Tranquility® Dedicated Outdoor Air (TO) Series

Submittal Data

Models TO 02 - 060 60Hz - HFC-410A

LC511

Rev.: November 18, 2016

CLIMATEMASTER®
Water-Source Heat Pump Systems

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TO Dedicated Outdoor Air Series

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CLIMATEMASTER DEDICATED OUTDOOR AIR SYSTEMS - 100% OUTDOOR AIR APPLICATIONS

ClimateMaster Outdoor Air Series dedicated outdoor air systems (DOAS) provide the most complete solution for your applications. Our many options allow you to provide full heating in the winter, incorporate our units into a water loop using our innovative refrigerant circuit design, while also dehumidifying your facility in the summer. Rely on ClimateMaster for total system solutions to your WSHP outdoor air applications.

CLIMATEMASTER'S APPROACH TO IAQ ISSUES OF INDOOR AIR QUALITY (IAQ)

Several HVAC trade and professional organizations, such as ASHRAE, have documented the need for suitable indoor air quality. A primary requirement for maintaining proper IAQ is the introduction of outdoor air. Unfortunately, outdoor air also introduces moisture into a facility and can create IAQ problems – mold, mildew and the proper environment for viruses and other organisms to flourish. The key to preventing mold formation and growth is to control the relative humidity within the space. However, a standard WSHP cannot achieve this because it is controlled on temperature alone. Instead, a system must be implemented that can provide full control of both temperature and humidity.

OPTIMAL IAQ DESIGN

Several important IAQ issues must be addressed to design the most effective dehumidification system for the application. ClimateMaster reviews the following list of criteria when building all Tranquility OA Series IAQ units.

DEDICATED OUTDOOR AIR SYSTEMS (DOAS)

The most energy efficient method for removing moisture is to use a dedicated outdoor air system that will reduce the dew point of supply air to below 55°F (13°C). This approach also helps remove existing moisture inside a facility. A DOAS design can also be optimized to remove maximum moisture at the lowest electrical consumption rate (Moisture Removal Efficiency, MRE) at both full and part-load conditions. ClimateMaster supplies DOAS units under our Tranquility OA (R-410A refrigerant) series product lines.

ASHRAE 90.1. The ASHRAE Building Code 90.1 establishes a standard for energy conservation of commercial HVAC equipment. It states that some systems cannot use new energy to reheat the air; rather, 75% of their energy must be site-recovered. Tranquility OA series units comply with, and exceeds, this code by using hot gas reheat coils.

LEAVING AIR TEMPERATURE CONTROL

ClimateMaster's IAQ units provide precise discharge temperature by using fully modulating hot gas control valves. Other systems that use solenoid valves and/or liquid sub-cooling loops can control the leaving air temperature to only ±10°F (±6°C) and typically are closer to ±20°F (±11°C). These systems do not comply with code 90.1. They require new energy to trim the leaving air temperature to avoid overcooling of the space.

This lack of accuracy also directly affects operation costs. Costs rise when new energy is required to adjust high temperature fluctuations in order to meet preset temperatures. Table 1 below shows the potential increase in energy consumption that can occur at different control accuracies. In addition, people can sense temperature differences greater than ±2.0°F (±1.0°C). Therefore, the greater the temperature swing, the more uncomfortable the occupants will be (see Figure 1).

AIR SEPARATED COILS

If a hot gas reheat coil is installed too close to the evaporator coil, re-hydration can occur. Water that forms on the evaporator coil can be blown onto the hot reheat coil, and thus be converted back into vapor and returned to the space. This completely negates all dehumidification efforts and fails to meet basic IAQ design requirements. Plus, the system ends up removing less moisture at a higher electrical cost. That's why we design our IAQ units with adequate separation between the outlet face of the evaporator coil and the inlet face of the hot gas reheat to prevent re-hydration (see Figure 2).

FILTRATION

Outdoor air is full of many airborne particles and pollutants. Filtration is essential to prevent dirt from accumulating on coils and contaminating indoor spaces. When 1- or 2-inch wide (25 or 51 mm) filters are used, they must be frequently replaced. Therefore, our IAQ units are equipped with a minimum of 4-inch (102 mm), pleated filters to reduce filter maintenance.

FULL-SIZE CONDENSERS

Our IAQ systems use the ideal control strategy that can provide first-stage cooling by delivering colder air to the space. Since the compressor must be energized for dehumidification, the unit can meet the space's part load sensible requirements. As a result, OA Series units can help reduce the size of the main building air conditioning system. This control is called room or OA reset of LAT.

Reference Calculations

Heating

$$LWT = EWT - \frac{HE}{GPM \times 500}$$

$$LAT = EAT + \frac{HC}{CFM \times 1.08}$$

Cooling

$$LWT = EWT + \frac{HR}{GPM \times 500}$$

$$LAT\ (DB) = EAT\ (DB) - \frac{SC}{CFM \times 1.08}$$

$$LC = TC - SC$$

$$S/T = \frac{SC}{TC}$$

Legend and Glossary of Abbreviations

BTUH = BTU(British Thermal Unit) per hour
CFM = airflow, cubic feet/minute
COP = coefficient of performance = BTUH output/BTUH input
DB = dry bulb temperature (°F)
EAT = entering air temperature, Fahrenheit (dry bulb/wet bulb)
EER = energy efficiency ratio = BTUH output/Watt input
MPT = male pipe thread
ESP = external static pressure (inches w.g.)
EWT = entering water temperature
GPM = water flow in U.S. gallons/minute
HE = total heat of extraction, BTUH
HC = air heating capacity, BTUH
HR = total heat of rejection, BTUH
HWC = hot water generator (desuperheater) capacity, Mbtuh
FPT = female pipe thread
KW = total power unit input, kilowatts
LAT = leaving air temperature, °F
LC = latent cooling capacity, BTUH
LWT = leaving water temperature, °F
MBTUH = 1000 BTU per hour
S/T = sensible to total cooling ratio
SC = sensible cooling capacity, BTUH
TC = total cooling capacity, BTUH
WB = wet bulb temperature (°F)
WPD = waterside pressure drop (psi & ft. of hd.)

Conversion Table - to convert inch-pound (English) to S-I (Metric)

Air Flow	Water Flow	Ext Static Pressure	Water Pressure Drop
Airflow (L/s) = CFM x 0.472	Water Flow (L/s) = gpm x 0.0631	ESP (Pa) = ESP (in of wg) x 249	PD (kPa) = PD (ft of hd) x 2.99

TO Series Nomenclature

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

TO VF 30 C F E 3 A B N T A

MODEL TYPE
TO = TRANQUILITY (R410A) OUTSIDE AIR

CONFIGURATION
HB = HORIZONTAL w/WHEEL AND BYPASS DAMPER
HD = HORIZONTAL NO WHEEL
HW = HORIZONTAL w/ WHEEL
RB = ROOFTOP w/WHEEL AND BYPASS DAMPER
RD = ROOFTOP (OUTDOOR) NO WHEEL
RW = ROOFTOP (OUTDOOR) w/ WHEEL
VF = VERTICAL w/ FILTER BOX (STANDARD)
VD = VERTCAL w/DAMPER BOX

UNIT SIZE
02
03
04 - (VD, VF)
ALL CONFIGURATIONS: 05, 08, 10, 15, 20, 25, 30
HD / RD CONFIGURATION: 36, 40, 46, 50, 56, 60

REVISION LEVEL
C = CAREL

VOLTAGE

OPTION	208-230/60/1	208-230/60/3	460/60/3	575/60/3	NON- FUSED DISC.	GFI
G	X	-	-	-	-	-
H	-	X	-	-	-	-
F	-	-	X	-	-	-
N	-	-	-	X	-	-
A	X	-	-	-	X	-
B	X	-	-	-	-	X
C	X	-	-	-	X	X
D	-	X	-	-	X	-
J	-	X	-	-	-	X
K	-	X	-	-	X	X
L	-	-	X	-	X	-
M	-	-	X	-	-	X
Y	-	-	X	-	X	X
P	-	-	-	X	X	-
R	-	-	-	X	-	X
W	-	-	-	X	X	X

SUPPLY MOTOR HP

OPTION	MOTOR HP	w/ VFD
A	0.5	-
B	1	-
C	1.5	-
D	2	-
E	3	-
F	5	-
G	7.5	-
H	10	-
J	15	-
K	20	-
L	25	-
M	30	-
N	0.5	X
P	1	X
Q	1.5	X
R	2	X
S	3	X
T	5	X
U	7.5	X
V	10	X
W	15	X
1	20	X
2	25	X
3	30	X

EXHAUST MOTOR HP

OPTION	MOTOR HP	w/ VFD
A	0.5	-
B	1	-
C	1.5	-
D	2	-
E	3	-
F	5	-
G	7.5	-
H	10	-
J	15	-
K	20	-
L	25	-
M	30	-
N	0.5	X
P	1	X
Q	1.5	X
R	2	X
S	3	X
T	5	X
U	7.5	X
V	10	X
W	15	X
1	20	X
2	25	X
3	30	X

SUPPLY AIR CONFIGURATION

OPTION	STANDARD FILTER	STANDARD FILTER WITH PRE-FILTER	MERV 13 FILTER	MERV 13 WITH PRE-FILTER
TOP	T	F	C	J
BOTTOM DISCHARGE	B	G	D	K
REAR DISCHARGE	A	H	E	L

RETURN AIR CONFIGURATION

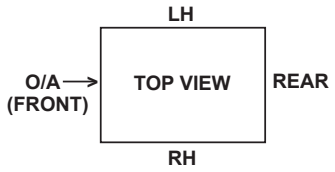
OPTION	STANDARD FILTER	STANDARD FILTER WITH PRE-FILTER	MERV 13 FILTER	MERV 13 WITH PRE-FILTER
NONE (NO WHEEL)	N	-	-	-
REAR RETURN	A	E	C	G
BOTTOM RETURN	B	F	D	H

HEAT EXCHANGER OPTIONS

OPTION	NON-COATED COIL	COATED COIL	SIDE WATER CONNECTION	BOTTOM WATER CONNECTION	LEFT HAND ACCESS	RIGHT HAND ACCESS
B	X	-	X	-	-	X
C	X	-	-	X	-	X
K	-	X	X	-	-	X
L	-	X	-	X	-	X
M	X	-	X	-	X	-
N	X	-	-	X	X	-
P	-	X	X	-	X	-
R	-	X	-	X	X	-

COMMUNICATION OPTIONS

OPTION	COMMUNICATION CONFIGURATION
1	CONTROLLER WITH NO BMS
2	CONTROLLER WITH BACnet Enet
3	CONTROLLER WITH BACnet MS/TP
4	CONTROLLER WITH LON
5	CONTROLLER WITH MODBUS



CONTROLS / MISC OPTIONS
E = LAT (STANDARD)
H = LAT (STANDARD), VFD FOR WHEEL
J = ZONE RESET
M = ZONE RESET, VFD FOR WHEEL
R = NIGHT SETBACK (HB, RB, & VD ONLY)
S = R + VFD FOR WHEEL
T = CO2
U = CO2, VFD FOR WHEEL

Notes:

1. Service access side referenced looking into O/A intake.
2. Side water connections are always on the same side as access except for horizontal size 20.
3. Condensate connection same side as water connections.
4. "HW & RW" model configurations are not available with "Top Supply with Bottom Return" option. if digit 14 is "T, F, C, or J" then digit 13 must be "A, E, C, or G".
5. Only applies to "RW" & "HW" model configurations.
6. Only applies to "RB" & "HB" model configurations.
7. Only applies to horizontal and rooftop model configurations.
8. Vertical models use Merv 11 filters only; horizontal and rooftop models use Merv 7 filters as standard.
9. If digit 9 is option "T" or "U", then vfd will need to be selected in digits 11 and 15.
10. Right hand access is standard for horizontal and rooftops. Right hand is not available for verticals. Left hand access is standard for verticals.

NOTE: A dedicated 115 VAC, 15 Amp circuit (by others) is required on all DOAS units for operation of the factory installed evaporator heat tape(s). Failure to connect heat tape(s) to a proper power supply may lead to freezing of the water in the heat exchanger. Failure of, and/or damage caused by the failure of a heat exchanger due to freezing will be exempt from warranty coverage if the heat tapes are not properly connected and working at the time of the failure.

	HD/RD Models		HW/RW Models	
Air Limits	**Cooling/Dehumid Mode**	**Heating Mode**	**Cooling/Dehumid Mode**	**Heating Mode**
Minimum Ambient Air*	40ºF [4.4ºC]	40ºF [4.4ºC]	40ºF [4.4ºC]	-10ºF [-23.3ºC]
Maximum Ambient Air*	100ºF [37.8ºC]	100ºF [37.8ºC]	100ºF [37.8ºC]	100ºF [37.8ºC]
Minimum Entering Air	50ºF [10.0ºC]	15ºF [-9.4ºC]	50ºF [10.0ºC]	-10ºF [-23.3ºC]
Maximum Entering Air	110ºF [43ºC]	80ºF [26.7ºC]	110ºF [43ºC]	80ºF [26.7ºC]
Water Limits				
Minimum Entering Water	35ºF [1.7ºC]	35ºF [1.7ºC]	35ºF [1.7ºC]	35ºF [1.7ºC]
Maximum Entering Water	105ºF [1.7ºC]	90ºF [32.2ºC]	105ºF [1.7ºC]	90ºF [32.2ºC]

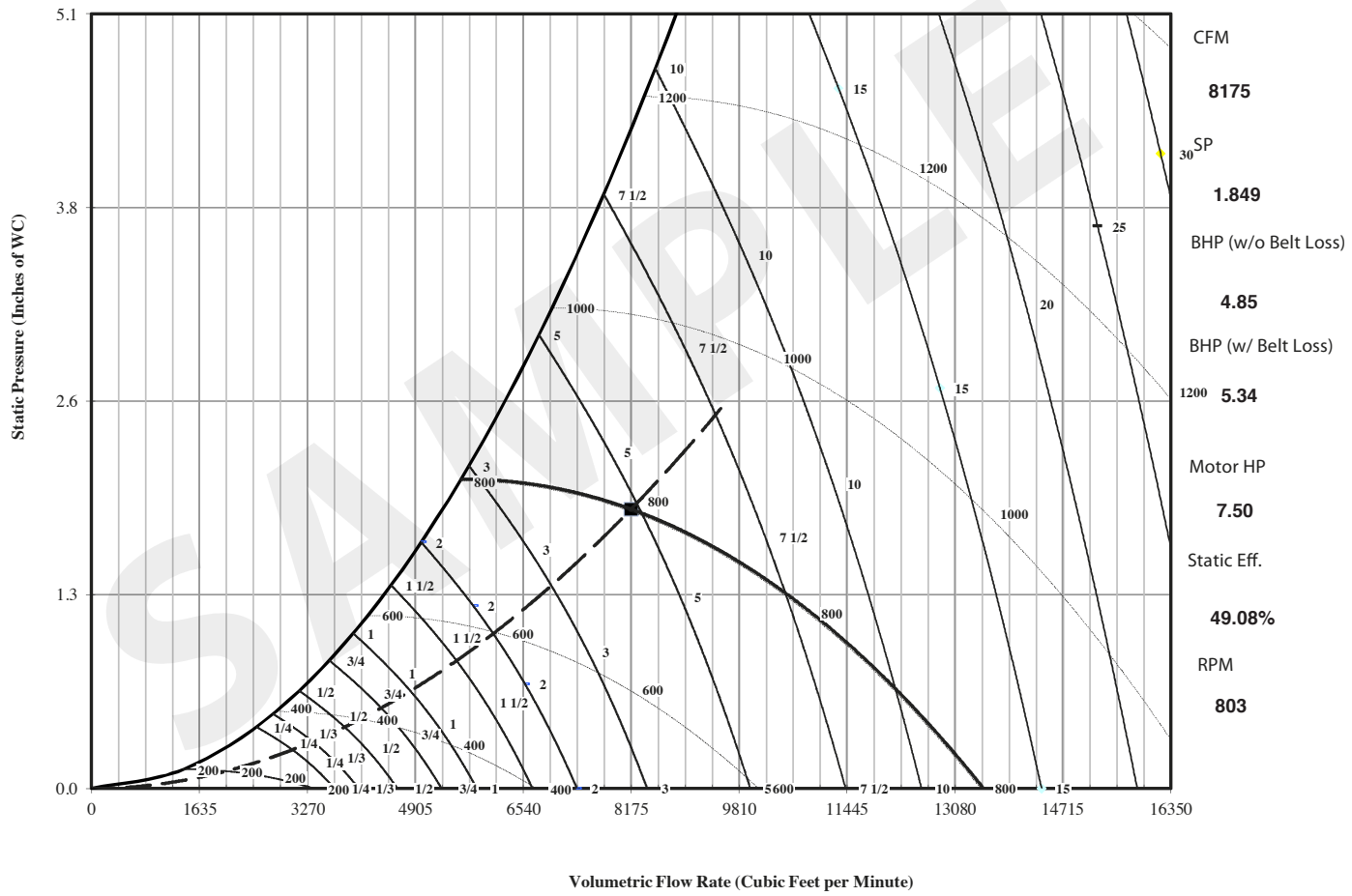
*Does not apply to rooftop models.

710-198

ATLI 18-13 R

Comefri Enter Tag

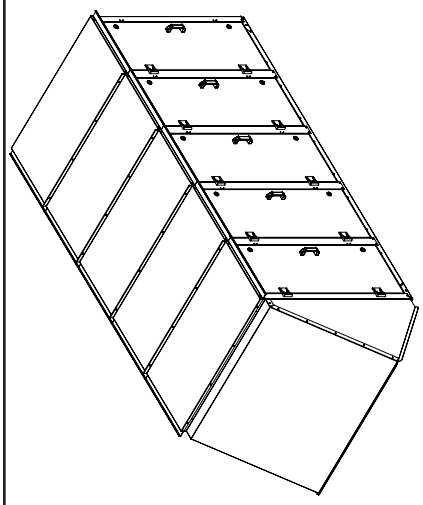
Supply Blower Performance Curve

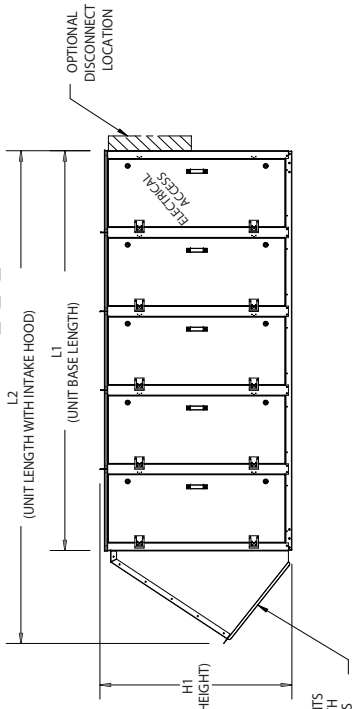


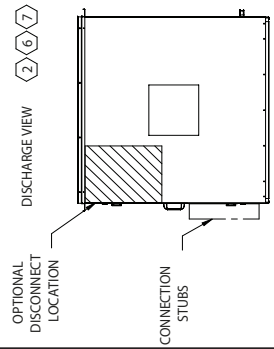
This is a sample blower curve. For unit-specific blower curves, please consult ClimateMaster applications department.

