System Specifications

Table 1: Dedicated Outdoor Air System General Data

	Dedicated Outdoor Air System	
	ARND20BDAT2	ARND20BDAR2
Cooling Mode Performance		
Capacity (Btu/h)	143,100	143,100
Heating Mode Performance		
Capacity (Btu/h) (Main Coil)	59,900	59,900
Capacity (Btu/h) (Reheat Coil)	45,900	45,900
Entering Air		
Cooling Max (°F DB/WB)	122/78	122/78
Heating Min (°F DB)	2.5	41
Unit Data		
Refrigerant Type[1]	R410A	R410A
Refrigerant Control	EEV	EEV
Sound Power dB(A)	84	84
Net Unit Weight (lbs)	725	600
Shipping Weight (lbs)	825	700
Communication Cable[2]	4 x 18	4 x 18
Fan		
Type	Backward Curved Plenum	Backward Curved Plenum
Motor	1	1
Motor/Drive	ECM/Direct	ECM/Direct
Airflow Rate (CFM)	2000	2000
External Static Pressure (in wg)	1.65	1.65
Airflow Range (CFM)	400 - 2000	400 - 2000
Piping (Main Coil)		
Liquid Line (in, OD)	1/2	1/2
Vapor Line (in, OD)	1-1/8	1-1/8
Piping (Reheat Coil)		
Liquid Line (in, OD)	1/2	1/2
Vapor Line (in, OD)	1-1/8	1-1/8
Condensate		
Condensate Line (in, OD)	1 NPT	1 NPT

EEV - Electronic Expansion Valve ECM - Electronically Commutated Motor

Power wiring is field supplied and must comply with the applicable local and national codes.

This data is rated 0 ft. above sea level, with 25 ft. of refrigerant piping per coil.

Main Coil Cooling capacity rating obtained with entering air of 95°F DB/75°F WB and leaving air of 52.9°F DB, 52.5°F WB.

Main Coil Heating capacity rating obtained with entering air of 44°F DB and leaving air of 75°F DB.

Reheat Coil Heating capacity rating obtained with entering air of 54°F DB and leaving air of 86°F DB.

[1]Take appropriate actions at the end of HVAC equipment life to recover, recycle, reclaim or destroy R410A refrigerant according to applicable regulations (40 CFR Part 82, Subpart F) under section 608 of CAA.

[2]All communication cable to be minimum 18 AWG, 4-conductor, stranded, shielded and must comply with applicable local and national code.

Power Supply (V/Hz/Ø): 208-230/60/3 (with preheat); 208-230/60/1 (without preheat).

Note:

Actual discharge air temperatures may vary from discharge air temperature set-point due to changes in outdoor air processing loads.

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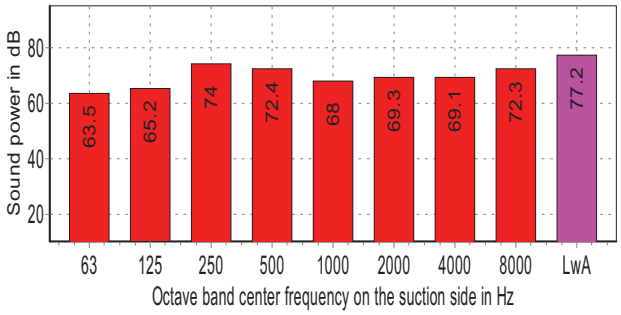
Table 2: Dedicated Outdoor Air System Electrical Data

Model	Voltage Range	MCA	MOP	Power Supply		
				Hz	Volts	Phase
ARND20BDAT2	187-253	96	100	60	208-230	3
ARND20BDAR2 (no preheat)	187-253	8	15	60	208-230	1

MCA = Minimum Circuit Ampacity MOP = Maximum Overcurrent Protection

Power wiring cable is field provided and must comply with the applicable local and national codes.

Figure 6: 2000 CFM Sound Data



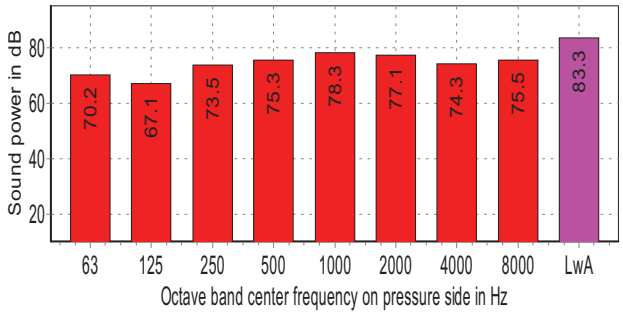
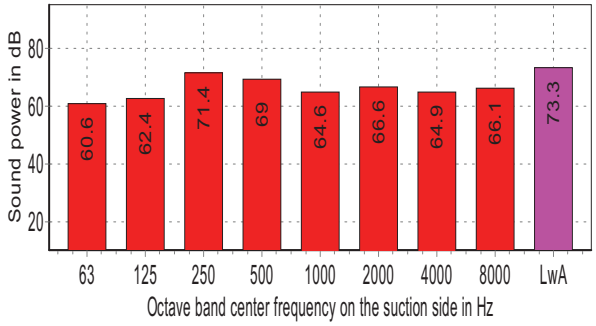


Figure 7: 1600 CFM Sound Data



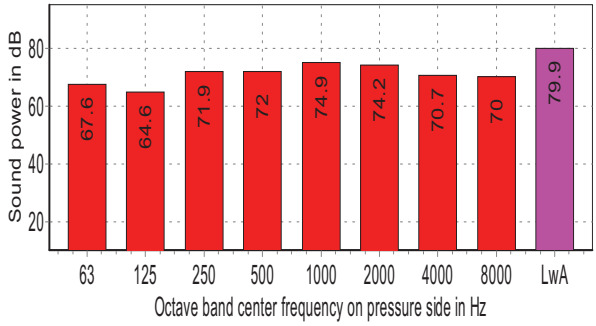
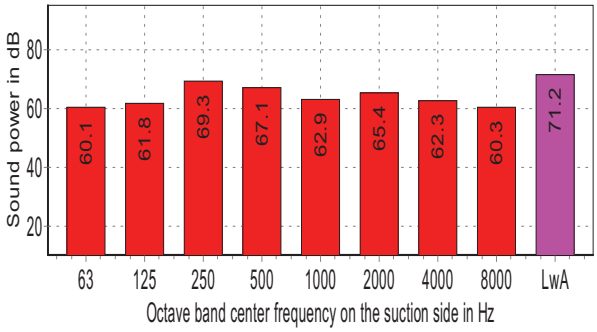
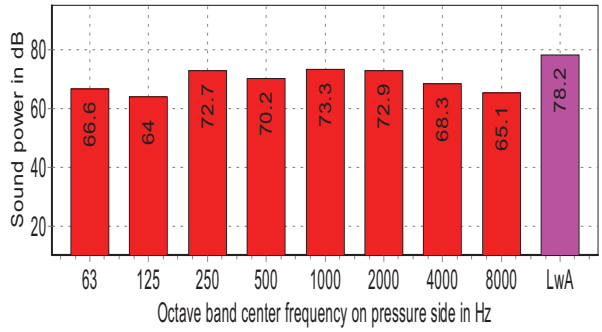