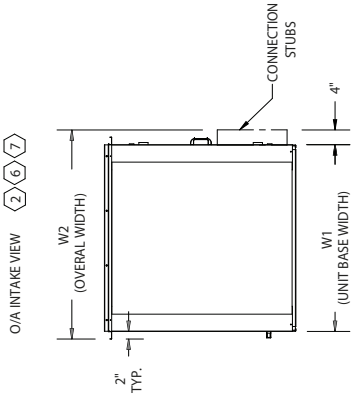
Horizontal Non-Wheeled Dimensional Data

Air Flow	Unit Cabinet Sizes	Unit Size (Tons)	L1	W1	H1	L2	W2
End Flow	24	02	80 3/8	37 1/8	43 7/8	102 3/8	43 1/8
		03					
		05					
	36	08	105 3/8	49 1/8	48 5/8	129 3/4	55 1/8
		10					
		15					
	44	20	111 7/8	54 1/2	52 5/8	138 1/4	60 1/2
	50	25	114 3/8	61 1/8	63 1/8	144 3/4	67 1/8
		30					
	60	36	117 3/8	72 1/2	75 3/8	153 1/8	78 1/2
		40					
		46					
		50					
	72	56	125 3/8	87 1/2	83 5/8	165 1/4	93 1/2
		60					
Down Flow	24	02	80 3/8	37 1/8	43 7/8	102 3/8	43 1/8
		03					
		05					
	36	08	105 3/8	49 1/8	48 5/8	129 3/4	55 1/8
		10					
		15					
	44	20	111 7/8	54 1/2	52 5/8	138 1/4	60 1/2
	50	25	114 3/8	61 1/8	63 1/8	144 3/4	67 1/8
		30					
	60	36	117 3/8	72 1/2	75 3/8	153 1/8	78 1/2
		40					
		46					
		50					
	72	56	125 3/8	87 1/2	83 5/8	165 1/4	93 1/2
		60					
Top Flow	24	02	80 3/8	37 1/8	43 7/8	102 3/8	43/18
		03					
		05					
	36	08	105 3/8	49 1/8	48 5/8	129 3/4	55 1/8
		10					
		15					
	44	20	111 7/8	54 1/2	52 5/8	138 1/4	60 1/2
	50	25	114 3/8	61 1/8	63 1/8	144 3/4	67 1/8
		30					
	60	36	117 3/8	72 1/2	75 3/8	153 1/8	78 1/2
		40					
		46					
		50					
	72	56	125 3/8	87 1/2	83 5/8	165 1/4	93 1/2
		60					





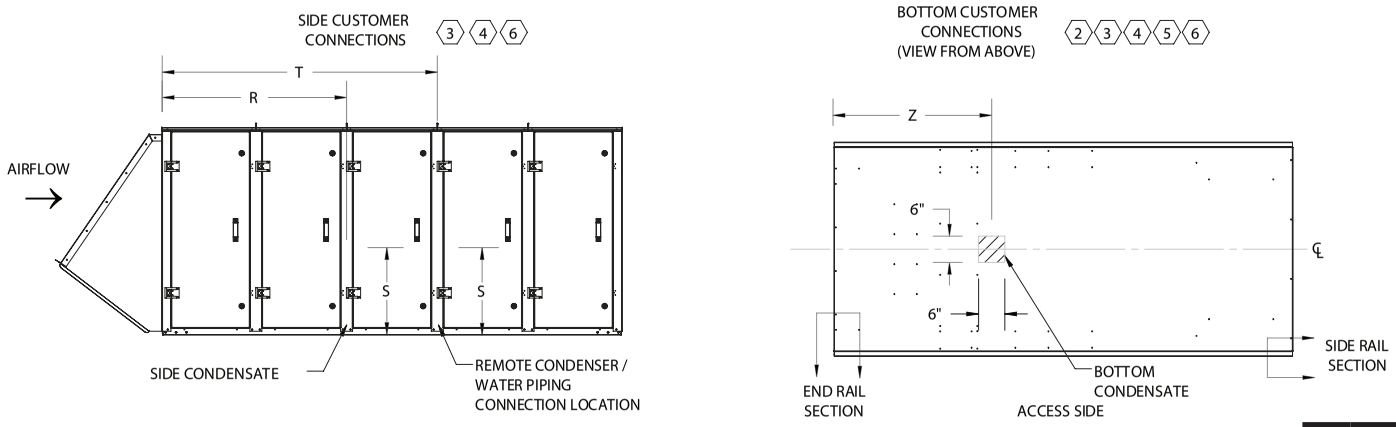




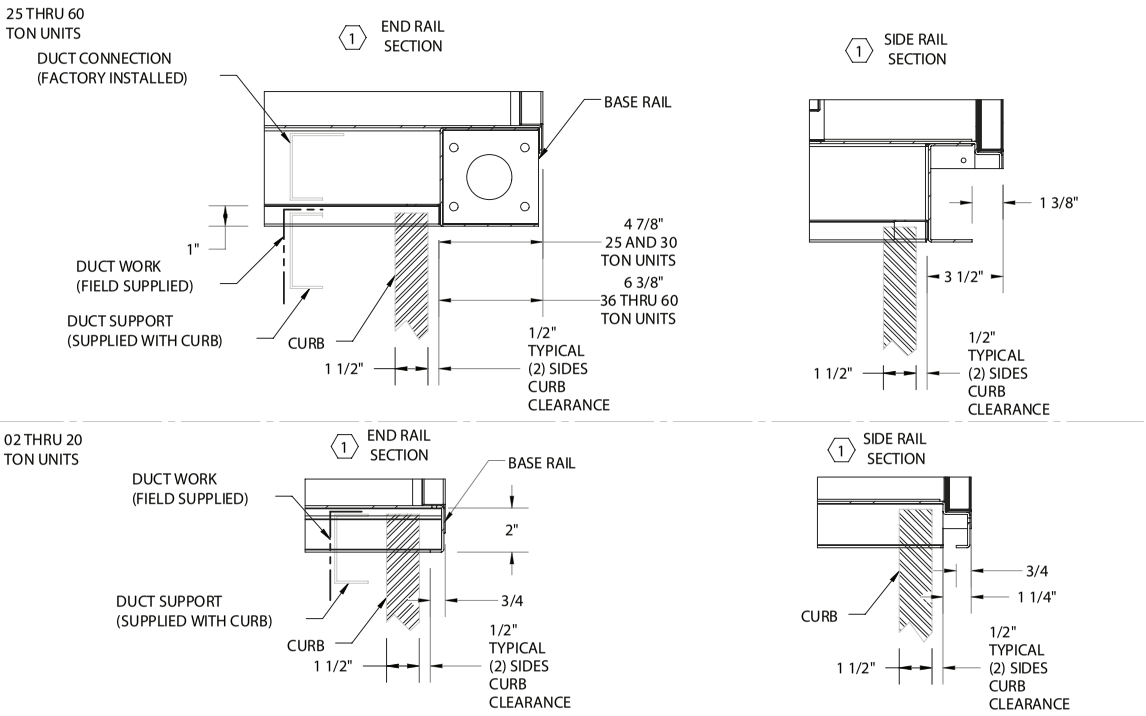
GENERAL NOTES AS REFERENCED BY INDIVIDUAL SHEETS:

1. PORTION OF SECTIONED OR DETAILED DRAWING HAS BEEN OMITTED FOR CLARITY.
2. HOODS OMITTED FOR CLARITY.
3. VIEW IS FOR PICTORAL PURPOSES. REFER TO PAGE 1 FOR UNIT TYPE SPECIFIC VIEW.
4. REFER TO SUBMITTAL FOR CUSTOMER CONNECTION LOCATIONS.
5. DIMENSIONS ARE TO ACCESS SIDE OF UNIT.
6. RH ACCESS SHOWN FOR DISPLAY PURPOSES. ACCESS DOOR CONFIGURATION MAY CHANGE DEPENDING ON UNIT SIZE.
7. REFER TO SHEET 3,4,5 FOR INTAKE AND DISCHARGE CONNECTION DIMENSIONS.
8. ALL DIMENSIONS ARE IN INCHES. TOLERANCE ± 1/8 INCH.

Horizontal Non-Wheeled Dimensional Data



NOTES:
REFER TO SHEET 1 FOR GENERAL NOTES.



Air Flow	Unit Cabinet Sizes	Unit Size (Tons)	R	T	S	Z
End Flow	24	02	27 1/8	27 1/8	16	30 1/4
		03				
		05				
	36	08	42 3/8	63 1/8	18	42 3/8
		10				
		15				
	44	20	45	67	20	44 7/8
	50	25	45 3/4	68 5/8	25	45 3/4
		30				
	60	36	46 7/8	70 1/2	38	47
		40				
		46				
	72	50	50 1/8	75 3/8	40	50 1/4
		56				
		60				
Down Flow	24	02	27 1/8	27 1/8	16	30 1/4
		03				
		05				
	36	08	42 3/8	63 1/8	18	42 3/8
		10				
		15				
	44	20	45	67	20	44 7/8
	50	25	45 3/4	68 5/8	25	45 3/4
		30				
	60	36	46 7/8	70 1/2	38	47
		40				
		46				
	72	50	50 1/8	75 3/8	40	50 1/4
		56				
		60				
Top Flow	24	02	27 1/8	27 1/8	16	30 1/4
		03				
		05				
	36	08	42 3/8	63 1/8	18	42 3/8
		10				
		15				
	44	20	45	67	20	44 7/8
	50	25	45 3/4	68 5/8	25	45 3/4
		30				
	60	36	46 7/8	70 1/2	38	47
		40				
		46				
	72	50	50 1/8	75 3/8	40	50 1/4
		56				
		60				

CUSTOMER CONNECTION LINE SIZE SUMMARY (in.)

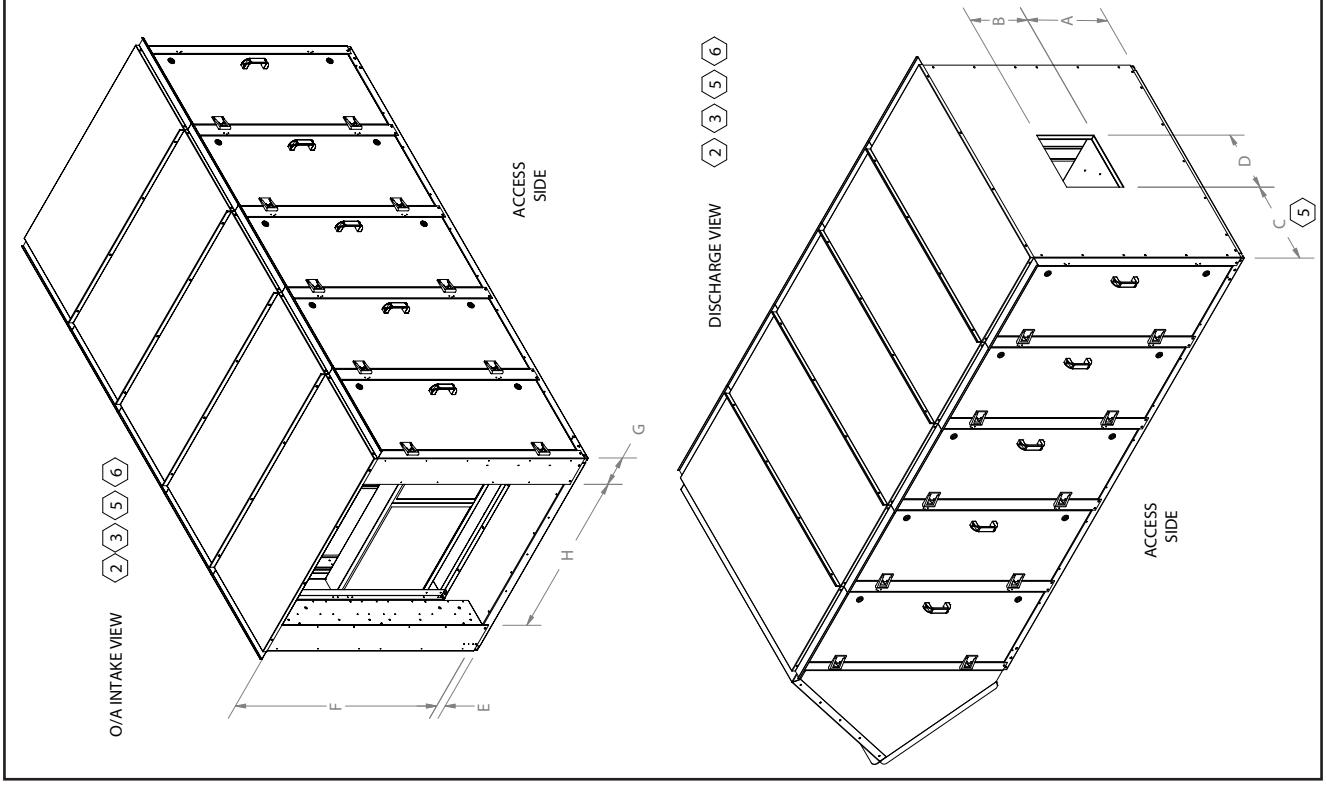
Unit Size	2 Tons	3 Tons	5 Tons	8 Tons	10 Tons	15 Tons	20 Tons	25 Tons	30 Tons	36 Tons	40 Tons	46 Tons	50 Tons	56 Tons	60 Tons
RC Discharge	1/2	5/8	3/4	7/8	7/8	1 1/8	1 1/8	1 1/8	1 3/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8
RC Return	3/8	1/2	1/2	5/8	5/8	3/4	3/4	7/8	7/8	3/4	3/4	7/8	7/8	7/8	7/8
Water Inlet	7/8	7/8	1 1/8	1 3/8	1 3/8	1 5/8	2 5/8	2 5/8	2 5/8	2 5/8	3 1/8	3 1/8	3 1/8	3 5/8	3 5/8
Water Outlet															
Condensate	1														

Page ____ of ____

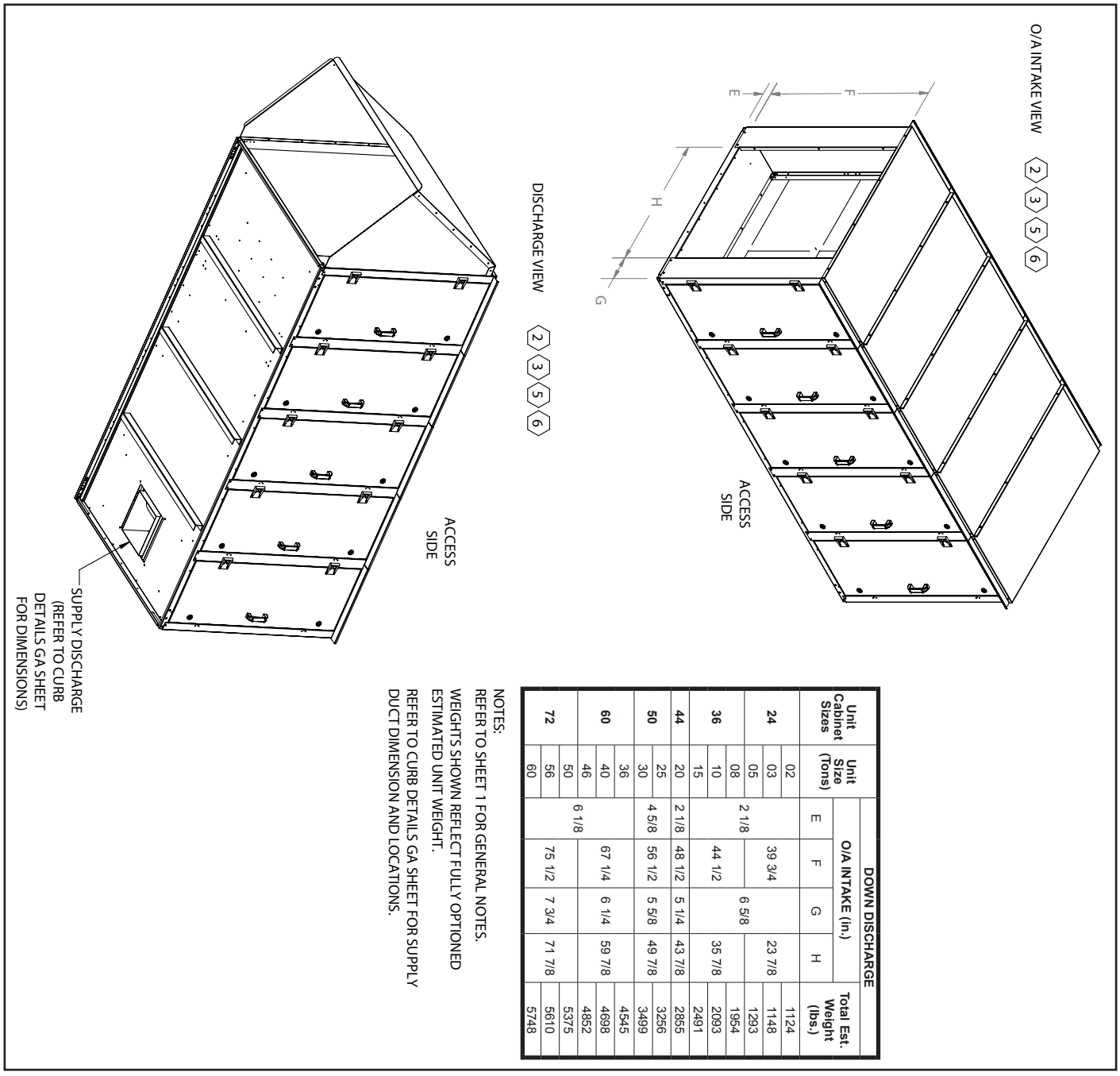
Horizontal Non-Wheeled Dimensional Data - End Discharge

END DISCHARGE												
Unit Cabinet Sizes	Unit Size (Tons)	Supply Discharge				O/A Intake (in.)					Total Est. Weight (lbs.)
		A	B	C ⟨5⟩	D	E	F	G	H		
24	02	3 3/4	11 1/2	13 5/8	9 7/8	2 1/8	39 3/4	6 5/8	23 7/8		1124
	03										1148
	05										1293
36	08		13 3/4	16 5/8	15 3/4		44 1/2		35 7/8		1954
	10										2093
	15										2491
44	20	3 3/4	16	17 7/8	18 3/4	2 1/8	48 1/2	5 1/4	43 7/8		2855
50	25	6 1/4		19 1/2	22 1/8	4 5/8	56 1/2	5 5/8	49 7/8		3256
	30										3499
60	36	7 3/4	16 1/2	25 1/4		6 1/8	67 1/4	6 1/4	59 7/8		4545
	40										4698
	46										4852
72	50		21 1/2	31 1/8	25 1/4		75 1/2	7 3/4	71 7/8		5375
	56										5610
	60										5748

NOTES:
REFER TO SHEET 1 FOR GENERAL NOTES.
WEIGHTS SHOWN REFLECT FULLY OPTIONED ESTIMATED UNIT WEIGHT.



Horizontal Non-Wheeled Dimensional Data - Down Discharge



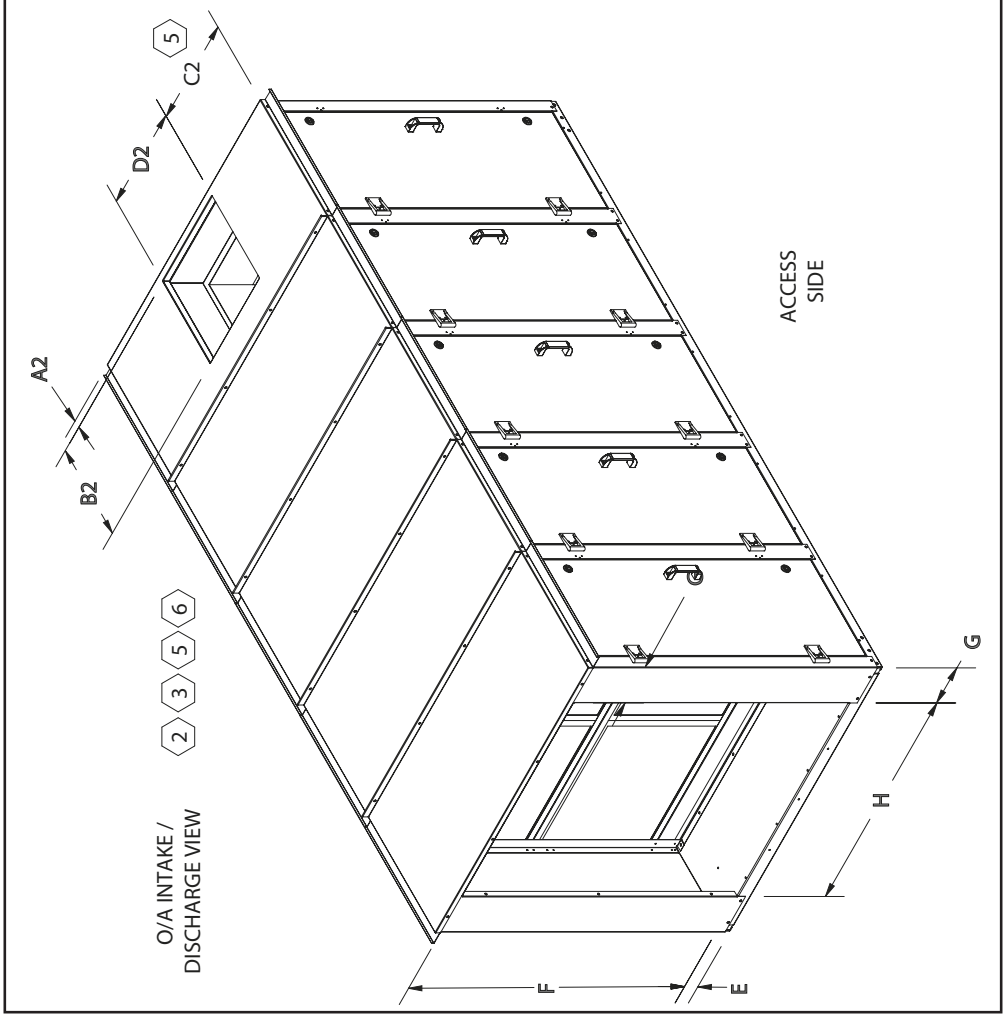
Unit Cabinet Sizes	Unit Size (Tons)	DOWN DISCHARGE O/A INTAKE (in.) E	F	G	H	Total Est. Weight (lbs.)
24	02	2 1/8	39 3/4	6 5/8	23 7/8	1124
	03					1148
	05					1293
	08					1954
36	10		44 1/2		35 7/8	2083
	15					2491
44	20					2855
50	25	4 5/8	56 1/2	5 5/8	49 7/8	3256
	30					3499
60	36	6 1/8	67 1/4	6 1/4	59 7/8	4545
	40					4698
	46					4852
	50					5375
72	56		75 1/2	7 3/4	71 7/8	5610
	60					5748

NOTES:
REFER TO SHEET 1 FOR GENERAL NOTES.
WEIGHTS SHOWN REFLECT FULLY OPTIONED ESTIMATED UNIT WEIGHT.
REFER TO CURB DETAILS GA SHEET FOR SUPPLY DUCT DIMENSION AND LOCATIONS.

Horizontal Non-Wheeled Dimensional Data - Top Dishcarge

Unit Cabinet Sizes	Unit Size (Tons)	TOP DISCHARGE Supply Discharge A2	B2	C2 ⟨5⟩	D2	O/A Intake (in.) E	F	G	H	Total Est. Weight (lbs.)
24	02	1 1/4	11 1/2	13 5/8	9 7/8	2 1/8	39 3/4	6 5/8	23 7/8	1124
	03									1148
	05									1293
36	08		13 3/4	16 5/8	15 3/4		44 1/2		35 7/8	1954
	10									2093
	15									2491
44	20		16	17 7/8	18 3/4	2 1/8	48 1/2	5 1/4	43 7/8	2855
50	25		16 1/2	19 1/2	22 1/8	4 5/8	56 1/2	5 5/8	49 7/8	3256
	30									3499
60	36			25 1/4		6 1/8	67 1/4	6 1/4	59 7/8	4545
	40									4698
	46									4852
72	50		21 1/2	31 1/8	25 1/4		75 1/2	7 3/4	71 7/8	5375
	56									5610
	60									5748

NOTES:
REFER TO SHEET 1 FOR GENERAL NOTES.
WEIGHTS SHOWN REFLECT FULLY OPTIONED ESTIMATED UNIT WEIGHT.



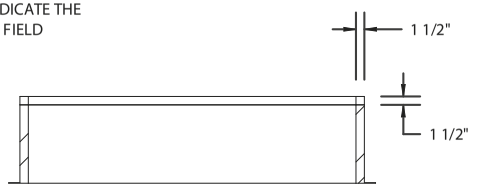
Horizontal Non-Wheeled Dimensional Data - Curb Details

Unit Cabinet Sizes	Unit Size (Tons)	END FLOW ROOFCURB DIS			TOP FLOW ROOFCURB DIM S			DOWN FLOW ROOFCURB DIM S						
		Curb P/N	Width (in.)	Length (in.)	Curb P/N	Width (in.)	Length (in.)	Curb P/N	Width (in.)	Length (in.)	Supply Discharge (in.)			
											A1	B1	C1	⑤ D1
24	02	CB02NNAN03-XX	33 1/2	77 3/4	CB02NNBN03-XX	33 1/2	77 3/4	CB02NNCN03-XX	33 1/2	77 3/4	0	11 1/2	10 3/8	9 7/8
	03	CB03NNAN03-XX			CB03NNBN03-XX			CB03NNCN03-XX						
	05	CB05NNAN03-XX			CB05NNBN03-XX			CB05NNCN03-XX						
36	08	CB08NNAN05-XX	45 1/2	102 3/4	CB08NNBN05-XX	45 1/2	102 3/4	CB08NNCN05-XX	45 1/2	102 3/4		13 3/4	13 3/8	15 3/4
	10	CB10NNAN05-XX			CB10NNBN05-XX			CB10NNCN05-XX						
	15	CB15NNAN05-XX			CB15NNBN05-XX			CB15NNCN05-XX						
44	20	CB20NNAN05-XX	50 7/8	109 1/4	CB20NNBN05-XX	50 7/8	109 1/4	CB20NNCN05-XX	50 7/8	109 1/4		16	14 5/8	18 3/4
50	25	CB25NNAN05-XX	53 1/8	103 5/8	CB25NNBN05-XX	53 1/8	103 5/8	CB25NNCN05-XX	53 1/8	103 5/8		16 1/2	14	22 1/8
	30	CB30NNAN05-XX			CB30NNBN05-XX			CB30NNCN05-XX						
60	36	CB36NNAN05-XX	64 1/2		CB36NNBN05-XX	64 1/2		CB36NNCN05-XX	64 1/2				19 3/4	
	40	CB40NNAN05-XX			CB40NNBN05-XX			CB40NNCN05-XX						
	46	CB46NNAN05-XX			CB46NNBN05-XX			CB46NNCN05-XX						
72	50	CB50NNAN05-XX	79 1/2	111 5/8	CB50NNBN05-XX	79 1/2	111 5/8	CB50NNCN05-XX	79 1/2	111 5/8		21 1/2	25 5/8	25 1/4
	56	CB56NNAN05-XX			CB56NNBN05-XX			CB56NNCN05-XX						
	60	CB60NNAN05-XX			CB60NNBN05-XX			CB60NNCN05-XX						

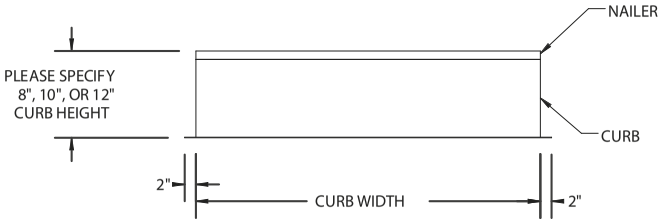
NOTES:
REFER TO SHEET 1 FOR GENERAL NOTES.

CURBS 120" AND LESS ARE SHIPPED AS COMPLETE CURBS. GREATER THAN 120" ARE SHIPPED KNOCKED DOWN.

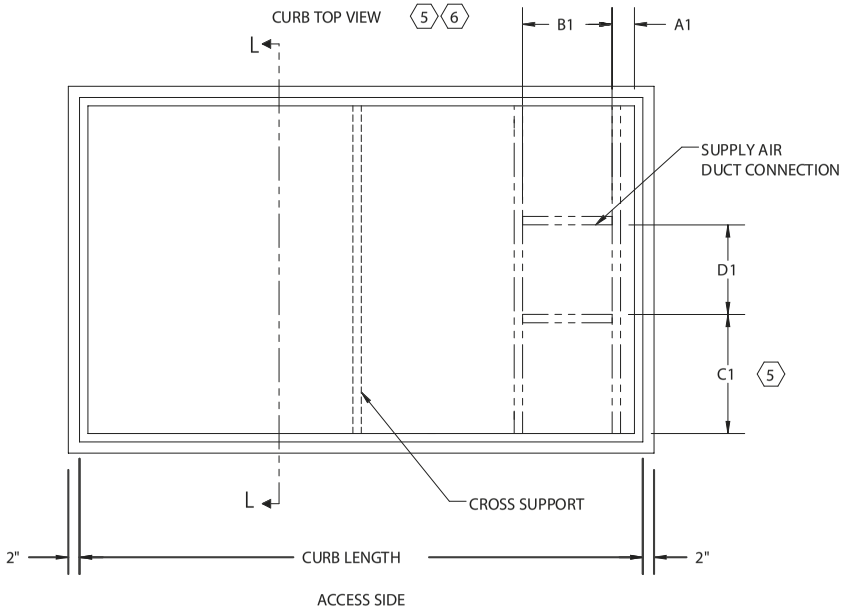
NUMBER AND LOCATION OF CROSS SUPPORT(S) IS DEPENDANT UPON THE GUAGE OF MATERIAL USED TO CONSTRUCT THE CURB, DUCT SUPPORT CONFIGURATION, LENGTH OF CURB, AND WIDTH OF CURB. INSTALLATION INSTRUCTIONS INCLUDED WITH CURB SHIPMENT INDICATE THE REQUIRED POSITION FOR FIELD ASSEMBLED CURBS.



SECTION L-L



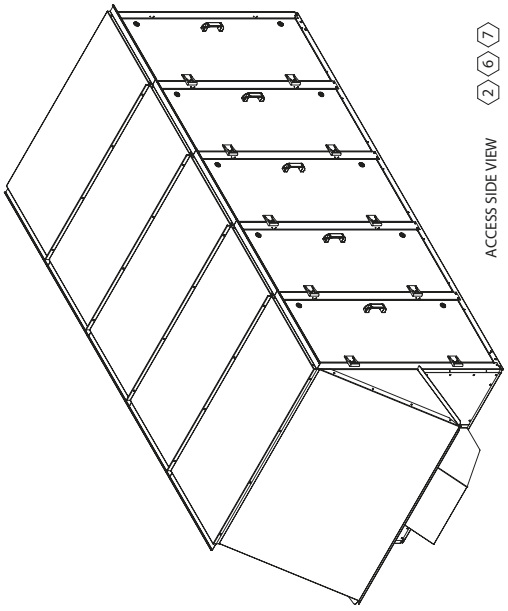
AIRFLOW →



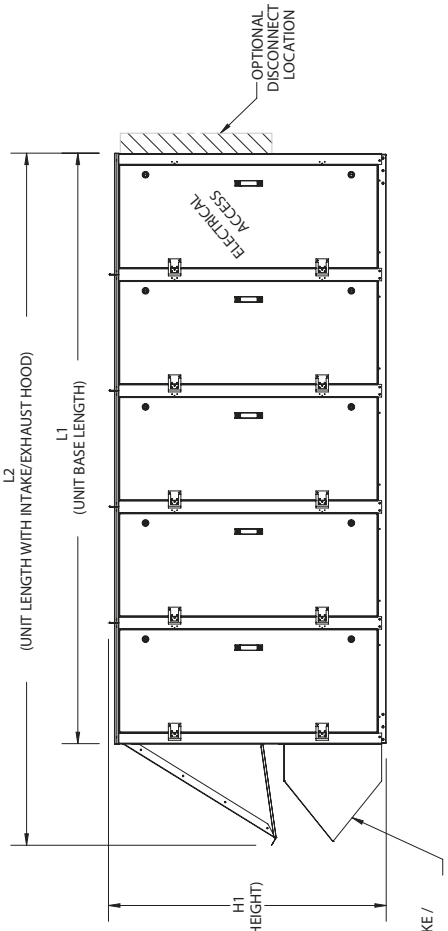
— — — DUCT CONNECTIONS FOR DOWN DISCHARGE

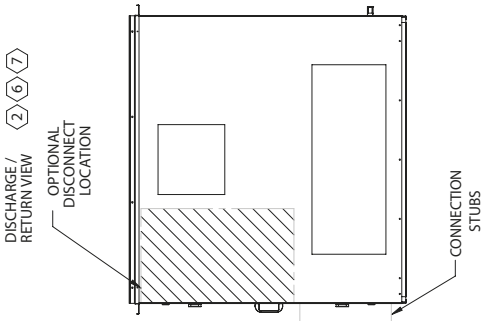
Horizontal Wheeled Dimensional Data

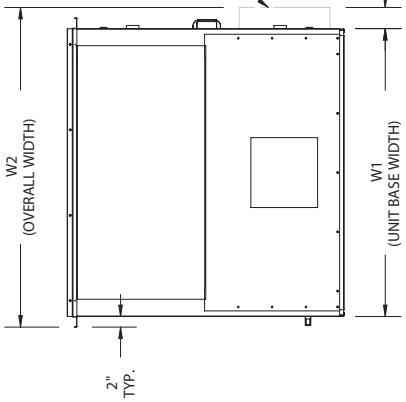
Air Flow	Unit Cabinet Sizes	Unit Size (Tons)	L1	W1	H1	L2	W2
End Flow	36-H	02	105 3/8	49 1/8	48 5/8	123 3/4	55 1/8
		03					
	44-H	05	111 7/8	54 1/2	52 5/8	130 1/4	60 1/2
	50-H	08	114 3/8	61 1/8	63 1/8	137 3/4	67 1/8
	60-H	10	117 3/8	72 1/2	75 3/8	140 3/4	78 1/2
	72-H	15	125 3/8	87 1/2	83 5/8	153 3/4	93 1/2
	78-H	20	135 3/8	90 1/2	92 5/8	164 1/4	96 1/2
		25					
		30					
Down Flow	36-H	02	105 3/8	49 1/8	48 5/8	123 3/4	55 1/8
		03					
	44-H	05	111 7/8	54 1/2	52 5/8	130 1/4	60 1/2
	50-H	08	137 1/4	61 1/8	63 1/8	160 5/8	67 1/8
	60-H	10	140 7/8	72 1/2	75 3/8	164 3/8	78 1/2
	72-H	15	150 5/8	87 1/2	83 5/8	179	93 1/2
	78-H	20	162 3/8	90 1/2	92 5/8	191 1/4	96 1/2
		25					
		30					
Top Flow	36-H	02	105 3/8	49 1/8	48 5/8	123 3/4	55 1/8
		03					
	44-H	05	111 7/8	54 1/2	52 5/8	130 1/4	60 1/2
	50-H	08	114 3/8	61 1/8	63 1/8	137 3/4	67 1/8
	60-H	10	117 3/8	72 1/2	75 3/8	140 3/4	78 1/2
	72-H	15	125 3/8	87 1/2	83 5/8	153 3/4	93 1/2
	78-H	20	135 3/8	90 1/2	92 5/8	164 1/4	96 1/2
		25					
		30					



ACCESS SIDE VIEW 〈2〉〈6〉〈7〉



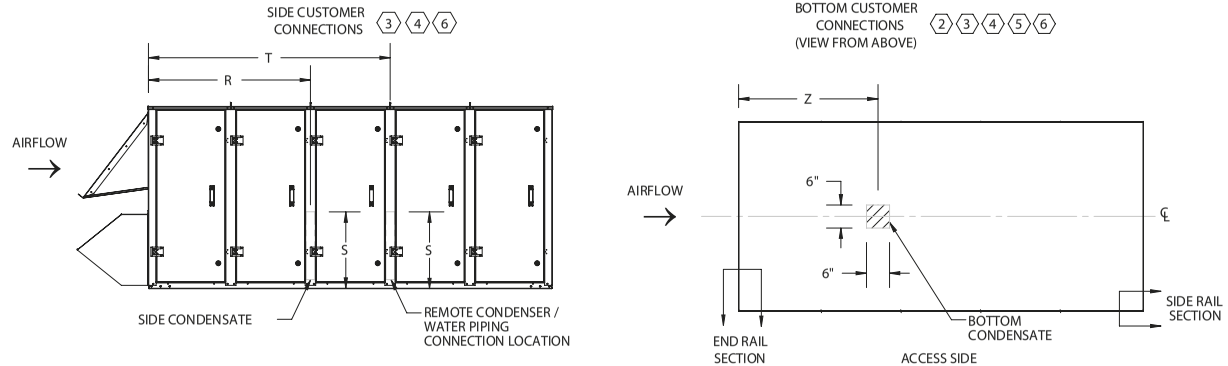


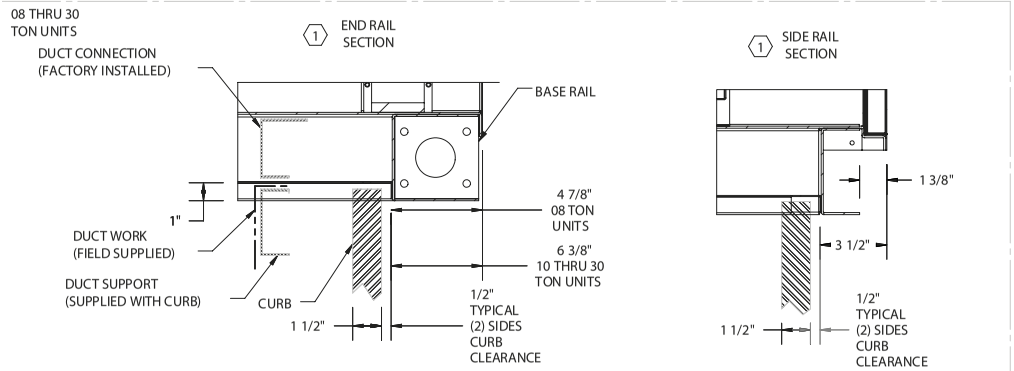


GENERAL NOTES AS REFERENCED BY INDIVIDUAL SHEETS:

〈1〉 PORTION OF SECTIONED DRAWING HAS BEEN OMITTED FOR CLARITY.
〈2〉 HOODS OMMITTED FOR CLARITY.
〈3〉 VIEW IS FOR PICTORAL PURPOSES. REFER TO PAGE 1 FOR UNIT TYPE SPECIFIC VIEW.
〈4〉 REFER TO SUBITTAL FOR CUSTOMER CONNECTION LOCATIONS.
〈5〉 DIMENSIONS ARE TO ACCESS SIDE OF UNIT.
〈6〉 RH ACCESS SHOWN FOR DISPLAY PURPOSES. ACCESS DOOR CONFIGURATION MAY CHANGE DEPENDING ON UNIT SIZE.
〈7〉 REFER TO SHEET 3,4,5 FOR INTAKE AND DISCHARGE CONNECTION DIMENSIONS.
〈8〉 ALL DIMENSIONS ARE IN INCHES. TOLERANCE ± 1/8 INCH.