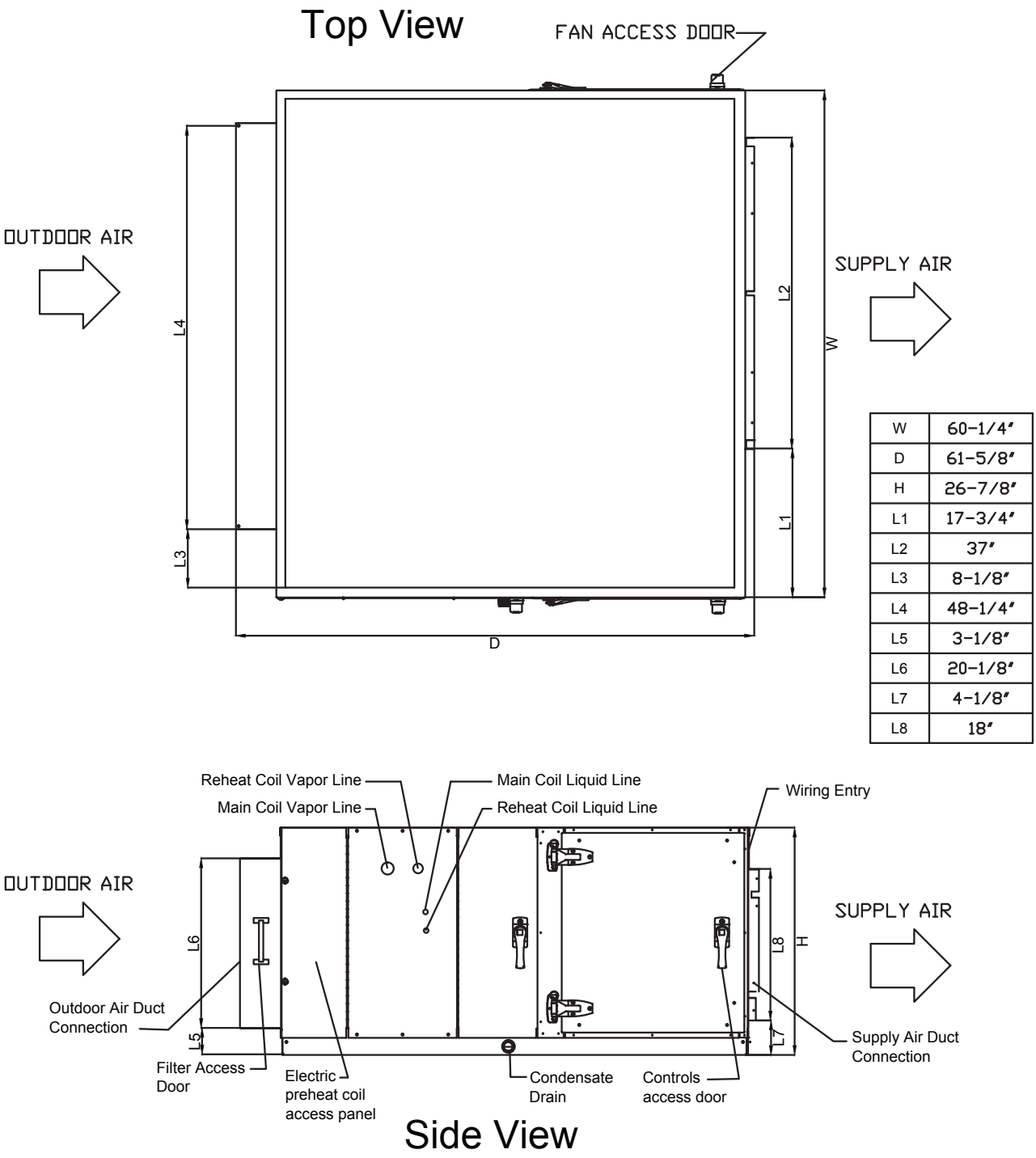
Figure 8: 1200 CFM Sound Data





DIMENSIONS

ARND20BDAT2 with Preheat

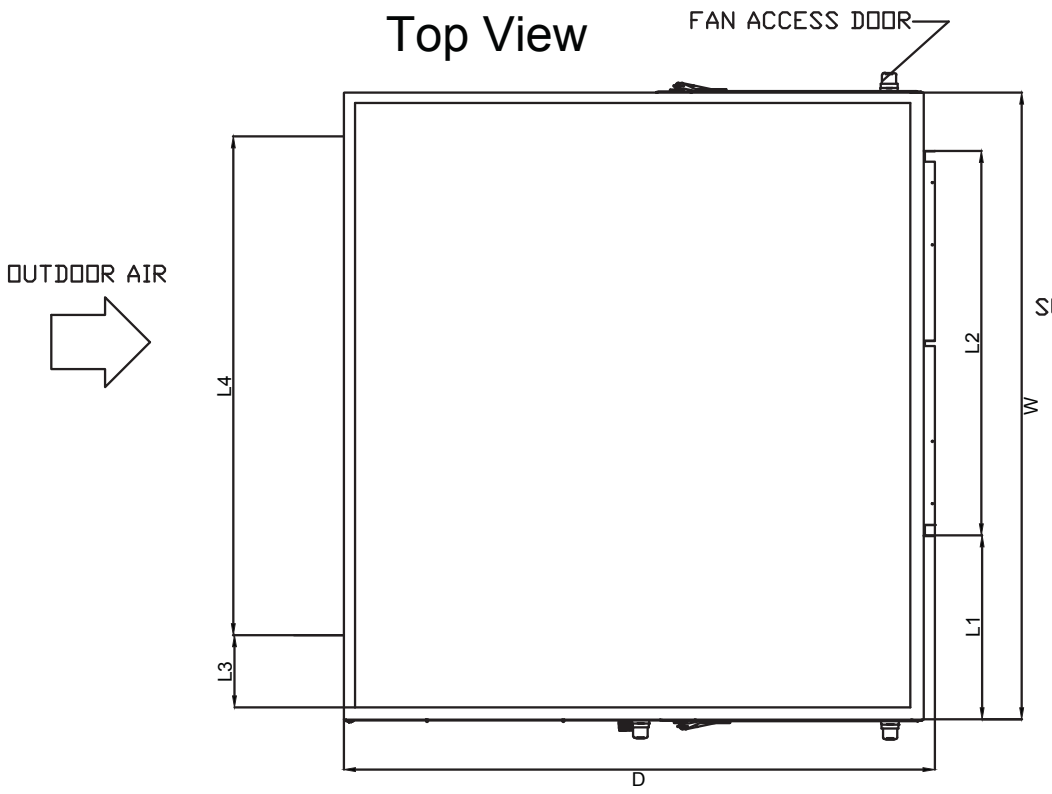


W	60-1/4″
D	61-5/8″
H	26-7/8″
L1	17-3/4″
L2	37″
L3	8-1/8″
L4	48-1/4″
L5	3-1/8″
L6	20-1/8″
L7	4-1/8″
L8	18″

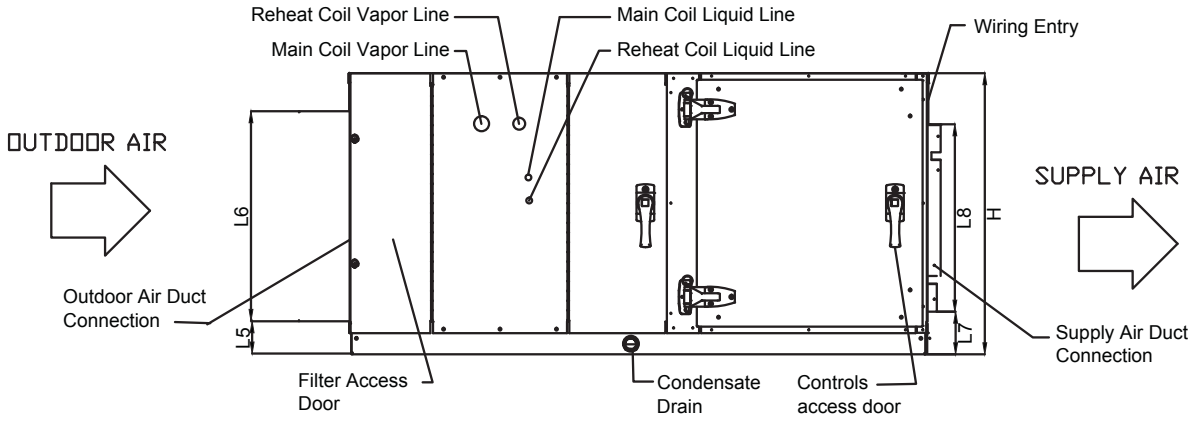
DIMENSIONS

ARND20BDAR2, without Preheat

Top View



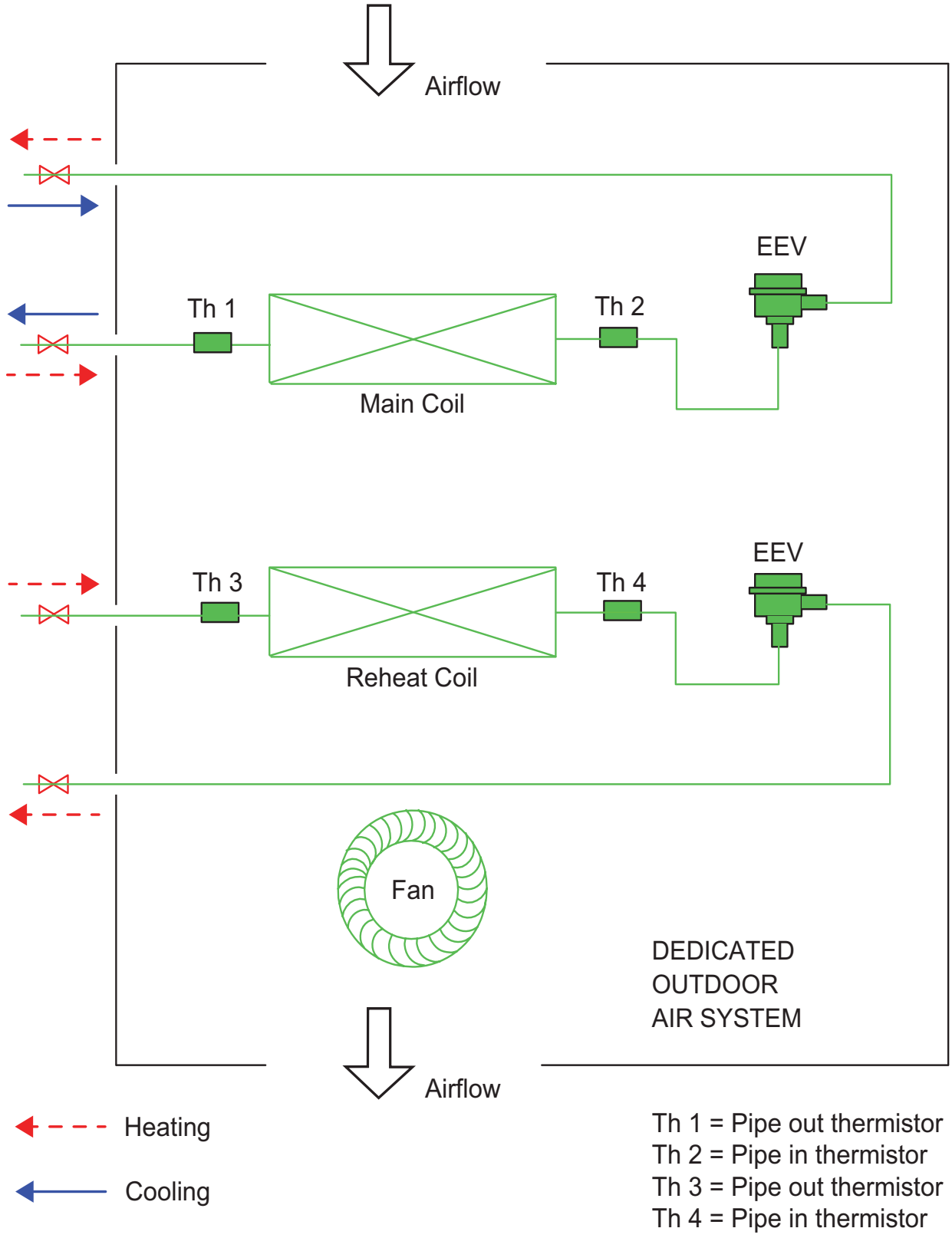
W	60-1/4″
D	56-3/4″
H	26-7/8″
L1	17-3/4″
L2	37″
L3	8-1/8″
L4	48-1/4″
L5	3-1/8″
L6	20-1/8″
L7	4-1/8″
L8	18″