Horizontal Wheeled Dimensional Data





Air Flow	Unit Cabinet Sizes	Unit Size (Tons)	R	T	S	Z
End Flow	36-H	02	63 1/8	63 1/8	18	52 3/8
		03				
	44-H	05	67	67	20	54 7/8
	50-H	08	68 5/8	68 5/8	25	55 3/4
	60-H	10	70 1/2	70 1/2	38	57
	72-H	15	75 3/8	75 3/8	40	60 1/4
	78-H	20	81 1/4	81 1/4	41	69 7/8
		25				
		30				
Down Flow	36-H	02	63 1/8	63 1/8	18	52 3/8
		03				
	44-H	05	67	67	20	54 7/8
	50-H	08	68 5/8	91 1/2	25	55 3/4
	60-H	10	70 1/2	94	38	57
	72-H	15	75 3/8	100 1/2	40	60 1/4
	78-H	20	81 1/4	108 1/4	41	69 7/8
		25				
		30				
Top Flow	36-H	02	63 1/8	63 1/8	18	52 3/8
		03				
	44-H	05	67	67	20	54 7/8
	50-H	08	68 5/8	68 5/8	25	55 3/4
	60-H	10	70 1/2	70 1/2	38	57
	72-H	15	75 3/8	75 3/8	40	60 1/4
	78-H	20	81 1/4	81 1/4	41	69 7/8
		25				
		30				

NOTES:
REFER TO SHEET 1 FOR GENERAL NOTES.

CUSTOMER CONNECTION LINE SIZE SUMMARY (in.)									
Unit Size	2 Tons	3 Tons	5 Tons	8 Tons	10 Tons	15 Tons	20 Tons	25 Tons	30 Tons
RC Discharge	1/2	5/8	3/4	7/8	7/8	1 1/8	1 1/8	1 1/8	1 3/8
RC Return	3/8	1/2	1/2	5/8	5/8	3/4	3/4	7/8	7/8
Water Inlet	7/8	7/8	1 1/8	1 3/8	1 3/8	1 5/8	2 5/8	2 5/8	2 5/8
Water Outlet									
Condensate	1								

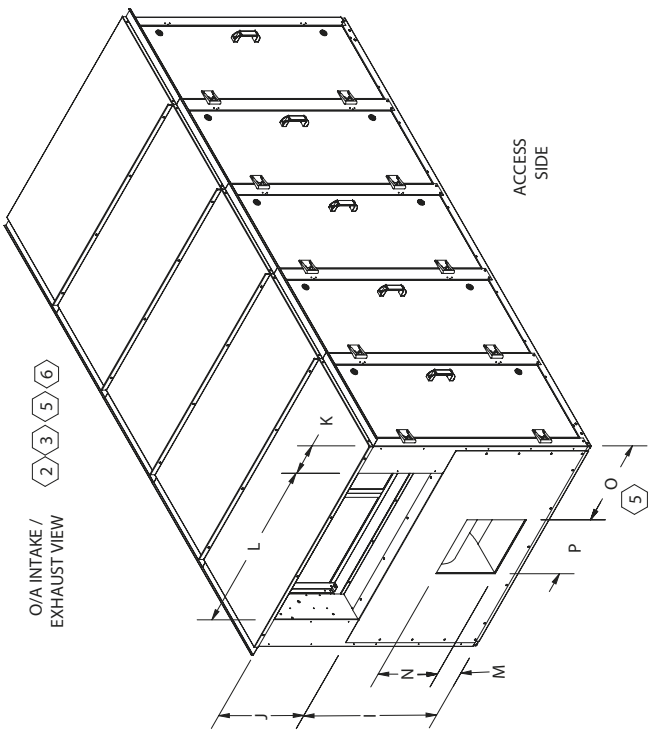
Horizontal Wheeled Dimensional Data - End Discharge

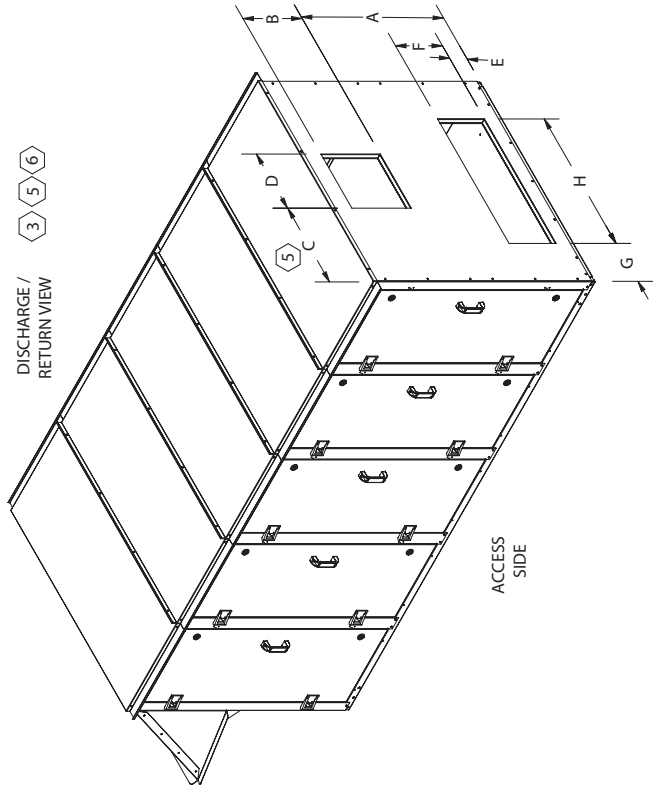
Unit Cabinet Sizes	Unit Size (Tons)	END DISCHARGE, END RETURN								
		Supply Discharge				Return Intake (in.)				
		A	B	C ⟨5⟩	D	E	F	G	H
36-H	02	24 3/4	12 3/4	17 7/8	13 1/4	3 7/8	10	9 3/8	30 1/2
	03								
44-H	05	29 1/4	11 1/2	21 1/4	12	3 7/8	14		35 7/8
50-H	08	34 1/4	16	22 3/4	15 3/4	6 3/8	20 1/2		42 1/2
60-H	10	40 7/8		26 7/8	18 3/4	7 7/8	30		53 7/8
72-H	15	48 1/4		34 3/8	18 3/4	7 7/8	36		68 7/8
78-H	20	43 5/8	24	31 1/8	28 3/8	7 7/8	32		71 7/8
	25								
	30								

Unit Cabinet Sizes	Unit Size (Tons)	CONTINUED - END DISCHARGE, END RETURN								Total Est. Weight (lbs.)
		Exhaust Discharge				O/A Intake (in.)				
		M	N	O ⟨5⟩	P	I	J	K	L	
36-H	02	3 3/4	12 3/4	17 7/8	13 1/4	28 1/2	17 7/8	6 5/8	35 7/8	1623
	03									1673
44-H	05	3 3/4	11 1/2	21 1/4	12	26 1/2	23 7/8	5 1/4	43 7/8	2031
50-H	08	6 1/4	16	22 3/4	15 3/4	37	23 7/8	5 5/8	49 7/8	2648
60-H	10	7 3/4	16	26 7/8	18 3/4	43 1/2	29 5/8	6 1/4	59 7/8	3320
72-H	15		16	34 3/8	18 3/4	45 1/2	35 7/8	7 3/4	71 7/8	4814
78-H	20		24	31 1/8	28 3/8	48 1/2	41 7/8	6 1/4	77 7/8	5364
	25									7405
	30									7530

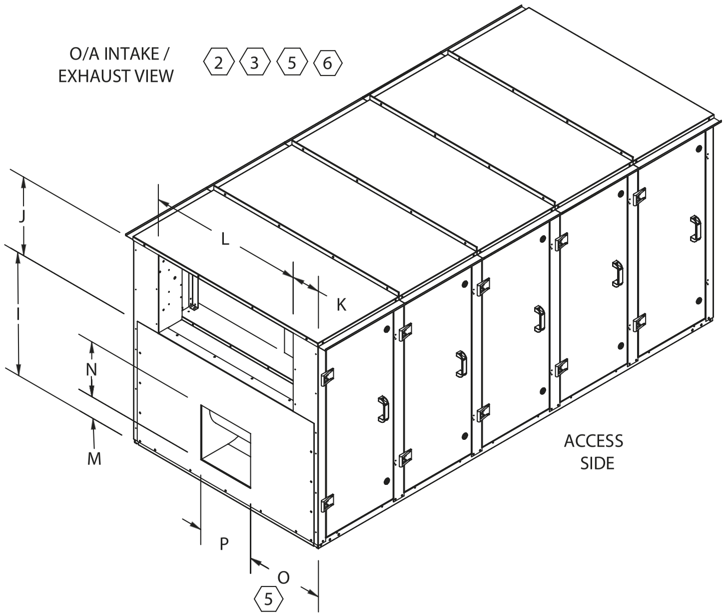
NOTES:
REFER TO SHEET 1 FOR GENERAL NOTES.

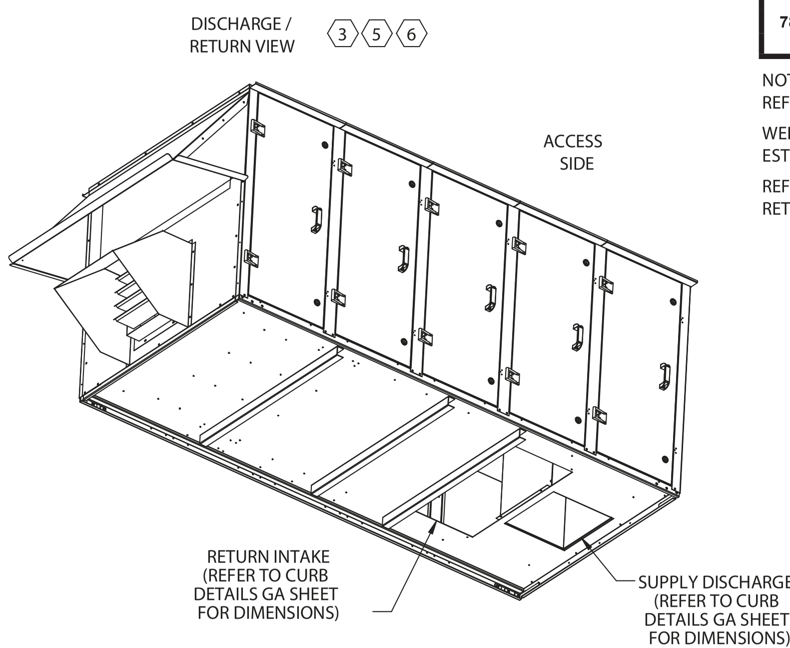
WEIGHTS SHOWN REFLECT FULLY OPTIONED ESTIMATED UNIT WEIGHT.





Horizontal Wheeled Dimensional Data - Down Discharge





Unit Cabinet Sizes	Unit Size (Tons)	DOWN DISCHARGE, DOWN RETURN								Total Est. Weight (lbs.)
		Exhaust Discharge				O/A Intake (in.)				
		M	N	O (5)	P	I	J	K	L	
36-H	02	3 3/4	12 3/4	17 7/8	13 1/4	28 1/2	17 7/8	6 5/8	35 7/8	1623
	03									1673
44-H	05	3 3/4	11 1/2	21 1/4	12	26 1/2	23 7/8	5 1/4	43 7/8	2031
50-H	08	6 1/4	16	22 3/4	15 3/4	37	23 7/8	5 5/8	49 7/8	2648
60-H	10	7 3/4	16	26 7/8	18 3/4	43 1/2	29 5/8	6 1/4	59 7/8	3320
72-H	15		16	34 3/8	18 3/4	45 1/2	35 7/8	7 3/4	71 7/8	4814
78-H	20		24	31 1/8	28 3/8	48 1/2	41 7/8	6 1/4	77 7/8	5364
	25									7405
	30									7530

NOTES:
REFER TO SHEET 1 FOR GENERAL NOTES.

WEIGHTS SHOWN REFLECT FULLY OPTIONED ESTIMATED UNIT WEIGHT.

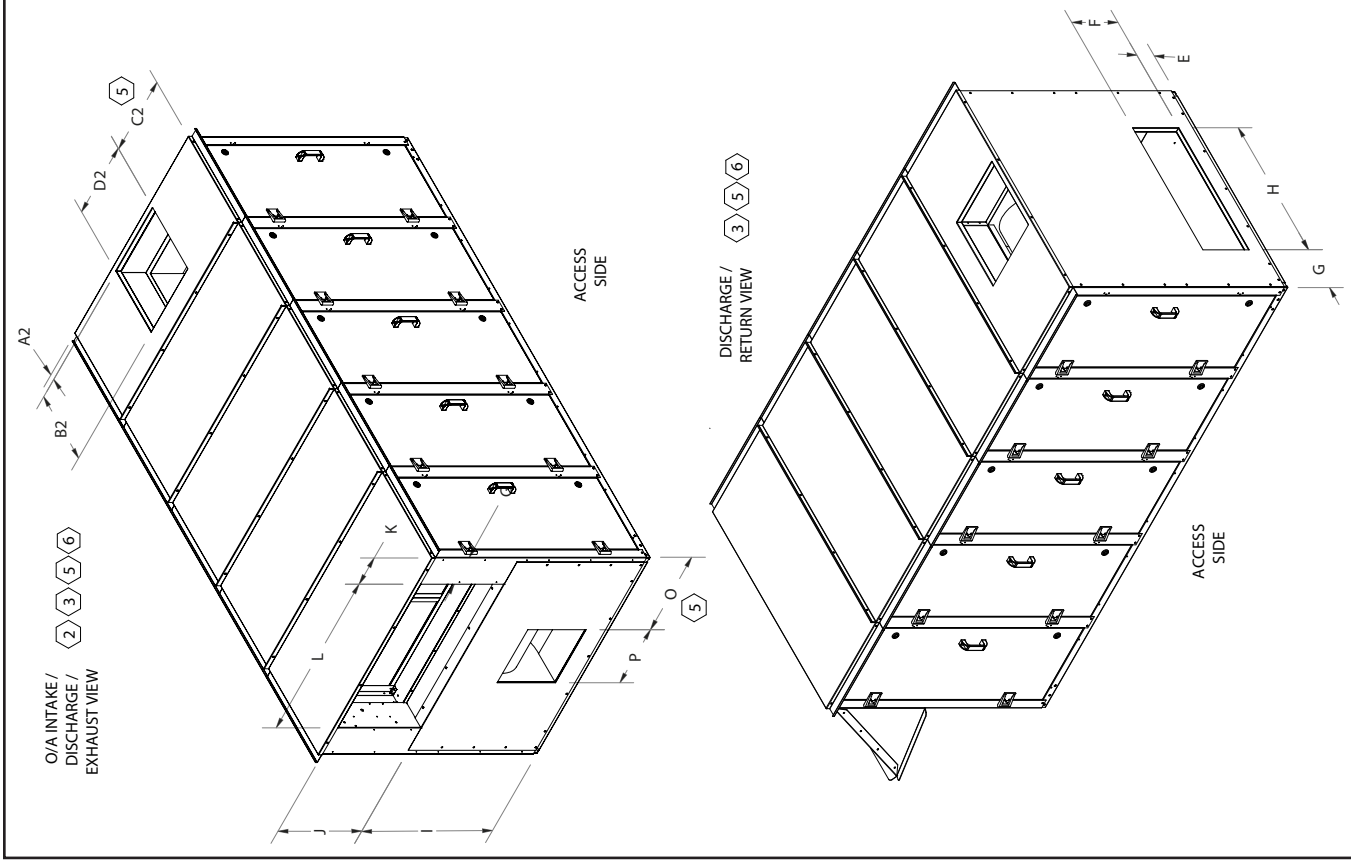
REFER TO CURB DETAILS GA SHEET FOR SUPPLY / RETURN DUCT DIMENSION AND LOCATIONS.