Side View

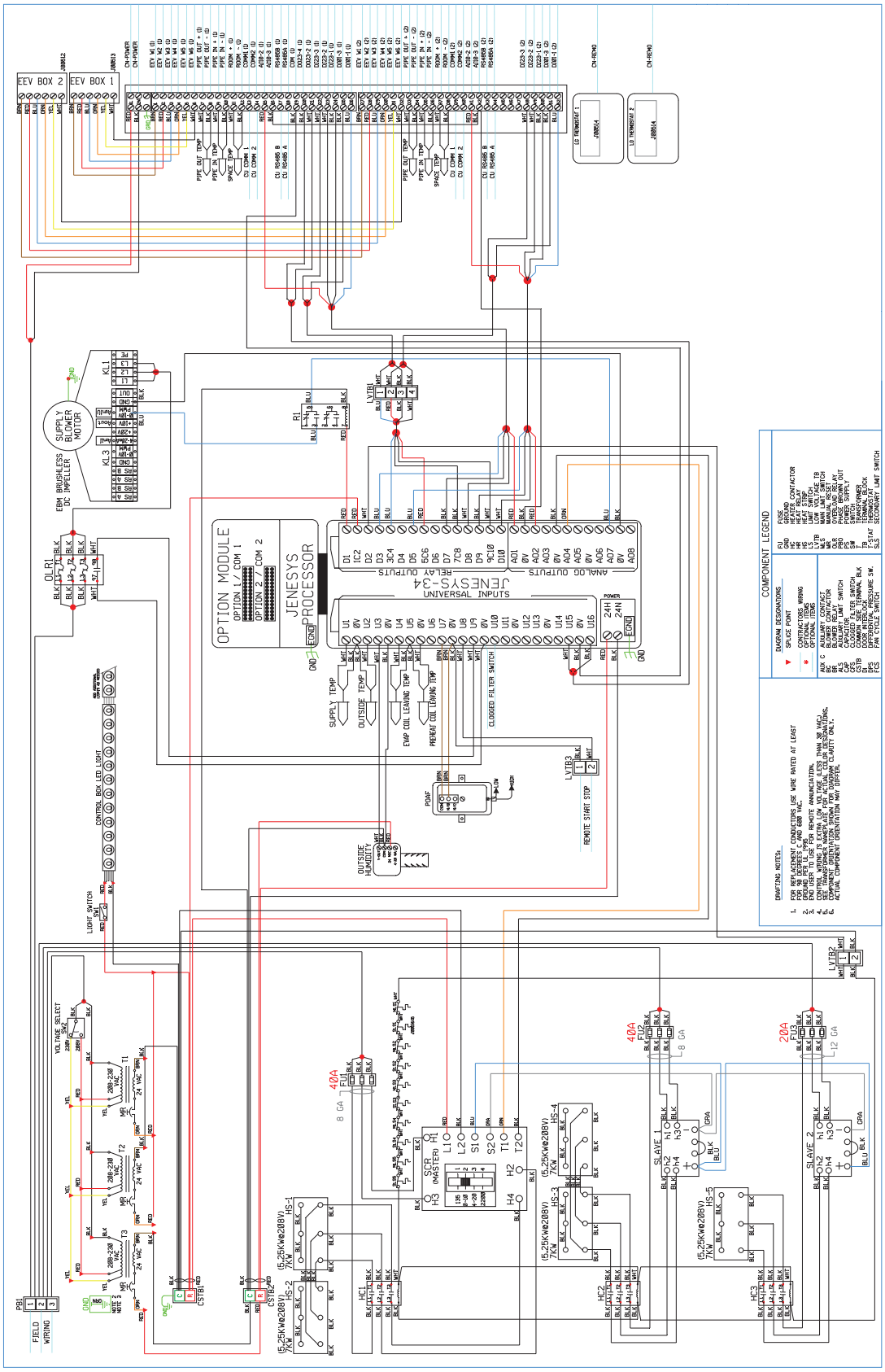
PIPING DIAGRAM

ARND20BDAT2 and ARND20BDAR2



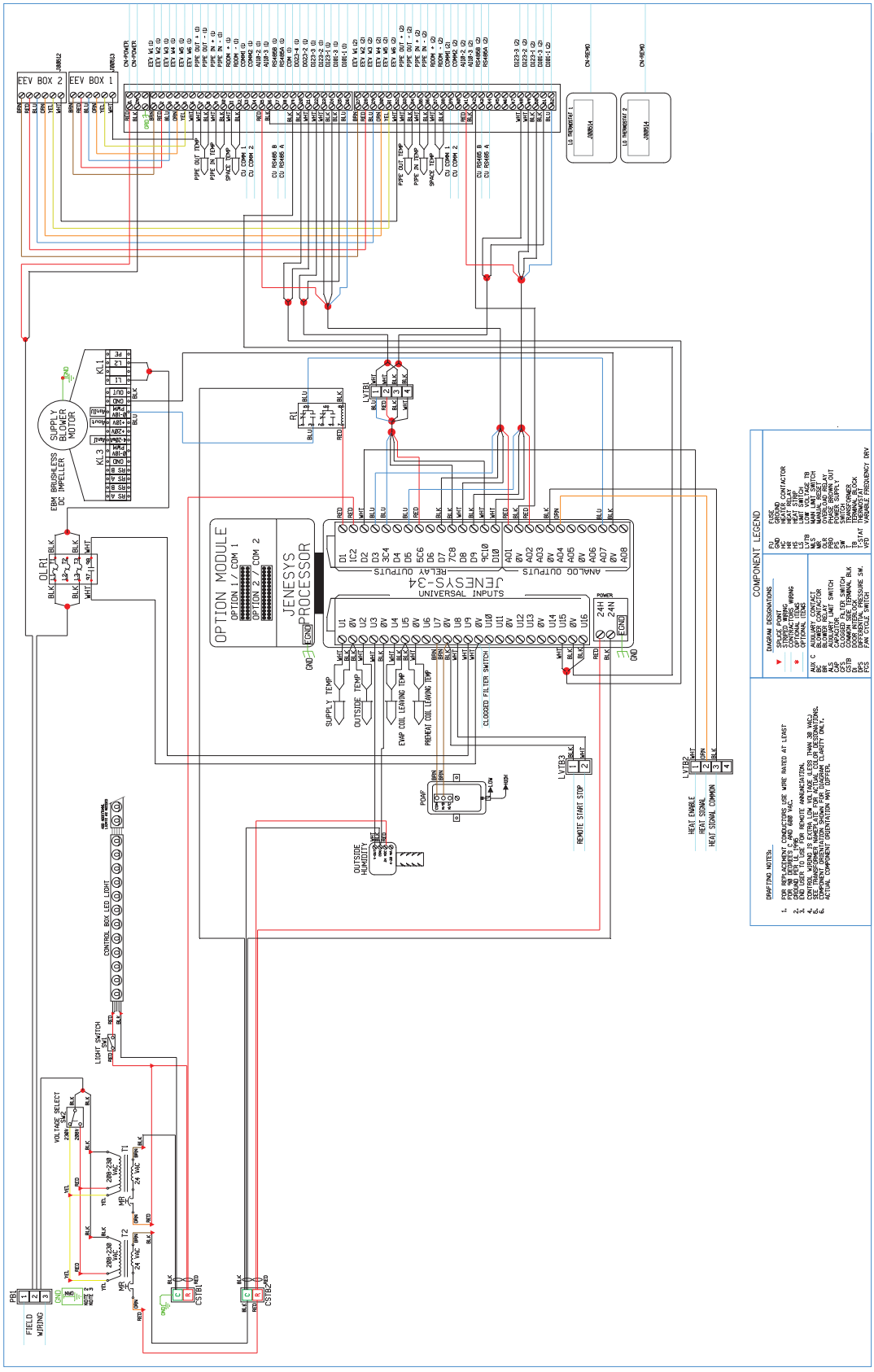
WIRING DIAGRAM

ARND20BDAT2 with Preheat



WIRING DIAGRAM

ARND20BDAR2 without Preheat



PERFORMANCE DATA

PERFORMANCE DATA

MULTI V™

Main Coil

Cooling Capacity

Table 3: Main Coil Cooling Capacity 2000 CFM, discharge temp. 53°F DB

Outdoor Air Temp. (°F DB)	Outdoor Air Temperature (°F WB)															
	58		61		64		67		70		73		75		78	
	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh
65	26.8	25.6	48.6	25.7	65.5	26.5										
70	37.2	37.2	44.4	36.7	64.3	37	86	37.8								
75	48.1	48.1	48.3	48.3	64.5	48	86.3	48.8	109.2	49.4	133.4	49.4				
80	58.9	58.9	59.1	59.1	64.7	59	86.5	59.8	109.2	60.4	133.9	61.1	151.2	61.1	175.4	60
90	80.4	80.4	80.7	80.7	81	81	85.8	81.7	108.6	82.2	133.6	83.1	150.5	83.4	176.2	83.2
95	91.1	91.1	91.4	91.4	91.7	91.7	92.1	92.1	108.2	93.3	133.7	94.4	150.2	94.5	176.6	94.7
100	101.7	101.7	102	102	102.4	102.4	102.8	102.8	108.3	104.5	133.2	105.4	150.1	105.7	177	106.1
104			110.5	110.5	110.9	110.9	111.4	111.4	111.8	111.8	133.1	114.4	150.4	114.9	177.3	115.3
110			123.2	123.2	123.6	123.6	124.1	124.1	124.6	124.6	131.8	125.1	148.7	125.6	175.6	126.2
115					134.2	134.2	134.7	134.7	135.3	135.3	135.9	131.3	148.2	136.2	175	136.9
120							145.2	145.2	145.9	145.9	146.5	146.5	147.7	146.9	174.5	147.7
122							149.5	149.5	150.1	150.1	150.7	150.7	151.2	151.2	174.3	151.9

Table 4: Main Coil Cooling Capacity 1600 CFM, discharge temp. 53°F DB

Outdoor Air Temp. (°F DB)	Outdoor Air Temperature (°F WB)															
	58		61		64		67		70		73		75		78	
	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh
65	21.4	20.6	36	20.8	51.9	21										
70	29.8	29.8	35.9	29.5	52	30	69.6	30.5								
75	38.5	38.5	38.6	38.6	52.2	38.8	69.3	39.2	87.6	39.6	107	39.6				
80	47.1	47.1	47.3	47.3	52.2	47.7	68.9	47.9	87.7	48.5	107.5	49	121.2	49	143.3	49.2
90	64.3	64.3	64.5	64.5	64.8	64.8	68.6	65.7	86.9	66.1	107.1	66.8	121.3	67.3	144.3	68.1
95	72.9	72.9	73.1	73.1	73.4	73.4	73.6	73.6	87.1	75.3	107.1	75.9	120.7	76.1	144.1	77.1
100	81.4	81.4	81.6	81.6	81.9	81.9	82.2	82.2	86.7	84.2	106.6	84.7	121	85.3	143.8	86
104			88.4	88.4	88.7	88.7	89.1	89.1	89.5	89.5	107	92.2	121.2	92.7	143.5	93.3
110			98.6	98.6	98.9	98.9	99.3	99.3	99.7	99.7	105.5	100.1	118.9	100.4	140.4	110.9
115					107.4	107.4	107.8	107.8	108.2	108.2	108.7	108.7	118.6	109	140	109.6
120							116.2	116.2	116.7	116.7	117.2	117.2	118.2	117.6	139.6	118.1
122							119.6	119.6	120	120	120.6	120.6	120.9	120.9	139.5	121.6

Table 5: Main Coil Cooling Capacity 1200 CFM, discharge temp. 53°F DB

Outdoor Air Temp. (°F DB)	Outdoor Air Temperature (°F WB)															
	58		61		64		67		70		73		75		78	
	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh
65	16.8	15.9	27.7	16	39.3	15.9										
70	22.3	22.3	27.7	22.6	39.5	22.7	52	22.8								
75	28.9	28.9	29	29	39.6	29.4	51.8	29.4	65.5	29.7	80	29.6				
80	35.3	35.3	35.5	35.5	39.4	36.1	51.9	36.2	65.6	36.4	80.8	36.9	91.2	36.9	107.7	37
90	48.2	48.2	48.4	48.4	48.6	48.6	51.8	49.7	66	50.1	80.8	50.5	91.2	50.7	107.9	50.9
95	54.6	54.6	54.8	54.8	55	55	55.2	55.2	65.7	56.9	80.9	57.3	91.4	57.6	108.3	58
100	61	61	61.2	61.2	61.4	61.4	61.7	61.7	65.9	63.8	80.7	64.1	91.1	64.4	108	64.8
104			66.3	66.3	66.6	66.6	66.8	66.8	67.1	67.1	80.9	69.8	91.3	70	107.7	70.2
110			73.9	73.9	74.2	74.2	74.5	74.5	74.8	74.8	79	75	89.2	75.3	105.3	75.7
115					80.5	80.5	80.8	80.8	81.2	81.2	81.5	81.5	88.9	81.7	105	82.2
120							87.2	87.2	87.7	87.7	87.9	87.9	88.6	88.2	104.7	88.6
122							89.7	89.7	90	90	90.5	90.5	90.7	90.7	104.6	91.2

Note:

Actual discharge air temperatures may vary from discharge air temperature set-point due to changes in outdoor air processing loads.

LG

PERFORMANCE DATA

Main Coil

Cooling Capacity

Table 6: Main Coil Cooling Capacity 1000 CFM, discharge temp. 53°F DB

Outdoor Air Temp. (°F DB)	Outdoor Air Temperature (°F WB)															
	58		61		64		67		70		73		75		78	
	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh
65	15.1	13.1	24.3	13.2	34.1	34.1										
70	18.6	18.6	24.2	18.6	33.9	33.9	44.4	44.4								
75	24.1	24.1	24.1	24.1	33.8	33.8	44.2	44.2	55.5	24.1	67.5	24.1				
80	29.6	29.6	29.6	29.6	33.6	33.6	44.1	44.1	55.3	29.6	67.3	29.6	75.8	29.6	89.3	29.6
90	40.6	40.6	40.6	40.6	40.6	40.6	43.7	43.7	54.8	40.6	66.8	40.6	75.3	40.6	88.8	40.6
95	46.1	46.1	46.1	46.1	46.1	46.1	46.1	46.1	54.6	46.1	66.6	46.1	75.1	46.1	88.5	46.1
100	51.5	51.5	51.5	51.5	51.5	51.5	51.5	51.5	54.4	51.5	66.4	51.5	74.8	51.5	88.3	51.5
104			55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	66.2	55.9	74.6	55.9	88.1	55.9
110			62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	65.9	62.5	74.3	62.5	87.8	62.5
115					67.9	67.9	67.9	67.9	67.9	67.9	67.9	67.9	74.1	67.9	87.5	67.9
120							73.5	73.5	73.5	73.5	73.5	73.5	73.9	73.5	87.3	73.5
122							75.6	75.6	75.7	75.7	75.7	75.7	75.7	75.7	87.2	75.7