Horizontal Wheeled Dimensional Data - Top Discharge

TOP DISCHARGE, END RETURN													
Unit Cabinet Sizes	Unit Size (Tons)	Supply Discharge (in.)				Return Intake (in.)							
		A2	B2 ⟨5⟩	C2	D2	E	F	G	H				
36-H	02	1 1/4	12 3/4	17 7/8	13 1/4	3 7/8	10	9 3/8	30 1/2				
	03												
44-H	05		11 1/2	21 1/4	12	3 7/8	14		35 7/8				
50-H	08		16	22 3/4	15 3/4	6 3/8	20 1/2		42 1/2				
60-H	10			26 7/8	18 3/4	7 7/8	30		53 7/8				
72-H	15			34 3/8	18 3/4	7 7/8	36		68 7/8				
78-H	20		24	31 1/8	28 3/8	7 7/8	32		71 7/8				
	25												
	30												

CONTINUED - TOP DISCHARGE, END RETURN													
Unit Cabinet Sizes	Unit Size (Tons)	Exhaust Discharge					O/A Intake (in.)						Total Est. Weight (lbs.)
		M	N	O ⟨5⟩	P		I	J	K	L			
36-H	02	3 3/4	12 3/4	17 7/8	13 1/4		28 1/2	17 7/8	6 5/8	35 7/8			1623
	03												1673
44-H	05	3 3/4	11 1/2	21 1/4	12		26 1/2	23 7/8	5 1/4	43 7/8			2031
50-H	08	6 1/4	16	22 3/4	15 3/4		37	23 7/8	5 5/8	49 7/8			2648
60-H	10		16	26 7/8	18 3/4		43 1/2	29 5/8	6 1/4	59 7/8			3320
72-H	15		16	34 3/8	18 3/4		45 1/2	35 7/8	7 3/4	71 7/8			4814
78-H	20	7 3/4	24	31 1/8	28 3/8		48 1/2	41 7/8	6 1/4	77 7/8			5364
	25												7405
	30												7530

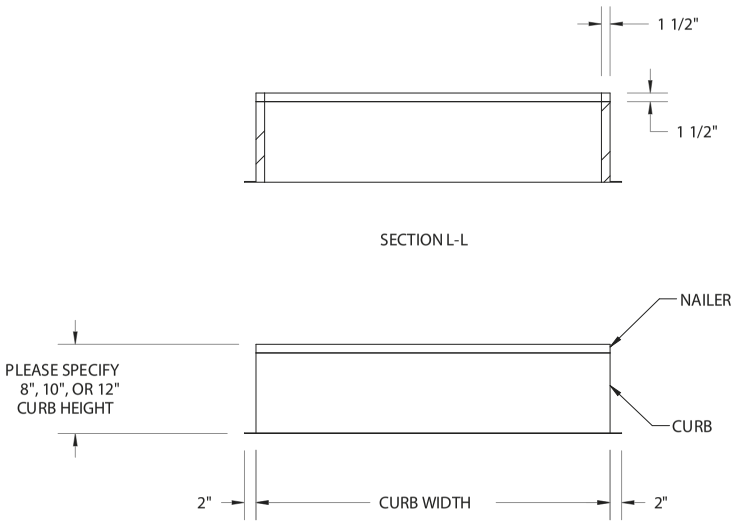
NOTES:
1. REFER TO SHEET 1 FOR GENERAL NOTES.
2. WEIGHTS SHOWN REFLECT FULLY OPTIONED ESTIMATED UNIT WEIGHT.

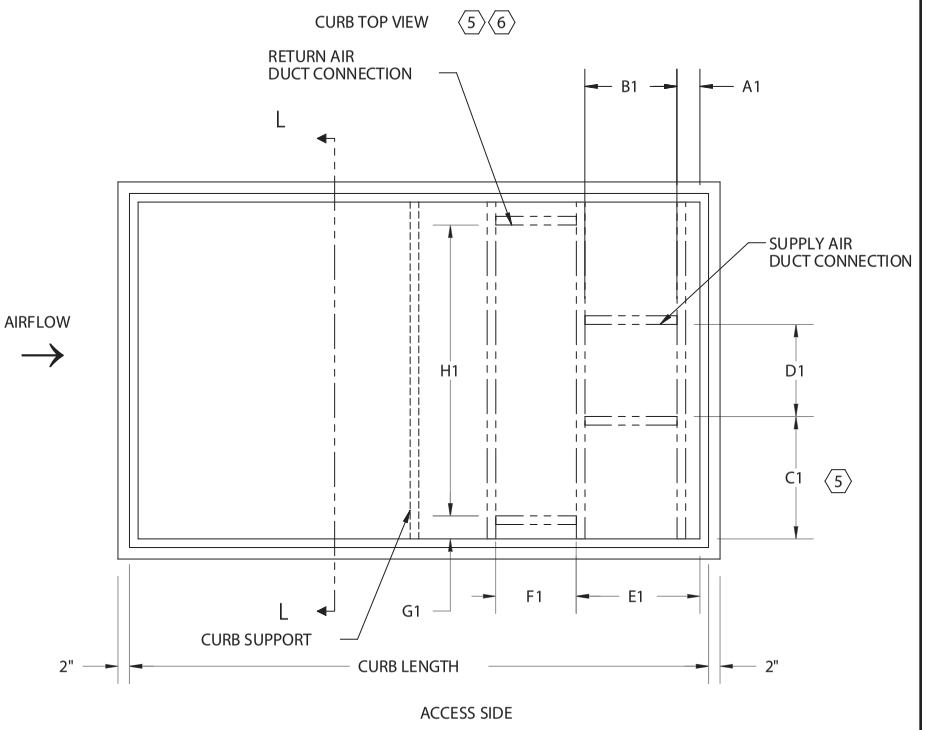


Horizontal Wheeled Dimensional Data - Curb Details

Unit Cabinet Sizes	Unit Size (Tons)	END/END FLOW ROOFCURB DIM S			TOP/END FLOW ROOFCURB DIM S			DOWN FLOW ROOFCURB DIM S										
											Supply Discharge (in.)				Return Intake (in.)			
		Curb P/N	Width (in.)	Length (in.)	Curb P/N	Width (in.)	Length (in.)	Curb P/N	Width (in.)	Length (in.)	A1	B1	C1 [5]	D1	E1	F1	G1	H1
36-H	02	CB02WNAN05-XX	45 1/2	102 3/4	CB02WNBN05-XX	45 1/2	102 3/4	CB02WNCN05-XX	45 1/2	102 3/4	0	12 3/4	14 5/8	13 1/4	14 1/4	13	5 3/4	31
	03	CB03WNAN05-XX			CB03WNBN05-XX			CB03WNCN05-XX										
44-H	05	CB05WNAN05-XX	50 7/8	109 1/4	CB05WNBN05-XX	50 7/8	109 1/4	CB05WNCN05-XX	50 7/8	109 1/4		11 1/2	18	12	13	17	6	36
50-H	08	CB08WNAN05-XX	53 1/8	103 5/8	CB08WNBN05-XX	53 1/8	103 5/8	CB08WNCN06-XX	53 1/8	126 1/2		16	17 1/4	15 3/4	17 1/2	18	3 5/8	43
60-H	10	CB10WNAN05-XX	64 1/2		CB10WNBN05-XX	64 1/2		CB10WNCN06-XX	64 1/2	127 1/8			21 3/8	18 3/4		30	3 3/4	54
72-H	15	CB15WNAN05-XX	79 1/2	111 5/8	CB15WNBN05-XX	79 1/2	111 5/8	CB15WNCN06-XX	79 1/2	136 7/8			28 7/8	18 3/4		31		69
78-H	20	CB20WNAN05-XX	82 1/2	121 5/8	CB20WNBN05-XX	82 1/2	121 5/8	CB20WNCN06-XX	82 1/2	148 5/8		24	25 5/8	28 3/8	25 1/2	32		72
	25	CB25WNAN05-XX			CB25WNBN05-XX			CB25WNCN06-XX										
	30	CB30WNAN05-XX			CB30WNBN05-XX			CB30WNCN06-XX										

NOTES:
REFER TO SHEET 1 FOR GENERAL NOTES.
CURBS 120" AND LESS ARE SHIPPED AS COMPLETE CURBS. GREATER THAN 120" ARE SHIPPED KNOCKED DOWN.
NUMBER AND LOCATION OF CROSS SUPPORT(S) IS DEPENDANT UPON THE GUAGE OF MATERIAL USED TO CONSTRUCT THE CURB, DUCT SUPPORT CONFIGURATION, LENGTH OF CURB, AND WIDTH OF CURB. INSTALLATION INSTRUCTIONS INCLUDED WITH CURB SHIPMENT INDICATE THE REQUIRED POSITION FOR FIELD ASSEMBLED CURBS.

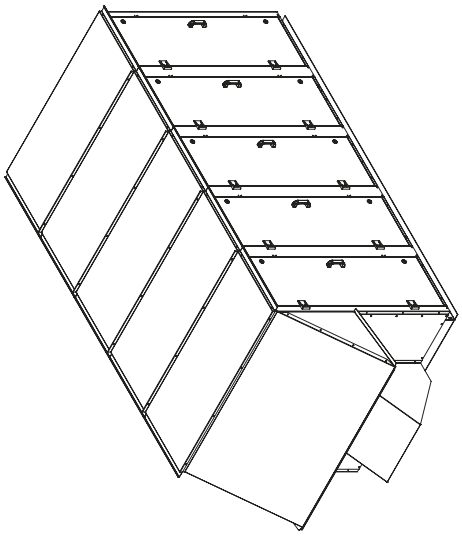


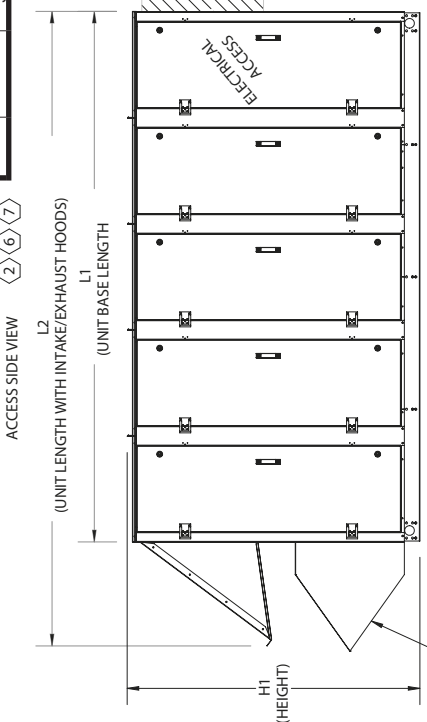


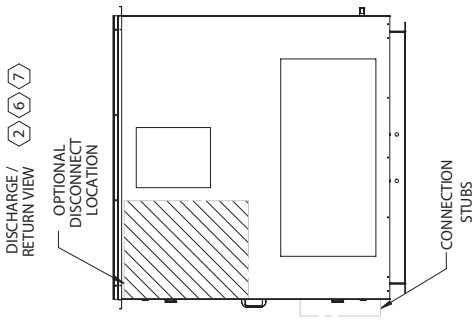
DUCT CONNECTIONS FOR DOWN DISCHARGE / DOWN RETURN

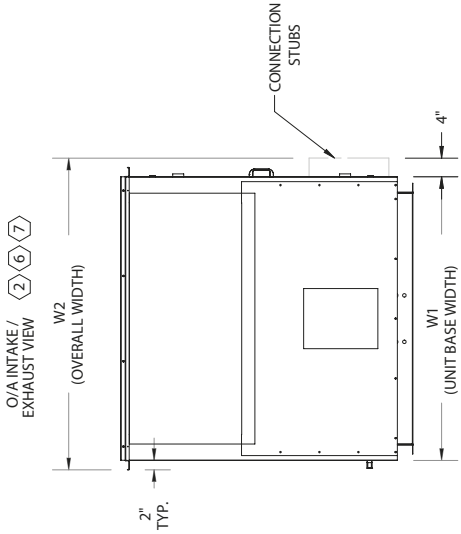
Horizontal Wheeled with Bypass Damper Dimensional Data

Air Flow	Unit Cabinet Sizes	Unit Size (Tons)	L1	W1	H1	L2	W2
End Flow	36-H	02	126 1/8	49 1/8	51 1/8	144 1/2	55 1/8
		03					
	44-H	05	133 7/8	54 1/2	55	152 1/4	60 1/2
	50-H	08	137 1/4	61 1/8	63	160 5/8	67 1/8
	60-H	10	140 7/8	72 1/2	75 1/4	164 3/8	78 1/2
	72-H	15	150 5/8	87 1/2	83 3/8	179	93 1/2
	78-H	20	162 3/8	90 1/2	92 5/8	191 1/4	96 1/2
		25					
		30					
Down Flow	36-H	02	126 1/8	49 1/8	51 1/8	144 1/2	55 1/8
		03					
	44-H	05	133 7/8	54 1/2	55	152 1/4	60 1/2
	50-H	08	137 1/4	61 1/8	63	160 5/8	67 1/8
	60-H	10	140 7/8	72 1/2	75 1/4	164 3/8	78 1/2
	72-H	15	150 5/8	87 1/2	83 3/8	179	93 1/2
	78-H	20	189 1/2	90 1/2	92 5/8	218 3/8	96 1/2
		25					
		30					
Top Flow	36-H	02	126 1/8	49 1/8	51 1/8	144 1/2	55 1/8
		03					
	44-H	05	133 7/8	54 1/2	55	152 1/4	60 1/2
	50-H	08	137 1/4	61 1/8	63	160 5/8	67 1/8
	60-H	10	140 7/8	72 1/2	75 1/4	164 3/8	78 1/2
	72-H	15	150 5/8	87 1/2	83 3/8	179	93 1/2
	78-H	20	162 3/8	90 1/2	92 5/8	191 1/4	96 1/2
		25					
		30					





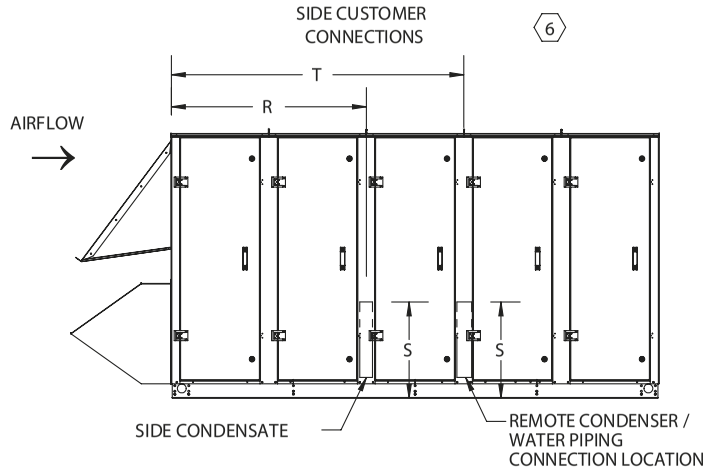


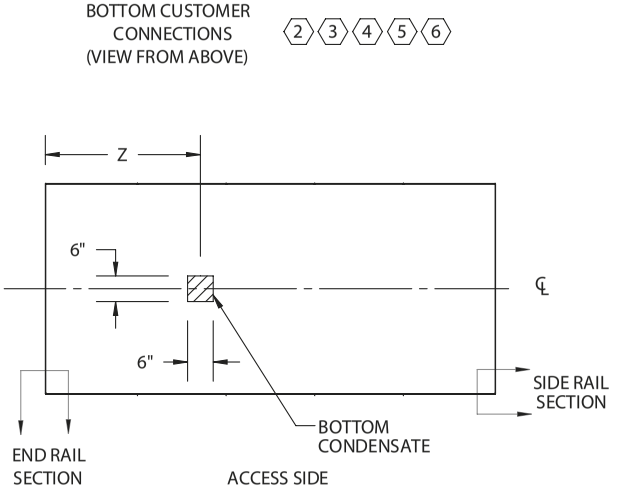


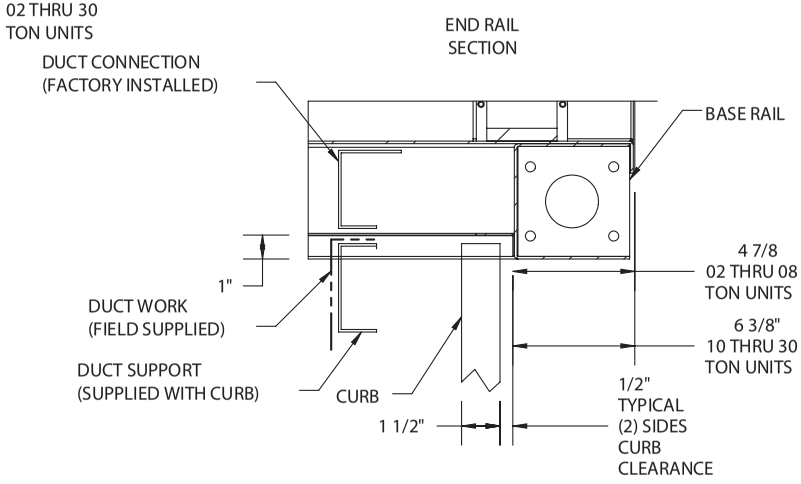
GENERAL NOTES AS REFERENCED BY INDIVIDUAL SHEETS:

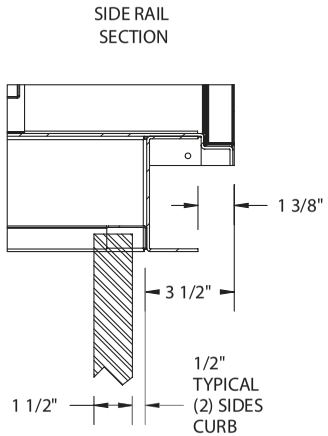
〈1〉 PORTION OF SECTIONED DRAWING HAS BEEN OMITTED FOR CLARITY.
〈2〉 HOODS OMMITTED FOR CLARITY.
〈3〉 VIEW IS FOR PICTORAL PURPOSES. REFER TO PAGE 1 FOR UNIT TYPE SPECIFIC VIEW.
〈4〉 REFER TO SUBITTAL FOR CUSTOMER CONNECTION LOCATIONS.
〈5〉 DIMENSIONS ARE TO ACCESS SIDE OF UNIT.
〈6〉 RH ACCESS SHOWN FOR DISPLAY PURPOSES. ACCESS DOOR CONFIGURATION MAY CHANGE DEPENDING ON UNIT SIZE.
〈7〉 REFER TO SHEET 3,4,5 FOR INTAKE AND DISCHARGE CONNECTION DIMENSIONS.
〈8〉 REFER TO SHEET 3,4,5 FOR INTAKE AND DISCHARGE CONNECTION DIMENSIONS.

Horizontal Wheeled with Bypass Damper Dimensional Data









Air Flow	Unit Cabinet Sizes	Unit Size (Tons)	R	T	S	Z
End Flow	36-H	02	63 1/8	83 7/8	18	61 3/8
		03				
	44-H	05	67	88 7/8	20	67 7/8
	50-H	08	68 5/8	91 1/2	25	68
	60-H	10	70 1/2	94	38	70 3/4
	72-H	15	75 3/8	100 1/2	40	77 3/8
	78-H	20	81 1/4	108 1/4	41	87 3/8
		25				
		30				
Down Flow	36-H	02	63 1/8	83 7/8	18	61 3/8
		03				
	44-H	05	67	88 7/8	20	67 7/8
	50-H	08	68 5/8	91 1/2	25	68
	60-H	10	70 1/2	94	38	70 3/4
	72-H	15	75 3/8	100 1/2	40	77 3/8
	78-H	20	81 1/4	135 1/4	41	87 3/8
		25				
		30				
Top Flow	36-H	02	63 1/8	83 7/8	18	61 3/8
		03				
	44-H	05	67	88 7/8	20	67 7/8
	50-H	08	68 5/8	91 1/2	25	68
	60-H	10	70 1/2	94	38	70 3/4
	72-H	15	75 3/8	100 1/2	40	77 3/8
	78-H	20	81 1/4	108 1/4	41	87 3/8
		25				
		30				

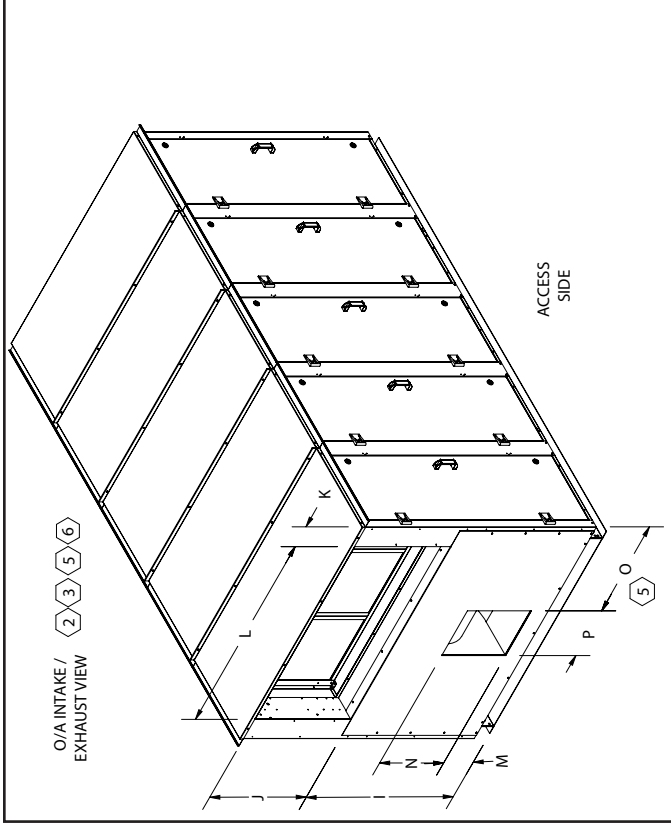
CUSTOMER CONNECTION LINE SIZE SUMMARY (in.)									
Unit Size	2 Tons	3 Tons	5 Tons	8 Tons	10 Tons	15 Tons	20 Tons	25 Tons	30 Tons
RC Discharge	1/2	5/8	3/4	7/8	7/8	1 1/8	1 1/8	1 1/8	1 3/8
RC Return	3/8	1/2	1/2	5/8	5/8	3/4	3/4	7/8	7/8
Water Inlet	7/8	7/8	1 1/8	1 3/8	1 3/8	1 5/8	2 5/8	2 5/8	2 5/8
Water Outlet									
Condensate	1								

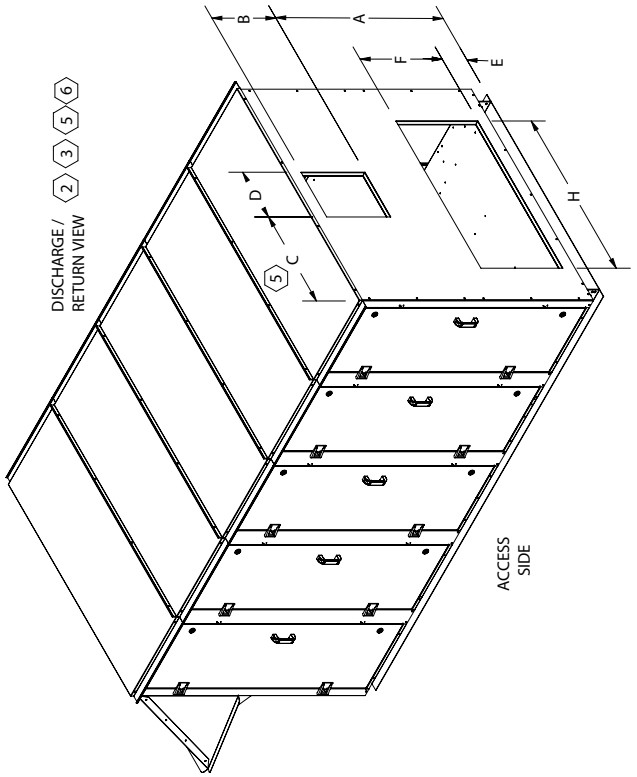
Horizontal Wheeled with Bypass Damper Dimensional Data - End Discharge

Unit Cabinet Sizes	Unit Size (Tons)	END DISCHARGE, END RETURN									
		Supply Discharge (in.)					Return Intake (in.)				
		A	B	C	D	E	F	G	H		
36-H	02	27 1/8	12 3/4	17 7/8	13 1/4	6 3/8	10	9 3/8	30 1/2		
	03										
44-H	05	31 5/8	11 1/2	21 1/4	12		14		35 7/8		
50-H	08	34 1/4	16	22 3/4	15 3/4		20 1/2		42 1/2		
60-H	10	40 7/8		26 7/8	18 3/4		30		53 7/8		
72-H	15	48 1/4		34 3/8	18 3/4	7 7/8	31 1/2		68 7/8		
78-H	20	43 5/8	24	31 1/8	28 3/8		32		71 7/8		
	25										
	30										

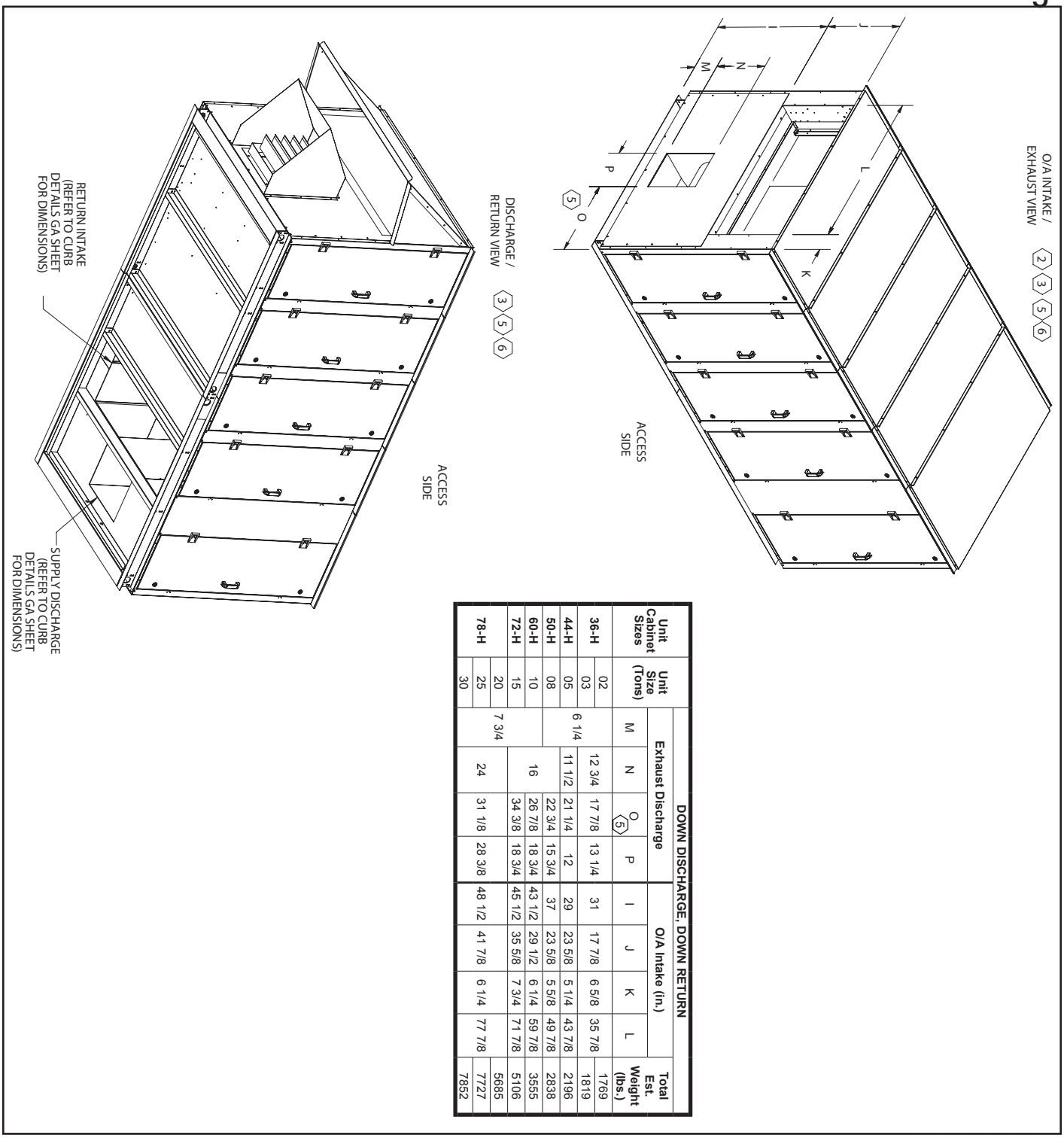
Unit Cabinet Sizes	Unit Size (Tons)	CONTINUED - END DISCHARGE, END RETURN										Total Est. Weight (lbs.)
		Exhaust Discharge					O/A Intake (in.)					
		M	N	O	P	I	J	K	L			
36-H	02	6 1/4	12 3/4	17 7/8	13 1/4	31	17 7/8	6 5/8	35 7/8			1769
	03											1819
44-H	05		11 1/2	21 1/4	12	29	23 5/8	5 1/4	43 7/8			2196
50-H	08		16	22 3/4	15 3/4	37	23 5/8	5 5/8	49 7/8			2838
60-H	10	7 3/4		26 7/8	18 3/4	43 1/2	29 1/2	6 1/4	59 7/8			3555
72-H	15			34 3/8	18 3/4	45 1/2	35 5/8	7 3/4	71 7/8			5106
78-H	20		24	31 1/8	28 3/8	48 1/2	41 7/8	6 1/4	77 7/8			5685
	25											7727
	30											7852

NOTES:
REFER TO SHEET 1 FOR GENERAL NOTES.
WEIGHTS SHOWN REFLECT FULLY OPTIONED ESTIMATED UNIT WEIGHT.





Horizontal Wheeled with Bypass Damper Dimensional Data - Down Discharge

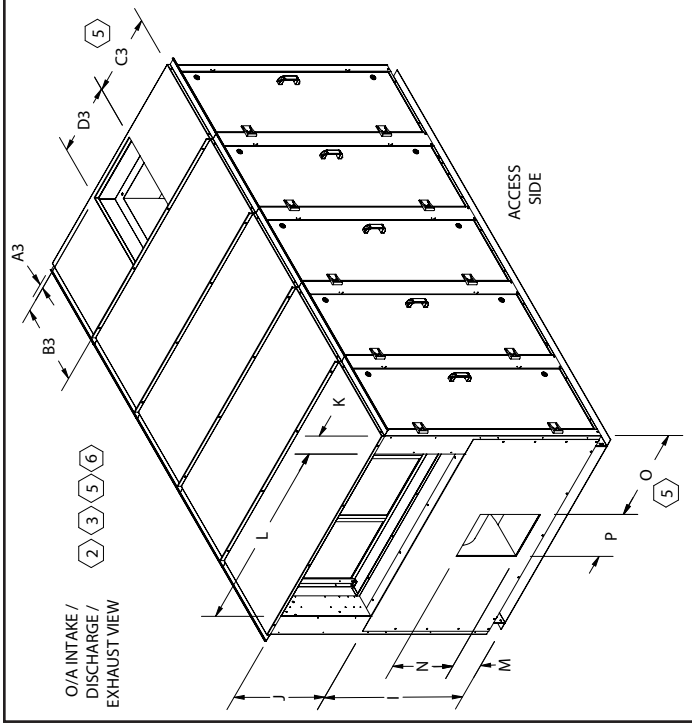


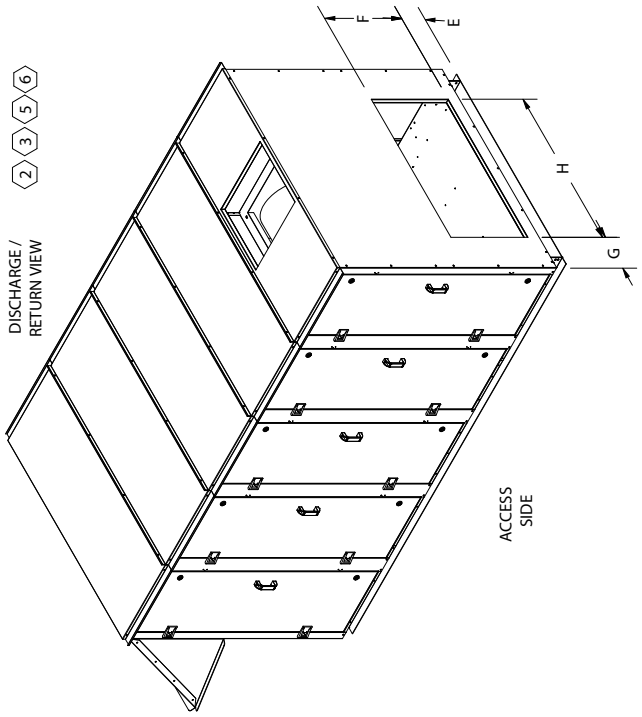
Unit Cabinet Sizes	Unit Size (Tons)	DOWN DISCHARGE, DOWN RETURN							
		Exhaust Discharge			O/A Intake (in.)				Total Est. Weight (lbs.)
		M	N	O 5	P	I	J	K	L	
36-H	02	6 1/4	12 3/4	17 7/8	13 1/4	31	17 7/8	6 5/8	35 7/8	1769
	03		11 1/2	21 1/4	12	29	23 5/8	5 1/4	43 7/8	1819
44-H	05		16	22 3/4	15 3/4	37	23 5/8	5 5/8	49 7/8	2196
50-H	08			26 7/8	18 3/4	43 1/2	29 1/2	6 1/4	59 7/8	2838
60-H	10			34 3/8	18 3/4	45 1/2	35 5/8	7 3/4	71 7/8	3555
72-H	15	7 3/4		31 1/8	28 3/8	48 1/2	41 7/8	6 1/4	77 7/8	5106
78-H	20		24							5685
	25									7727
	30									7852

Horizontal Wheeled with Bypass Damper Dimensional Data - Top Discharge

TOP DISCHARGE, END RETURN									
Unit Cabinet Sizes	Unit Size (Tons)	Supply Discharge (in.)				Return Intake (in.)			
		A3	B3	C3	D3	E	F	G	H
36-H	02	1 1/4	12 3/4	17 7/8	13 1/4	6 3/8	10	9 3/8	30 1/2
	03		11 1/2	21 1/4	12		14		35 7/8
44-H	05			22 3/4	15 3/4		20 1/2		42 1/2
50-H	08		16	26 7/8	18 3/4		30		53 7/8
60-H	10			34 3/8	18 3/4		31 1/2		68 7/8
72-H	15					7 7/8			
78-H	20		24	31 1/8	28 3/8		32		71 7/8
	25								
	30								

CONTINUED - TOP DISCHARGE, END RETURN											
Unit Cabinet Sizes	Unit Size (Tons)	Exhaust Discharge				O/A Intake (in.)				Total Est. Weight (lbs.)
		M	N	O 5	P	I	J	K	L	
36-H	02	6 1/4	12 3/4	17 7/8	13 1/4	31	17 7/8	6 5/8	35 7/8	1769
	03		11 1/2	21 1/4	12	29	23 5/8	5 1/4	43 7/8	1819
44-H	05			22 3/4	15 3/4	37	23 5/8	5 5/8	49 7/8	2196
50-H	08		16	26 7/8	18 3/4	43 1/2	29 1/2	6 1/4	59 7/8	2838
60-H	10			34 3/8	18 3/4	45 1/2	35 5/8	7 3/4	71 7/8	3555
72-H	15	7 3/4								5106
78-H	20		24	31 1/8	28 3/8	48 1/2	41 7/8	6 1/4	77 7/8	5685
	25									7727
	30									7852

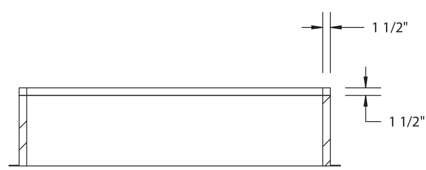




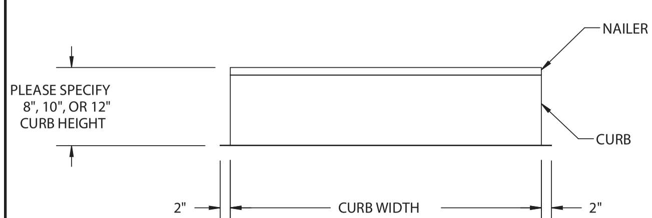
Horizontal Wheeled with Bypass Damper Dimensional Data - Curb Details

Unit Cabinet Sizes	Unit Size (Tons)	END/END FLOW ROOFCURB DIM S Curb P/N	Width (in.)	Length (in.)	TOP/END FLOW ROOFCURB DIM S Curb P/N	Width (in.)	Length (in.)	DOWN/DOWN FLOW ROOFCURB DIM S Curb P/N	Width (in.)	Length (in.)	Supply Discharge (in.) A2	B2	C2 ⑤	D2	Return Intake (in.) E2	F2	G2	H2
36-H	02	CB02WNDN06-XX	41 1/8	115 3/8	CB02WNEN06-XX	41 1/8	115 3/8	CB02WNFN06-XX	41 1/8	115 3/8	0	12 3/4	12 3/8	13 1/4	14 1/4	13	3 5/8	31
	03	CB03WNDN06-XX			CB03WNEN06-XX			CB03WNFN06-XX										
44-H	05	CB05WNDN06-XX	46 1/2	123 1/8	CB05WNEN06-XX	46 1/2	123 1/8	CB05WNFN06-XX	46 1/2	123 1/8		11 1/2	15 3/4	12	13	17	3 3/4	36
50-H	08	CB08WNDN06-XX	53 1/8	126 1/2	CB08WNEN06-XX	53 1/8	126 1/2	CB08WNFN06-XX	53 1/8	126 1/2		16	17 1/4	15 3/4	17 1/2	18	3 5/8	43
60-H	10	CB10WNDN06-XX	64 1/2	127 1/8	CB10WNEN06-XX	64 1/2	127 1/8	CB10WNFN06-XX	64 1/2	127 1/8			21 3/8	18 3/4		30	3 3/4	54
72-H	15	CB15WNDN06-XX	79 1/2	136 7/8	CB15WNEN06-XX	79 1/2	136 7/8	CB15WNFN06-XX	79 1/2	136 7/8			28 7/8	18 3/4		31		69
78-H	20	CB20WNDN06-XX	82 1/2	148 5/8	CB20WNEN06-XX	82 1/2	148 5/8	CB20WNFN07-XX	82 1/2	175 3/4		24	25 5/8	28 3/8	25 1/2	32		72
	25	CB25WNDN06-XX			CB25WNEN06-XX			CB25WNFN07-XX										
	30	CB30WNDN06-XX			CB30WNEN06-XX			CB30WNFN07-XX										

NOTES:
REFER TO SHEET 1 FOR GENERAL NOTES.
CURBS 120" AND LESS ARE SHIPPED AS COMPLETE CURBS. GREATER THAN 120" ARE SHIPPED KNOCKED DOWN.
NUMBER AND LOCATION OF CROSS SUPPORT(S) IS DEPENDANT UPON THE GUAGE OF MATERIAL USED TO CONSTRUCT THE CURB, DUCT SUPPORT CONFIGURATION, LENGTH OF CURB, AND WIDTH OF CURB. INSTALLATION INSTRUCTIONS INCLUDED WITH CURB SHIPMENT INDICATE THE REQUIRED POSITION FOR FIELD ASSEMBLED CURBS.