Table 7: Main Coil Cooling Capacity 800 CFM, discharge temp. 53°F DB

Outdoor Air Temp. (°F DB)	Outdoor Air Temperature (°F WB)															
	58		61		64		67		70		73		75		78	
	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh
65	12.1	10.5	19.4	10.5	27.3	10.5										
70	14.9	14.9	19.3	14.9	27.2	14.9	35.5	14.9								
75	19.3	19.3	19.3	19.3	27	19.3	35.4	19.3	44.4	19.3	53.9	19.3				
80	23.7	23.7	23.7	23.7	26.9	23.7	35.2	23.7	44.2	23.7	53.8	23.7	60.6	23.7	71.4	23.7
90	32.5	32.5	32.5	32.5	32.5	32.5	34.9	32.5	43.9	32.5	53.5	32.5	60.2	32.5	71	32.5
95	36.8	36.8	36.8	36.8	36.8	36.8	36.8	34.8	43.7	36.9	53.3	36.8	60	36.8	70.8	36.8
100	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	43.5	41.2	53.1	41.2	59.9	41.2	70.6	41.2
104			44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	52.9	44.7	59.7	44.7	70.5	44.7
110			50	50	50	50	50	50	50	50	52.7	50	59.5	50	70.2	50
115					54.4	54.4	54.4	54.4	54.4	54.4	54.4	54.4	59.3	54.4	70	54.4
120							58.8	58.8	58.8	58.8	58.8	58.8	59.1	58.8	69.8	58.8
122							60.5	60.5	60.5	60.5	60.5	60.5	60.5	59	69.7	60.5

Table 8: Main Coil Cooling Capacity 600 CFM, discharge temp. 53°F DB

Outdoor Air Temp. (°F DB)	Outdoor Air Temperature (°F WB)															
	58		61		64		67		70		73		75		78	
	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh
65	9	7.9	14.6	7.9	20.5	7.9										
70	11.2	11.2	14.5	11.2	20.4	11.3	26.6	11.3								
75	14.4	14.4	14.5	14.5	20.3	14.5	26.6	14.6	33.3	14.7	40.5	14.7				
80	17.7	17.7	17.7	17.7	20.2	17.8	26.4	17.9	33.2	17.9	40.4	18	45.4	17.8	53.6	17.8
90	24.1	24.1	24.2	24.2	24.3	24.3	26.2	24.4	32.9	24.5	40	24.6	45.2	24.3	53.3	24.3
95	27.3	27.3	27.4	27.4	27.5	27.5	27.6	27.6	32.8	27.7	39.9	27.8	45	27.6	53.1	27.6
100	30.5	30.5	30.6	30.6	30.7	30.7	30.8	30.8	32.6	30.9	39.8	31.1	44.9	30.9	52.9	30.9
104			33.2	33.2	33.3	33.3	33.4	33.4	33.5	33.5	39.7	33.7	44.8	33.6	52.9	33.6
110			36.9	36.9	37.1	37.1	37.2	37.2	37.4	37.4	39.6	37.5	44.6	37.5	52.7	37.5
115					40.3	40.3	40.4	40.4	40.6	40.6	40.8	40.8	44.5	40.8	52.5	40.8
120							43.6	43.6	43.8	43.8	44.1	44.1	44.3	44.1	52.4	44.1
122							44.8	44.8	45	45	45.4	45.4	45.4	45.4	52.3	45.4

Note:

Actual discharge air temperatures may vary from discharge air temperature set-point due to changes in outdoor air processing loads.

PERFORMANCE DATA

MULTI V™

Main Coil

Cooling Capacity / Heating Capacity

Table 9: Main Coil Cooling Capacity 400 CFM, discharge temp. 53°F DB

Outdoor Air Temp. (°F DB)	Outdoor Air Temperature (°F WB)															
	58		61		64		67		70		73		75		78	
	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh	TC MBh	SHC MBh
65	6	5.2	9.7	5.3	13.6	5.3										
70	7.4	7.4	9.6	7.5	13.6	7.5	17.7	7.5								
75	9.6	9.6	9.6	9.6	13.5	9.7	17.7	9.7	22.2	9.8	26.9	9.8				
80	11.2	11.2	11.8	11.8	13.4	11.9	17.6	11.9	22.1	11.9	26.9	12	30.3	12	35.7	12.1
90	16.1	16.1	16.1	16.1	16.2	16.2	17.5	16.3	21.9	16.3	26.7	16.4	30.2	16.4	35.5	16.5
95	18.2	18.2	18.3	18.3	18.3	18.3	18.4	18.4	21.9	18.5	26.6	18.6	30	18.6	35.4	18.7
100	20.3	20.3	20.4	20.4	20.5	20.5	20.6	20.6	21.8	20.6	26.5	20.7	29.9	20.8	35.3	20.9
104			22.1	22.1	22.2	22.2	22.3	22.3	22.4	22.4	26.5	22.5	29.9	20.8	35.2	22.6
110			24.6	24.6	24.7	24.7	24.8	24.8	24.9	24.9	26.4	25	29.9	22.5	35.1	25.2
115					26.8	26.8	26.9	26.9	27.1	27.1	27.2	27.2	29.7	25.1	35	27.4
120							29.1	29.1	29.2	29.2	29.3	29.3	29.5	29.4	34.9	29.5
122							29.9	29.9	30	30	30.2	30.2	30.2	30.2	34.9	30.4

Table 10: Main Coil Heating Capacity 2000 CFM, discharge temp. 75°F

Outdoor Air Temp. (°F DB)	TC (MBh)
41	73.4
42	71.3
44	67.0
46	62.6
48	58.3
50	54.0
52	49.7
54	46.4
56	43.7
58	40.7
60	37.6
62	34.7

Table 11: Main Coil Heating Capacity 1600 CFM, discharge temp. 75°F

Outdoor Air Temp. (°F DB)	TC (MBh)
41	58.8
42	57.0
44	53.6
46	50.1
48	46.7
50	43.2
52	40.7
54	38.3
56	35.9
58	33.5
60	31.3
62	28.8

Table 12: Main Coil Heating Capacity 1200 CFM, discharge temp. 75°F

Outdoor Air Temp. (°F DB)	TC (MBh)
41	44.1
42	42.8
44	40.2
46	37.6
48	35.2
50	33.3
52	31.6
54	29.7
56	27.9
58	26.0
60	24.3
62	22.4

Table 13: Main Coil Heating Capacity 1000 CFM, discharge temp. 75°F

Outdoor Air Temp. (°F DB)	TC (MBh)
41	36.7
42	35.6
44	33.5
46	31.3
48	29.2
50	27.0
52	24.8
54	22.7
56	20.5
58	18.4
60	16.2
62	14.0

Note:

Actual discharge air temperatures may vary from discharge air temperature set-point due to changes in outdoor air processing loads.

LG

PERFORMANCE DATA

Main Coil / Reheat Coil

Heating Capacity

Table 14: Main Coil Heating Capacity 800 CFM, discharge temp. 75°F

Outdoor Air Temp. (°F DB)	TC (MBh)
41	29.4
42	28.5
44	26.8
46	25.1
48	23.3
50	21.6
52	19.9
54	18.1
56	16.4
58	14.7
60	13.0
62	11.2

Table 15: Main Coil Heating Capacity 600 CFM, discharge temp. 75°F

Outdoor Air Temp. (°F DB)	TC (MBh)
41	22.0
42	21.4
44	20.1
46	18.8
48	17.5
50	16.2
52	14.9
54	13.6
56	12.3
58	11.0
60	9.7
62	8.4

Table 16: Main Coil Heating Capacity 400 CFM, discharge temp. 75°F

Outdoor Air Temp. (°F DB)	TC (MBh)
41	14.7
42	14.3
44	13.4
46	12.5
48	11.7
50	10.8
52	9.9
54	9.1
56	8.2
58	7.3
60	6.5
62	5.6

Table 17: Reheat Coil Heating Capacity 2000 CFM, discharge temp. 75°F

Entering Air Temp. (°F DB)	TC (MBh)
53	47.5

Table 18: Reheat Coil Heating Capacity 1600 CFM, discharge temp. 75°F

Entering Air Temp. (°F DB)	TC (MBh)
53	38.0

Table 19: Reheat Coil Heating Capacity 1200 CFM, discharge temp. 75°F

Entering Air Temp. (°F DB)	TC (MBh)
53	28.5

Table 20: Reheat Coil Heating Capacity 1000 CFM, discharge temp. 75°F

Entering Air Temp. (°F DB)	TC (MBh)
53	23.8

Table 21: Reheat Coil Heating Capacity 800 CFM, discharge temp. 75°F

Entering Air Temp. (°F DB)	TC (MBh)
53	19.0

Table 22: Reheat Coil Heating Capacity 600 CFM, discharge temp. 75°F

Entering Air Temp. (°F DB)	TC (MBh)
53	14.3

Table 23: Reheat Coil Heating Capacity 400 CFM, discharge temp. 75°F

Entering Air Temp. (°F DB)	TC (MBh)
53	9.5

Note:

Actual discharge air temperatures may vary from discharge air temperature set-point due to changes in outdoor air processing loads.

PERFORMANCE DATA

Preheat Coil

Heating Capacity

Table 24: Preheat Coil Heating Capacity

Airflow (CFM)	Outdoor Air Temp (°F DB)
2000	2.5
1600	-7.9
1200	-12.6

[1] 1200 CFM preheat coil capacity is limited by outdoor unit heating capacity.

Note:

Electric preheat coil is controlled by a SCR controller which modulates heat as needed to meet required 41°F discharge set point during heating mode and will modulate to full heat capacity during defrost mode.

Preheat Coil Design

When using DOAS model ARND20BDAR2 (without preheat) and outdoor air design temperatures fall below 41°F, a field supplied pre heat coil or ERV is required to raise incoming outdoor air temperatures above 41°F for heating mode. The DOAS controller has contacts to interlock and enable/disable preheat coil or ERV.

Figure 9: Preheat Coil Design

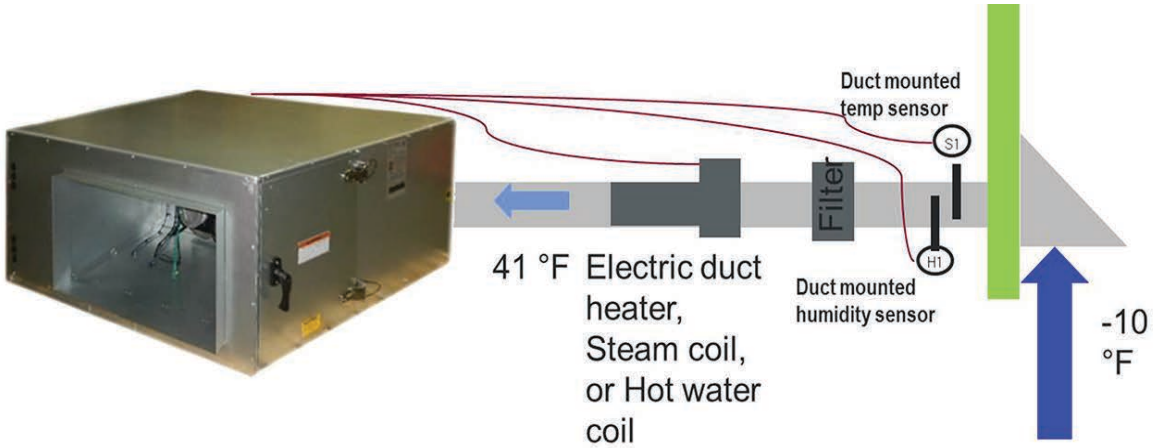
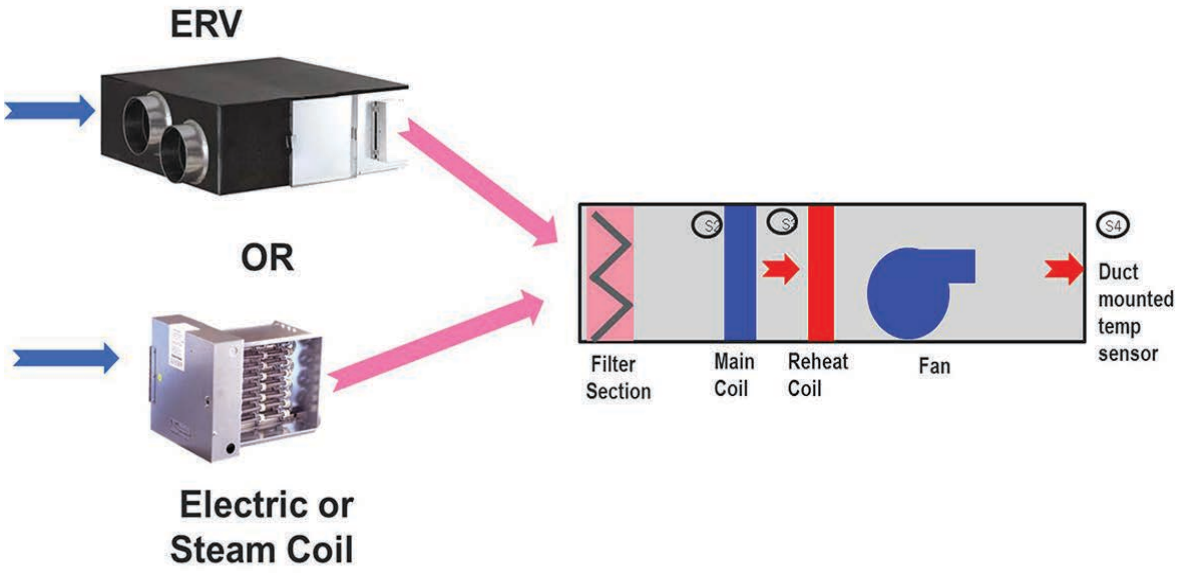