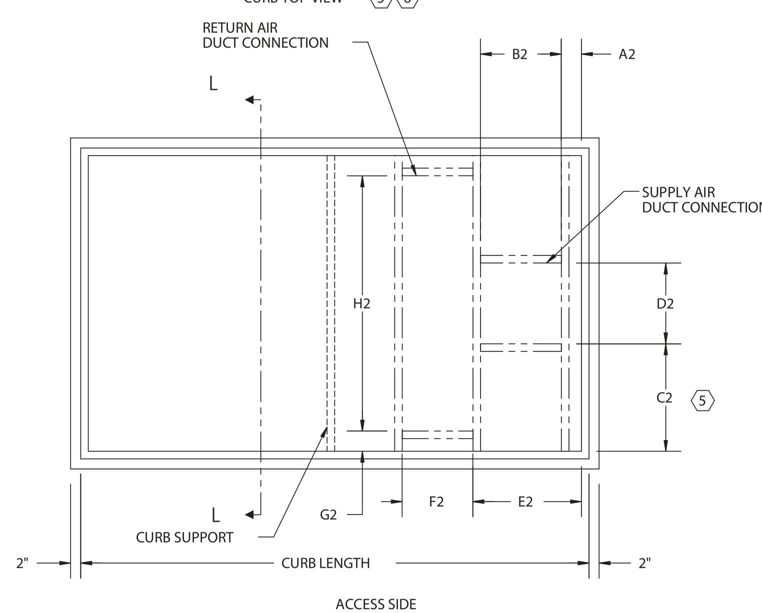


SECTION L-L

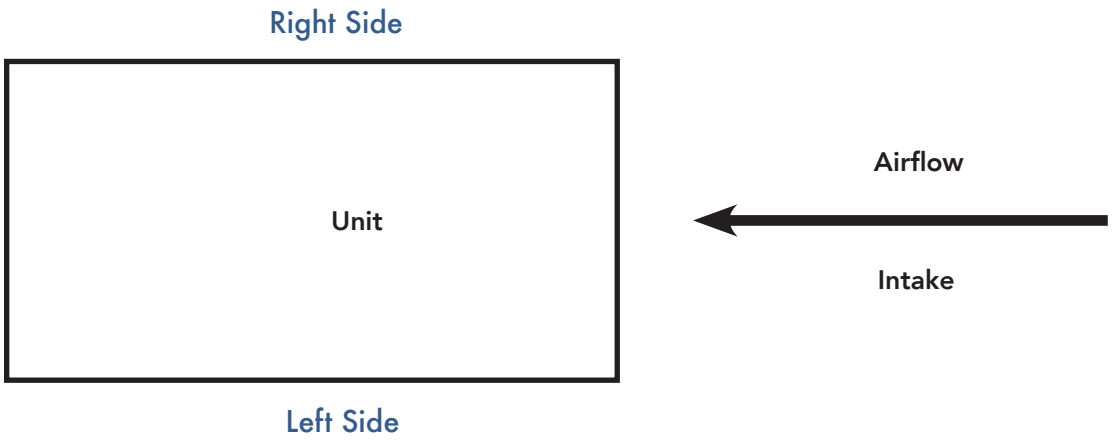


AIRFLOW →

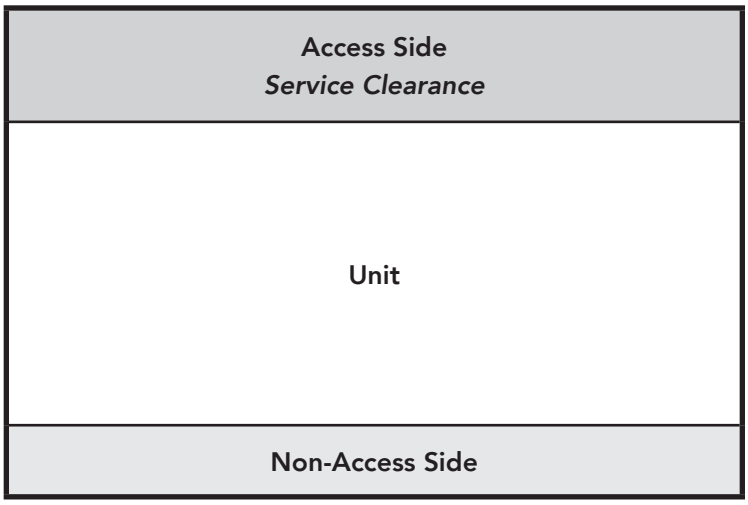
CURB TOP VIEW ⑤⑥



Unit Connections and Service Clearances



Note: Units with side water connections will have connection on the same side as access side except 20 ton units.



Access Side Clearance

Minimum = 3 ft. (Ideal = Unit Width + 1 ft.)

Non-Access Side

Minimum = 6 in. (Ideal = 3 ft.)

TOHD/RD Physical Data

Model Size	2	3	5	8	10	15
Fan Motor Available HP*	0.5/1.0	0.5/1.5	0.5/1.5	0.5/1.5	0.5/1.0/3.0	1.0/1.5/5.0
Blower Wheel Size*	“7-7”	“90-4”	“10-07”	“11-10”	“11-10”	“12-12”
Compressor Type/Qty	Scroll, 1 each			Scroll (tandem), 2 each		
Number of Refrigerant Circuits	1 Circuit					
Factory Charge lb/unit	5	8	15	20	26	40
Water Connection Size “ O.D.	7/8”	7/8”	1 1/8”	1 3/8”	1 3/8”	1 5/8”
Water Flow Rate GPM	7	11	19	26	34	49
Water Pressure Drop PSI/Ft	3.6/8.3	4.1/9.45	4.0/9.23	5.4/12.46	6.6/15.22	9.4/1.68
Condensate Connection Size	1”	1”	1”	1”	1”	1”
Filter Qty/Size	(2) 18X24X4	(2) 18X24X4	(2) 18X24X4	(4) 20X24X4	(4) 20X24X4	(4) 20X24X4
Operating Weight	1124	1148	1293	1954	2093	2491
Shipping Weight	1165	1189	1350	2030	2190	2643

Model Size	20	25	30	36	40	46
Fan Motor Available HP*	1.5/2.0/5.0	2.0/3.0/7.5	3.0/5.0/10.0	3.0/5.0/10.0	3.0/5.0/10.0	3.0/5.0/15.0
Blower Wheel Size*	“15-12”	“15-15”	“15-15”	“15-15”	918	920
Compressor Type/Qty	Scroll (tandem), 2 each			Scroll (2 each tandem), 4 each		
Number of Refrigerant Circuits	1 Circuit			2 Circuits		
Factory Charge lb/unit	62	73	87	110	130	150
Water Connection Size “ O.D.	2 5/8”	2 5/8”	2 5/8”	2 5/8”	3 1/8”	3 1/8”
Water Flow Rate GPM	69	84	102	118	137	153
Water Pressure Drop PSI/Ft	6.2/14.30	6.2/14.30	7.1/16.38	7.1/16.38	7.8/18.00	8.2/18.91
Condensate Connection Size	1”	1”	1”	1”	1”	1”
Filter Qty/Size	(6) 18X24X4	(4) 28X30X4	(4) 28X30X4	(9) 20X24X4	(9) 20X24X4	(9) 20X24X4
Operating Weight	2855	3256	3499	4545	4698	4852
Shipping Weight	3042	3478	3753	4846	5033	5247

Model Size	50	56	60
Fan Motor Available HP*	5.0/7.5/15	5.0/7.5/15	5.0/7.5/20
Blower Wheel Size*	920	920	922
Compressor Type/Qty	Scroll (2 each tandem), 4 each		
Number of Refrigerant Circuits	2 Circuits		
Factory Charge lb/unit	8	8	15
Water Connection Size “ O.D.	7/8”	7/8”	1 1/8”
Water Flow Rate GPM	11	11	19
Water Pressure Drop PSI/Ft	10.4/24.00	12.6/29.06	13.3/30.68
Condensate Connection Size	1”	1”	1”
Filter Qty/Size	(9) 25X29X4	(9) 25X29X4	(9) 25X29X4
Operating Weight	5375	5610	5748
Shipping Weight	5768	6072	6210

TOHW/RW Physical Data

Model Size	2	3	5	8	10
Fan Motor Available HP*	0.5/1.0/1.5	0.5/1.0/2.0	1.0/1.5/5.0	3.0/7.5	2.0/3.0/7.5
Blower Wheel Size*	ATLI 7-7F	ATLI 7-7F	ATLI 10-7F	ATZAF 12-12 T1	150-9R BD
Compressor Type/Qty	Scroll, 1 each			Scroll (tandem), 2 each	
Number of Refrigerant Circuits	1 Circuit				
Factory Charge lb/unit	CF	11	18	23	29
Water Connection Size " O.D.	7/8"	7/8"	1 1/8"	1 3/8"	1 3/8"
Water Flow Rate GPM	7	11	19	26	34
Water Pressure Drop PSI/Ft	3.6/8.3	4.1/9.45	4.0/9.23	5.4/12.46	6.6/15.22
Condensate Connection Size	1"	1"	1"	1"	1"
Filter Qty/Size (Supply)	(2) 20X24X4	(2) 20X24X4	(3) 18X24X4	(2) 28X30X4	(3) 24X24X4
Filter Qty/Size (Return)	(2) 20X24X4	(2) 20X24X4	(3) 18X24X4	(2) 28X30X4	(3) 24X24X4
Operating Weight	2016	2064	2468	2888	3635
Shipping Weight	2073	2105	2525	2963	3733

Model Size	15	20	25	30
Fan Motor Available HP*	3.0/5.0/10.0	5.0/7.5/15.0	5.0/10.0/20.0	5.0/10.0/20.0
Blower Wheel Size*	ATLI 15-11R	ATLI 15-11R	ATZAF 20-20 T1	ATZAF 20-20 T1
Compressor Type/Qty	Scroll (tandem), 2 each			
Number of Refrigerant Circuits	1 Circuit			
Factory Charge lb/unit	48	70	CF	118
Water Connection Size " O.D.	1 5/8"	2 5/8"	2 5/8"	2 5/8"
Water Flow Rate GPM	49	69	84	102
Water Pressure Drop PSI/Ft	9.4/1.68	6.2/14.30	6.2/14.30	7.1/16.38
Condensate Connection Size	1"	1"	1"	1"
Filter Qty/Size (Supply)	(3) 25X29X4	(3) 28X30X4	(3) 28X30X4	(3) 28X30X4
Filter Qty/Size (Return)	(3) 25X29X4	(3) 28X30X4	(3) 28X30X4	(3) 28X30X4
Operating Weight	5180	5886	6277	6468
Shipping Weight	5332	6073	6498	6722

NOTE 1: **A strainer is required on the ENTERING WATER connection to the DOAS unit.**
The strainer must be provided and installed by others.
The strainer must be 60 mesh (250 Micron) or finer.
Failure to install a properly sized strainer can lead to premature fouling and possible failure of a brazed plate heat exchanger.
DOAS units installed and operated without a properly sized strainer will not qualify for warranty coverage.

NOTE 2: **A dedicated 115 VAC, 15 Amp circuit (by others) is required on all DOAS units for operation of the factory installed evaporator heat tape(s). Failure to connect heat tape(s) to a proper power supply may lead to freezing of the water in the heat exchanger. Failure of, and/or damage caused by the failure of a heat exchanger due to freezing will be exempt from warranty coverage if the heat tapes are not properly connected and working at the time of the failure.**

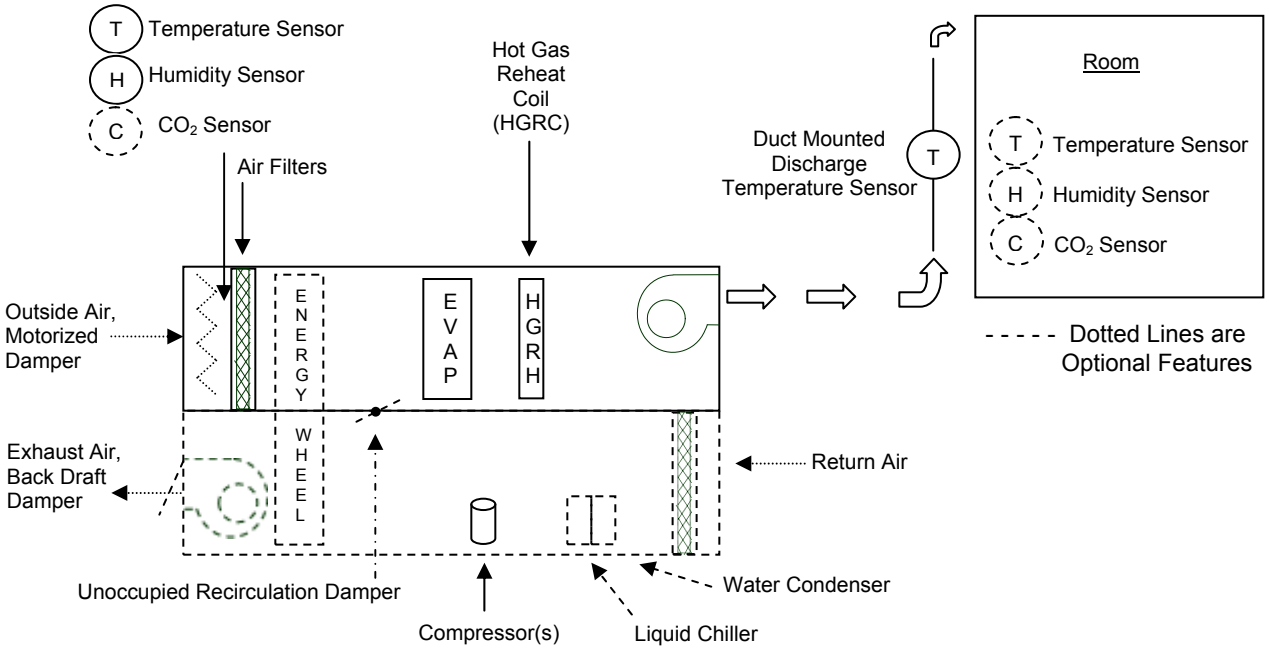
Sensor Control Definitions and Location

Unit Temperature and Humidity Sensors:
A temperature and humidity sensor will be located before the evaporator coil. The sensors feed back to the unit microprocessor the dry bulb temperature and relative humidity entering the evaporator.

Leaving Air Temperature Sensor:
The supply air sensor will be located in the supply air ductwork. The sensor feeds back to the unit microprocessor the discharge air dry bulb temperature.

Room Temperature Sensors (Optional): (Required with Room Reset of LAT Option)
The room temperature sensor will be located in the conditioned room. The sensor feeds back to the unit microprocessor the room dry bulb temperature.

Room Humidity Sensor (Optional): (Required with Unoccupied Recirculation Damper)
The humidity sensor will be located in the conditioned room. The sensor feeds back to the unit microprocessor the room relative humidity (RH).



LEAVING AIR TEMPERATURE (LAT) CONTROL SCHEME

LAT control scheme uses a duct-mounted sensor to maintain a constant supply air temperature. The system microprocessor PID loop receives an analog signal from the duct sensor. The controller then outputs a 0 – 10 vdc signal to modulate a hot gas reheat or an auxiliary heater in small incremental changes to provide a constant discharge temperature. During hot gas reheat mode the LAT control tolerance will be ± 0.2°F from setpoint.

ROOM TEMPERATURE & HUMIDITY CONTROL OPTIONS

Room Reset of Leaving Air Temperature (LAT) Control Scheme:

In addition to the leaving air temperature sensor used in the LAT control scheme, {1, 2, 3 or 4} room mounted temperature sensor(s) will be required. (If multiple room sensors are applied the sensors will average the room temperature. Room Reset of LAT Control will be accomplished by means of room temperature resetting the LAT setpoint via the controller's PID loop. Warmer or cooler air is provided when the LAT is greater then or less then the room temperature setpoint of 72°F (field adjustable between 65 – 85°F). The controller will maintain room temperature up to the full cooling and heating capabilities as follows:

When Room Temperature Air = Room Temperature Setpoint: The controller will maintain the current leaving air temperature setpoint.

When Room Temperature Air > Room Temperature Setpoint: The controller will lower the LAT setpoint to maintain room temperature setpoint. The unit controller will identify new LAT setpoint, resulting in a lower supply temperature to balance the room heat gain; thus, holding the room temperature to the setpoint.

When Room Temperature Air < Room Temperature Setpoint: The controller will raise the LAT setpoint to maintain room temperature. The unit controller will identify new LAT setpoint, resulting in a higher supply temperature to balance the room heat loss; thus, holding the room temperature to the setpoint.

Unoccupied Room Humidity Control Scheme: (Required with Unoccupied Recirculation Damper)

In addition to the temperature sensors used in the room reset of LAT control scheme, a room humidity sensor is utilized. The sensor will be utilized during the unoccupied mode operation as described in this sequence of operation.

OCCUPIED/UNOCCUPIED MODE SWITCHOVER

The unit will switch between occupied and unoccupied mode through an occupancy contactor provided by a {BMS, Unit DDC Occupancy Timer}

100% Outside Air Dehumidifiers: (Applies to Wheel and Non Wheeled Units)

Occupied Mode - On contact closure, the unit will go into occupied mode, the outside air damper will signal open. Once the damper is in the open position, the supply fan will be activated for continuous airflow operation. Units provided with an enthalpy wheel, the wheel and exhaust fan will be activated once the outside air damper is in the open position.

Unoccupied Mode – When the contact opens, the unit will deactivate the fan(s), compressor(s), enthalpy wheel (if applicable), and signal the outside air damper close.

100% Outside Air Dehumidifiers with Recirculation Air Damper controlled by CO2: (Applies to Wheeled Units Only)

Occupied Mode – On contact closure, the unit will go into occupied mode, the recirculation air damper will signal close and the outside air damper will signal open. The enthalpy wheel and exhaust air fan will be engaged once the outside air damper is in the open position. The unit will operate with 100% outside air and 100% exhaust air. The fans run continuously.