Figure 10: Preheat Coil Design Options



FAN CURVES

Figure 11: 2000 CFM Fan Curve

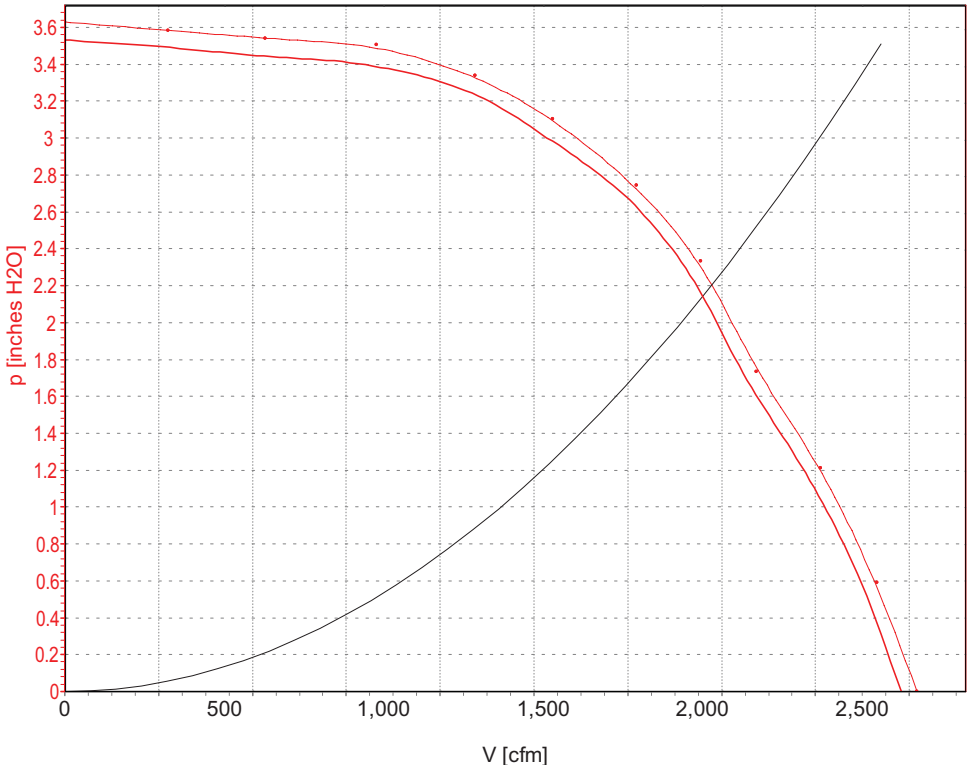


Figure 12: 1600 CFM Fan Curve

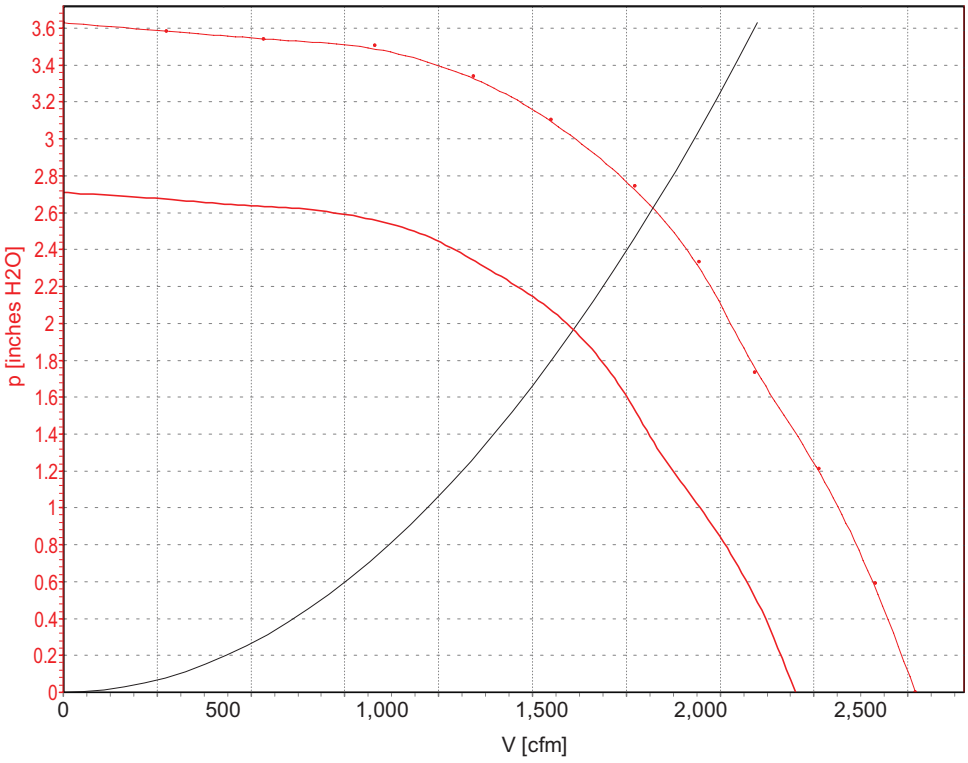
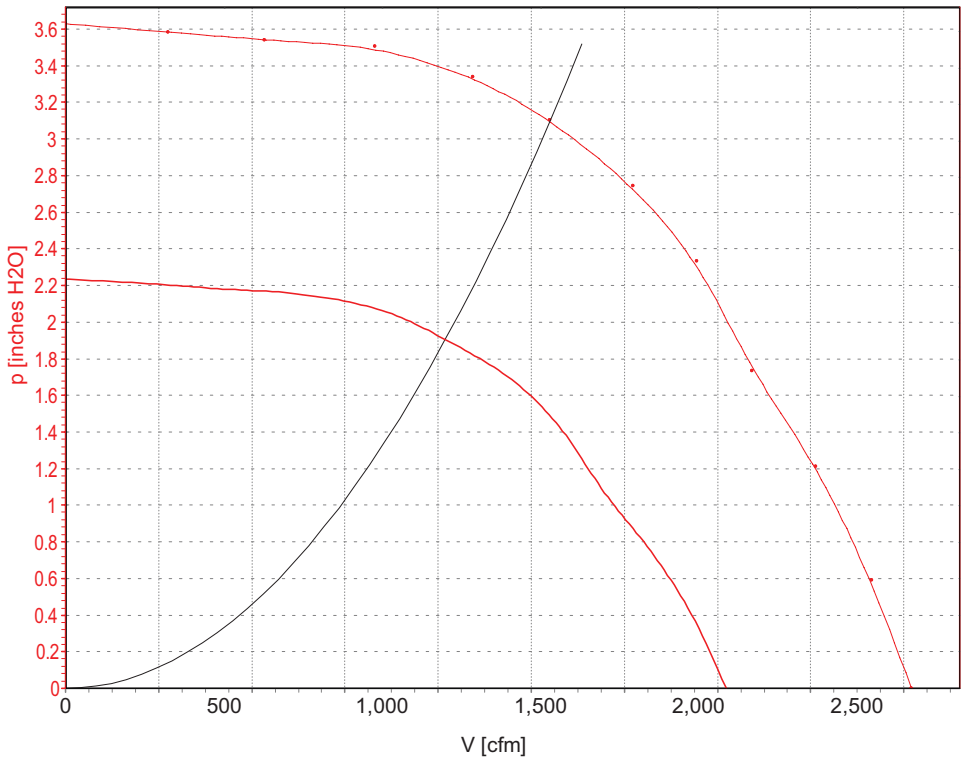


Figure 13: 1200 CFM Fan Curve



APPLICATION GUIDELINES

Selecting the Best Location

Placement of the unit relative to ductwork, electrical and plumbing must be carefully considered. Use flexible gasket material to seal the duct to the unit.

Verify floor, foundation or suspension support can sustain the total unit weight, including accessories. The unit must be level on both horizontal axes to support the unit and reduce noise and vibration.

Allow adequate space for piping access and panel removal. To ensure proper access for field service, maintain minimum clearances for field piping and other obstructions. Minimum clearance required on the access side is 36 inches. All other sides require minimum clearance of 6 inches.

Refer to Figure 143. Condensate drain connections are located on the access side of the unit. Follow local building codes for additional service clearance requirements.

Mounting Details

DOAS units are equipped for suspended installations. The unit should be lifted into position by supporting the unit with the skid used for shipping. Carefully install the DOAS unit to prevent damage to the cabinet and to ensure the unit is installed level. Additional installation provisions may be necessary depending on the job specifications. The specifying engineer or installing contractor are responsible for ensuring the installation of the DOAS is structurally sound. Refer to Figure 154 and Figure 165 for recommended suspended installation methods.

Figure 14: Installation Clearances

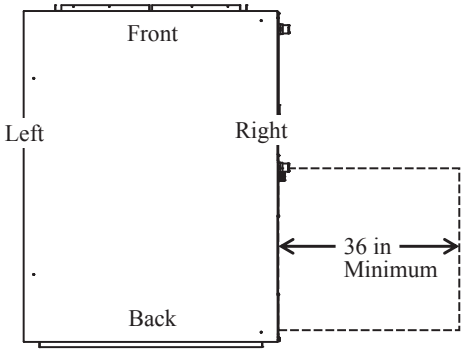


Figure 15: Series Platform Suspension Installation

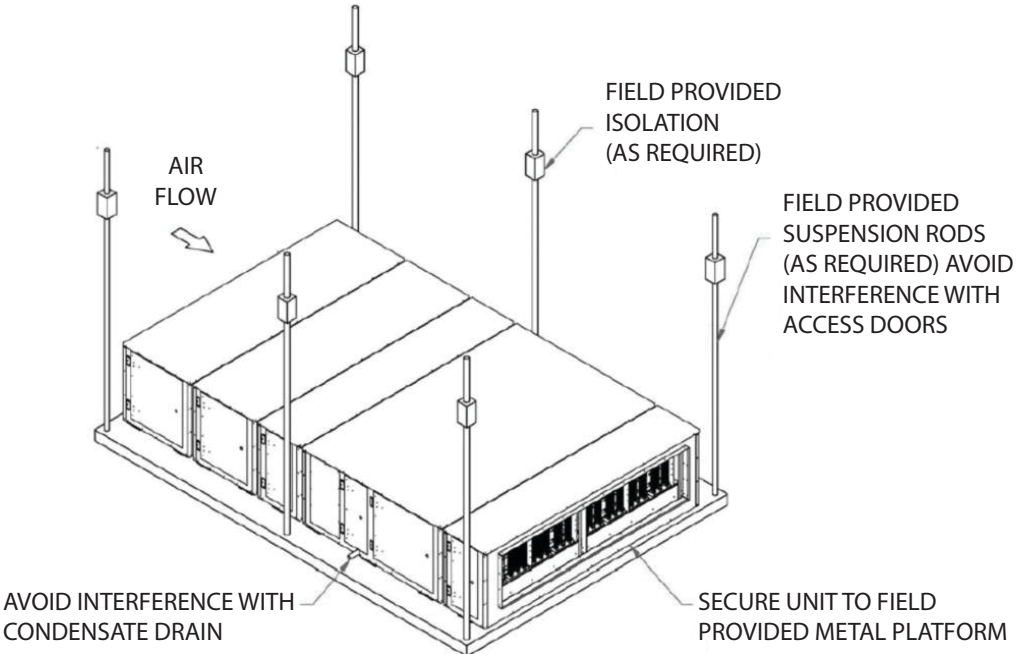
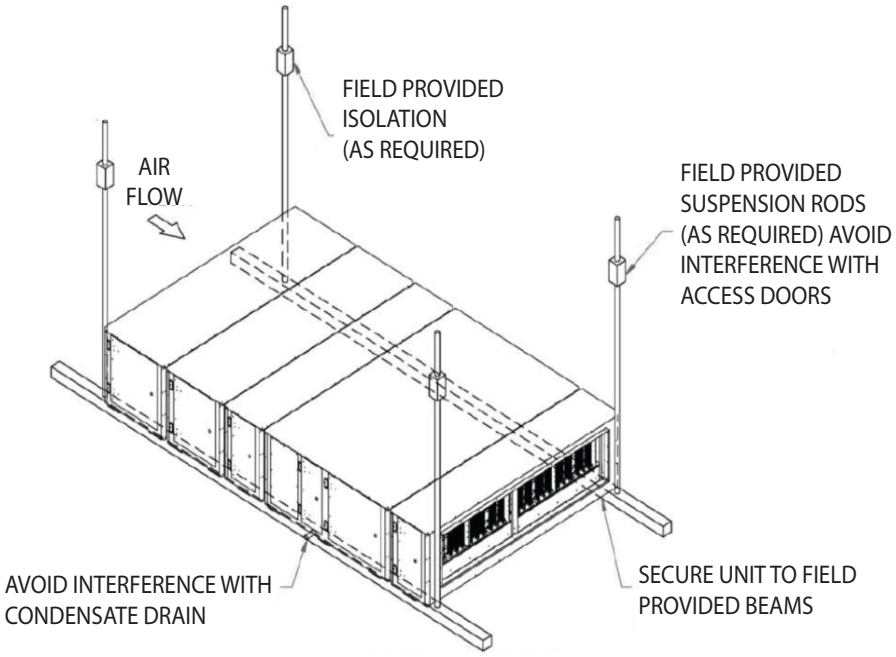


Figure 16: Series Parallel Beam Suspension Installation



A p-trap and drain line must be installed with the p-trap not to exceed 6" from the drain connection. The lines should be the same pipe size or larger than the drain connection. Include a p-trap, and pitch downward towards the drain. An air break should be used with long runs of condensate lines.

Note:

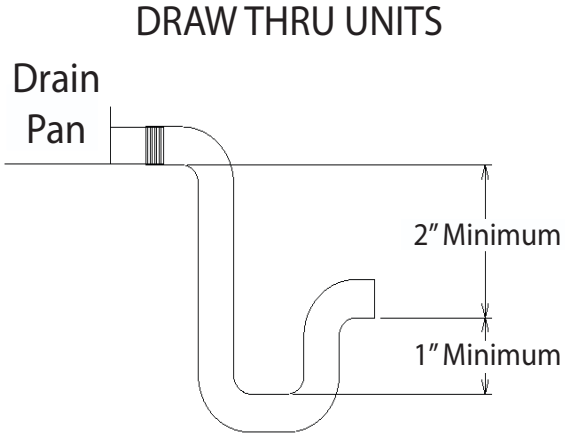
Units cannot be operated without p-traps. Failure to install a p-trap can result in an overflow of condensate water.

Draw-through cooling coils will have a negative static pressure in the drain pan area. This will cause an un-trapped drain to back-up due to air being pulled though the condensate drain piping. Condensate drain trapping and piping must conform to all applicable state and local codes.

Note:

The drain pan connection is a 1" male pipe thread (MPT) fitting.

Figure 17: Drain Trap



REFRIGERANT CHARGE

Refrigerant trim charges must be manually calculated using Table 2525. LATS does not currently have the ability to calculate refrigerant charge for DOAS units.

Table 25: System Refrigerant Charge Calculator (lbs.).

System Tag or ID_____	Job Name_____ Project Manager_____ Date_____			
Line #	Description	Refrigerant Charge per Feet of Pipe	Quantity (ft)	Total (lbs.)
Main Coil Volume			1	7.5
1	Linear feet of 1/4" liquid line	0.015		
2	Linear feet of 3/8" liquid line	0.041		
3	Linear feet of 1/2" liquid line	0.079		
4	Linear feet of 5/8" liquid line	0.116		
5	Linear feet of 3/4" liquid line	0.179		
6	Linear feet of 7/8" liquid line	0.238		
7	Linear feet of 1" liquid line	0.323		
8	Total Trim (additional charge)			
Reheat Coil Volume			1	2.9
1	Linear feet of 1/4" liquid line	0.015		
2	Linear feet of 3/8" liquid line	0.041		
3	Linear feet of 1/2" liquid line	0.079		
4	Linear feet of 5/8" liquid line	0.116		
5	Linear feet of 3/4" liquid line	0.179		
6	Linear feet of 7/8" liquid line	0.238		
7	Linear feet of 1" liquid line	0.323		
8	Total Trim (additional charge)			

TECHNICAL DATA

Casing

The case is designed to mount concealed above a finished ceiling. Fan supply air is front horizontal with a dedicated rear outdoor air connection. The unit is manufactured with galvanized steel double wall construction with foam insulation. Foam insulation has a density of 2 pounds/cubic foot and shall be tested in accordance with ASTM D-1929-11.

Fan Assembly and Control

The unit has a backward curved, plenum fan. The fan is direct drive with an electronically commutated motor (ECM). The fan/motor assembly is isolated with a neoprene gasket. The fan speed is controlled using a microprocessor and can be field adjusted from the factory setting to compensate for a limited amount of additional resistance to airflow caused by field connected ductwork or other airflow restricting devices.

Filter

The outdoor air filter is a 2-inch thick pleated filter panel with MERV 8 rating.

Microprocessor Controls

The unit is provided with an integrated microprocessor-based controller. Remote duct discharge air temperature sensor, outdoor air temperature sensor, and outdoor air humidity sensor for field mounting in the ductwork are shipped loose inside the control cabinet. The field supplied communication cable between the air handler and outdoor units is to be a minimum of 18 AWG, 4-conductor, stranded, and shielded cable (RS-485), terminated via screw terminal on the control boards.

The microprocessor control will operate the air handler using one of the five operating modes:

- Cooling
- Heating
- Dehumidification
- Ventilation
- Defrost

Cooling mode is activated when the outdoor air temperature sensor detects temperature increase above the outside air cooling enable set-point. Outdoor unit compressors modulate to meet the cooling demand by the main coil and maintain discharge air temperature set point.

Heating mode is activated when the outdoor air temperature sensor detects temperature decrease below the outside air heating enable set-point. Electric preheat coil is activated and SCR controller modulates the percentage output of the heater to maintain minimum discharge air of 41°F. Outdoor unit compressors modulate to meet the heating demand by the main coil and maintain discharge air temperature set point.

Dehumidification mode is activated when outdoor air humidity sensor detects outdoor humidity level increase above the outside humidity set point. Outdoor unit compressors will modulate to maintain main coil discharge air setpoint of 53°F. Reheat coil outdoor unit compressors will modulate to increase the main coil discharge air up to the discharge air set-point.

Ventilation mode (occupied mode) is activated when the air handling unit is turned on and the supply fan runs at constant speed.

Defrost mode is activated upon signal from main coil outdoor unit that defrost is required. The supply fan remains on and discharge air temperature is maintain by the electric preheat coil until the main coil defrost cycle is completed.

Electric Preheat Coil (ARND20BDAT2 only)

DOAS Model ARND20BDAT2 has an electric preheat coil upstream of the main coil and reheat coil. The electric preheat coil has full modulation capacity controlled by a silicon controlled rectifier (SCR).

Main Coil

The main coil uses R410A refrigerant. It is constructed of copper tubes with aluminum fins mechanically bonded to the tubes and galvanized steel end casings. Fin design is sine wave rippled. An electronic expansion valve (EEV) regulates the flow of refrigerant.

Reheat Coil

The reheat coil uses R410A refrigerant. It is constructed of copper tubes with aluminum fins mechanically bonded to the tubes and galvanized steel end casings. Fin design is sine wave rippled. An EEV regulates the flow of refrigerant.

Controls Features

The microprocessor controller can be directly connected to a PC and accessed by a web browser. DOAS can be directly integrated to LonWorks and BACnet building automation systems.

Condensate Pan

The unit includes a sloped 304 stainless steel drain pan.

ACRONYMS

Table 26: Table of Acronyms.

ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning	HVAC	Heating, Ventilation and Air Conditioning
AHU	Air Handling Unit	IDU	Indoor Unit
AWG	American Wire Gauge	MBh	Thousands BTUs per hour
Btu/h	British Thermal Units per hour	MCA	Maximum Circuit Ampacity
CFM	Cubic Feet per Minute	MPT	Male Pipe Thread
DB	Dry Bulb	ODU	Outdoor Unit
dB(A)	Decibels with “A” frequency weighting	PTAC	Packaged Terminal Air Conditioner
DOAS	Dedicated Outdoor Air System	SCR	Silicon Controlled Rectifier
ECM	Electronically Commutated Motor	VRF	Variable Refrigerant Flow
EEV	Electronic Expansion Valve	WB	Wet Bulb

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Supersedes: VRF-EM-DR-001-US 014A09