Room CO2 > Setpoint (Occupied): The bypass damper is closed and 100% outdoor air is introduced into the space. The supply air blower VFD adjusts to an established pressure differential setpoint across the hot gas reheat coil. The pressure drop corresponds to the design supply air volume. Also, the exhaust air blower VFD adjusts to an established pressure differential setpoint across the wheel's exhaust air side to maintain design exhaust air volume.

Room CO2 < Setpoint (Occupied): The bypass damper opens to allow return air (exhaust air side of the system) to bypass into the supply air. The controller will adjust the mixing amount until the room CO2 setpoint is established or until the minimum amount of OSA is reached. The supply air blower VFD will adjust to maintain the same pressure differential setpoint across the hot gas reheat coil to maintain the specified supply air volume. The exhaust air blower VFD will adjust to a new pressure differential setpoint across the wheel to meet the exhaust air volume that is 10% of the OSA volume.

Unoccupied Mode: When the contact closure opens, the unit will deactivate the enthalpy wheel and exhaust air fan, the outside air damper will signal close and the recirculation damper will signal open to the 100% return airflow position. The supply fan will run continuously or to cycle (programmable option) on a call for room dehumidification, cooling or heating.

AIR DEHUMIDIFICATION AND/OR COOLING MODE

When the refrigeration cooling cycle is activated, the air is cooled and dehumidified to the design dew point or below. Based on the air entering the evaporator, the unit will activate compressor(s) as follows:

Occupied Mode:

When the dew point is above the system setpoint of 55°F dew point setpoint (field adjustable selections are between 48 - 65°F DP) When the air temperature is above 70°F dry bulb, even if the air dew point is below the dew point setpoint.

Unoccupied Mode: (Applies to wheeled units with recirculation air damper only)

Recirculation Damper Systems only will operate as follows during the unoccupied mode:
A call for cooling only is made when the room is above the unoccupied cooling setpoint of 85°F default (field adjustable). The unit will operate in full cooling mode, reheat off. Cooling will be deactivated once the room temperature falls below setpoint minus the unoccupied cooling differential.
A call for dehumidification is made when the room RH level exceeds the unoccupied setpoint of 60%RH (field adjustable). The unit will operate as described in the Air Reheat Mode operation. Dehumidification will be deactivated once the room RH levels drops below setpoint minus the unoccupied humidity differential.

AIR REHEAT MODE WITH HOT GAS REFRIGERANT

Air heating is accomplished by means of the hot gas refrigerant discharged off the compressor which feeds a hot gas reheat condenser coil (HGRH) in the air stream. The HGRH coil completely condenses the refrigerant that passes though it, thus extracting energy for air heating. The HGRH control valve is modulated by the unit's microprocessor to control heat output as based on the temperature control option selected.

In addition to the HGRH coil, the system will utilize a water condenser. The second condenser condenses hot gas refrigerant that is diverted around the HGRH. The second condenser will operate in series with the HGRH for simultaneous heat rejection to control heat output as based on the temperature control option selected.

AIR HEATING MODE

When dehumidification and/or cooling are not required the unit will operate an auxiliary heating coil as follows:

Occupied Mode:

The controller will switch to water source heat pump operation. To activate heat pump mode, the air side evaporator is taken offline by diverting refrigerant flow from the air side evaporator to the liquid chiller enabling heat extraction from the water loop. Air heating is accomplished by means of the hot gas reheat coil and operates as described in Air Reheat Mode with Hot Gas Refrigerant above.

Unoccupied Mode: (Applies to wheeled units with recirculation air damper only)

Recirculation Damper Systems only will operate as follows during the unoccupied mode:
A call for heating is made when the room is below the unoccupied heating setpoint of 65°F. The unit will operate in full heating mode. Heating will be deactivated once the room temperature rises above setpoint plus the unoccupied heating differential.

EMERGENCY SYSTEM SHUTDOWN

Emergency system shut down will occur when a contactor is opened within a smoke detector or other similar device by others. Once the contactor is opened the units 24v circuit will be broken thus deactivating motors, fans and compressors.

General:

Furnish and install ClimateMaster "Tranquility®" horizontal (HD) / rooftop (RD) high efficient HFC-410A 100% OA Water Source Heat Pumps, as indicated on the plans. Equipment shall be completely assembled, piped and internally wired. The unit shall include the following minimum components: Compressor(s), dehumidification/cooling coil, hot gas reheat coil, receiver, blower motors, controls and water cooled condenser and heat pump evaporator. Units shall have Variable Hot Gas Reheat and leaving air temperature control to ±0.2°F (±0.1°C) in cooling/dehumidification and heating modes. Capacities and characteristics shall be as listed in the schedule and the specifications that follow.

Horizontal/Rooftop 100% OA Water Source Heat Pumps:

Units shall be supplied completely factory built for an entering water temperature range from 35° to 105°F (1.7° to 40.6°C) as standard. Equivalent units from other manufacturers can be proposed provided approval to bid is given 10 days prior to bid closing. All equipment listed in this section must be tested in accordance with American Refrigeration Institute / International Standards Organization (AHRI/ISO) and certified in accordance with UL 1995 Second Edition. The units shall have an ETL-US label. All units shall be fully quality tested by factory run testing under design operating conditions and water flow rates as described herein. The following quality control system checks shall be performed: triple leak check, pressure tests, evacuate and accurately charge system, perform detailed heating, dehumidification and cooling mode tests, and hot gas reheat mode testing. **Units tested without water flow are not acceptable.**

Basic Construction:

HD model units shall be constructed for indoor installation and usage. RD model units shall be constructed for outdoor installation and usage and shall include rain hood, low leak outdoor air isolation damper with 24V motorized actuator, and additional weather-stripping for improved weather resistance. The cabinet shall be 1" (25.4mm) double wall construction, 16-gauge (1.5mm) galvaneal outer panels and 22gauge (0.7mm) galvanized metal inner liner. RD model units shall be tested in accordance with UL rain test standards. A 12-gauge (2.5MM) galvanized base rail assembly shall be incorporated with the unit base pan for the base of the unit.

All exterior and other painted surfaces shall be constructed of galvaneal steel with a powder coated painted finished. Painting shall be by a powder coat technique to assure positive adherence with a high-impact finish. All sides of panels shall be painted. The panels shall be rated to meet a minimum of 1,000-hour salt spray test. Unit color shall be light gray. This corrosion protection system shall meet the stringent 1000-hour salt spray test per ASTM B117.

The unit roof shall be constructed as described above with a standing seam construction. All roof edges shall overlap sides of unit and have lip extending away from unit sides so that rainwater drippage shall not fall on top of access doors.

Unit shall be single side access. Access to filters, indoor blower, electrical controls, compressor compartment, and damper section shall be provided by double wall access doors with hinges, and compression latches with non-corrosive handles. All external fasteners shall be stainless steel bolts. **Self-taping or drive screws are unacceptable.**

Bottom base pan of entire unit shall have no penetrations by bolts or screws.
All double wall cabinet panels shall house a 1 inch (25.4mm) thick, solid foam insulation with a minimum "R" factor of 5.0. **Unit insulation must meet these stringent requirements or unit(s) will not be accepted.**

Entire unit base shall be insulated on the underneath side to provide condensation protection, and noise attenuation.

RD Outdoor cabinets shall include a rain hood and low leak isolation dampers with 24v motorized actuator and rain/water resistant door gasketing.

The unit shall be furnished with 4" (100mm) filter racks and one set 4" (100mm) MERV 8 pleated filters.

Fan and Motor Assembly:

The assembly shall include a fan, housing and solid steel fan shaft encased in ball bearings. Unit shall have a belt drive fan assembly, fan pulley and adjustable motor sheave with v-belt drive. Fan shall be forward curved, low speed centrifugal that has been statically and dynamically balanced, and tested in accordance with current A.M.C.A. standards bulletin 210. Fan bearings shall be permanently lubricated type and be self-aligning. The motor shall be a single- or three-phase (as specified), high efficiency, ball bearing, open type with internal thermal overload protection. The motor shall be mounted on an adjustable base for proper belt tension. The fan and motor assembly must be capable of overcoming the external static pressures as shown on the schedule. Airflow / Static pressure rating of the unit shall be based on a wet coil and a clean filter in place.

Refrigerant Circuit:

Units shall have a sealed refrigerant circuit including a high efficiency HFC-410A scroll compressor(s) designed for heat pump operation, a thermostatic expansion valve for refrigerant metering, an enhanced corrugated aluminum lanced fin and rifled copper tube refrigerant to air heat exchanger, plate refrigerant to water heat exchanger, plate water to refrigerant evaporator, hot gas reheat/ heat pump heating coil, liquid receiver, modulating HGRH controls and safety controls including a high pressure switch, low pressure switch (loss of charge), water coil low temperature sensor, and air coil low temperature sensor. The unit shall be provided with a refrigerant receiver. The receiver will assist the unit in operating at the highest efficiency over the entire operating range of load conditions.

Access fittings shall be factory installed on high and low pressure refrigerant lines to facilitate field service. Activation of any safety device shall prevent compressor operation via a microprocessor lockout circuit. The lockout circuit shall be reset at the contractor supplied disconnect switch. **100% OA WSHP units that utilize a reversing operation shall not be acceptable.**

Unit refrigeration circuit shall allow entering OA as low as 15°F (-9°C) without the use of preheat. **Units not capable of operation with OA down to this temperature will not be accepted.**

Evaporator Dehumidifier Coil:

Fins shall be die formed, lanced, aluminum with extruded fin collars to provide maximum heat transfer, and shall be damage resistant. Fin spacing shall be 10 FPI (fins per inch) [3.94 fins per 10 mm]. Coil tubing shall be fabricated from seamless drawn copper. The inner tubing shall be rifled to produce turbulent refrigeration flow and to enhance the heat transfer process. The tubes shall be hydraulically expanded into the fins to form a permanent metal-to-metal bond for maximum heat transfer and stability. The coil shall be six (6) rows deep. All air coils shall be leak tested with 625-psig (4309 kPa) nitrogen. After testing, coils must be sealed.

Optional Coil Coating: Coils will be protected with Electrofin E-coating to resist chemicals and corrosion. The coating shall be applied to both the tubing and fins. The coil must be sealed, electrostatically charged and dip-coated.

Condenser (Reheat Coil):

The reheat coil shall be positioned with a 5" (127 mm) minimum clearance from the DX coil to avoid water re-evaporation. Direct connection of the reheat coil to the DX coil is not allowed. Fins shall be die-formed, aluminum with extruded fin collars to provide maximum heat transfer, and shall be damage-resistant. Fin spacing shall be 12 FPI (fins per inch) [4.72 fins per 10 mm]. Coil tubing shall be fabricated from seamless drawn copper. The tubes shall be hydraulically expanded into the fins to form a permanent metal-to-metal bond for maximum heat transfer and stability. The coil shall be a minimum of two (2) rows deep. All air coils shall be leak tested with 625-psig (4,309 kPa) nitrogen. After testing, coils must be sealed.

Optional Coil Coating: Coils will be protected with Electrofin E-coating to resist chemicals and corrosion. The

coating shall be applied to both the tubing and fins. The coil must be sealed, electrostatically charged and dip-coated.

Water Condenser and Water to Refrigerant Evaporator:

This WSHP unit(s) shall be equipped with two (2) brazed plate water to refrigerant heat exchangers. The plate water to refrigerant evaporator shall be piped in series with the water condenser. The water condenser must be first in series with respect to incoming water flow from the water loop. The water to refrigerant condenser allows the refrigerant energy to be released into the water loop during cooling operation and it also shall operate as a condenser in the heat pump heating mode to discharge any overage of compressor energy generated and not needed to control unit Leaving Air Temperature (LAT). In the heat pump heating mode the excess of refrigerant energy will discharged into the water loop and acts as a water heating "supercharger" heating the water before the water to refrigerant evaporator extracts the energy for heating (heat of extraction). This process is patented.

The system shall be designed for simultaneous heat of rejection to both the hot gas reheat coil and the water condenser while controlling the LAT within ±0.2°F (±0.1°C).

The plate water to refrigerant evaporator and the plate refrigerant to water condenser shall both be constructed as a brazed plate heat exchanger. The heat exchanger shall consist of stainless steel plates, copper-brazed together to allow a maximum working temperature of 350°F (177°C). The heat exchanger shall be factory leak-tested with helium at 625-psig (4,309 kPa) for quality assurance and, must have a maximum working pressure of 450 psi (3,103 kPa). The brazed plate heat exchangers shall be UL listed.

The head pressure shall be controlled by the system's internal flooding valve.

Compressor(s):

Compressors: (4 & 5 HP): The compressor shall be a heavy–duty scroll-type, single compressor complete with start kit on single-phase motors. The compressor shall be equipped with low- and high-pressure safety switches, with internal protection from overheating. The compressors shall be externally vibration isolated. A standard factory two (2)-year compressor warranty shall be included. The unit must include hot gas bypass for each system compressor.

Compressors: (8 to 15 HP): The compressors shall be a tandem pair, heavy-duty scroll-type. A factory-mounted sensor that will deactivate one compressor when the load reaches the mid-range of the system's capacity, shall stage the compressors. The compressors must be equipped with high- and low-pressure safety switches, with internal protection from overheating. The compressors shall be externally vibration isolated. A standard factory two (2)-year compressor warranty shall be included. The unit must include hot gas bypass for each system compressor.

Compressors: (>35 HP): The compressors shall be a dual circuit, tandem pair, and heavy–duty scroll type. A factory-mounted sensor that will deactivate each compressor when the load reaches the quarter-range of the system's capacity shall stage the compressors. The compressor shall be in the dehumidifier and equipped with high- and low-pressure safety switches, with internal protection from overheating. The compressor shall be externally vibration isolated. A standard factory two–year compressor warranty shall be included. The unit shall be provided with hot gas bypass for each system circuit. **The use of semi-hermetic compressors is not acceptable.**

Drain Pan:

The drain pan shall be 20-gauge (0.812 mm) stainless steel, sloped, and positioned under the evaporator coil. It shall be silver-solder, welded and securely attached to the evaporator end plates to avoid shifting. The drain pan shall be fitted with a minimum 1" MPT non-corrosive plastic drain connection and an internal P-Trap. The drain pan shall meet all the requirements of ASHRAE 62. Drain pan shall be fully insulated. Drain outlet shall be located at the pan as to allow complete and unobstructed drainage of condensate.

Electrical:

The electrical control panel shall be easily accessible on one side so that all service can be performed from the side of the unit. It shall be of adequate size so as to house all electrical controls and devices.

The unit shall be provided with single-point power connection, factory wired to the power connection lug set. Unit to include power terminal block to power heat tape for water-to-refrigerant heat exchangers (separate 115 vac circuit required by others).

The electrical controls shall include low voltage transformers to supply 24 VAC control power, clearly labeled high- and low-voltage terminal strips, high- and low-pressure control (with manual reset of the high-pressure cutout and automatic reset of low pressure cutout), and an anti–shortcycling timer delay to protect against compressor cycling.

Option: Disconnect Switch, Non-Fused

Option: Disconnect Switch, Non-Fused and 115 VAC GFI convenience outlet (separate 115 vac circuit required by others).

Controls:

The unit shall include factory mounted temperature and humidity sensors in the filter section, pre-wired to controller in panel for actuation of compressor in ambient temperatures above 55°F (12.7°C) dew point (programmable).

The unit must be supplied with the necessary controls as defined in the unit's Sequence of Operation for proper temperature and humidity control of the space. See plans and/or other documentation for the detailed sequence of operation of this unit.

Warranty:

ClimateMaster shall warranty equipment for a period of 24 months from date of shipment.

Option: Extended 3-year compressor warranty covers compressor for a total of 5 years.

General:

Furnish and install ClimateMaster "Tranquility®" horizontal (HW) / rooftop (RW) high efficient HFC-410A 100% OA Water Source Heat Pumps, as indicated on the plans. Equipment shall be completely assembled, piped and internally wired. The unit shall include the following minimum components: Enthalpy energy recovery wheel, compressor(s), dehumidification/cooling coil, hot gas reheat coil, receiver, supply and exhaust air blowers, blower motors, controls and water cooled condenser and heat pump evaporator. Units shall have Variable Hot Gas Reheat and leaving air temperature control to ±0.2°F (±0.1°C) in cooling/dehumidification and heating modes. Capacities and characteristics shall be as listed in the schedule and the specifications that follow.

Horizontal/Rooftop 100% OA Water Source Heat Pumps:

Units shall be supplied completely factory built for an entering water temperature range from 35° to 105°F (1.7° to 40.6°C) as standard. Equivalent units from other manufacturers can be proposed provided approval to bid is given 10 days prior to bid closing. All equipment listed in this section must be tested in accordance with American Refrigeration Institute / International Standards Organization (AHRI/ISO) and certified in accordance with UL 1995 Second Edition. The units shall have an ETL-US label. All units shall be fully quality tested by factory run testing under design operating conditions and water flow rates as described herein. The following quality control system checks shall be performed: triple leak check, pressure tests, evacuate and accurately charge system, perform detailed heating, dehumidification and cooling mode tests, and hot gas reheat mode testing. **Units tested without water flow are not acceptable.**

Basic Construction:

HW model units shall be constructed for indoor installation and usage. RW model units shall be constructed for outdoor installation and usage and shall include rain hood, low leak outdoor air isolation damper with 24V motorized actuator, and additional weather-stripping for improved weather resistance. The cabinet shall be 1" (25.4mm) double wall construction, 16-gauge (1.5mm) galvaneal outer panels and 22gauge (0.7mm) galvanized metal inner liner. RW model units shall be tested in accordance with UL rain test standards. A 12-gauge (2.5MM) galvanized base rail assembly shall be incorporated with the unit base pan for the base of the unit.

All exterior and other painted surfaces shall be constructed of galvaneal steel with a powder coated painted finished. Painting shall be by a powder coat technique to assure positive adherence with a high-impact finish. All sides of panels shall be painted. The panels shall be rated to meet a minimum of 1,000-hour salt spray test. Unit color shall be light gray. This corrosion protection system shall meet the stringent 1000-hour salt spray test per ASTM B117.

The unit roof shall be constructed as described above with a standing seam construction. All roof edges shall overlap sides of unit and have lip extending away from unit sides so that rainwater drippage shall not fall on top of access doors.

Unit shall be single side access. Access to filters, indoor blower, electrical controls, compressor compartment, and damper section shall be provided by double wall access doors with hinges, and compression latches with non-corrosive handles. All external fasteners shall be stainless steel bolts.
Self-taping or drive screws are unacceptable.

Bottom base pan of entire unit shall have no penetrations by bolts or screws.

All double wall cabinet panels shall house a 1 inch (25.4mm) thick, solid foam insulation with a minimum "R" factor of 5.0. **Unit insulation must meet these stringent requirements or unit(s) will not be accepted.**

Entire unit base shall be insulated on the underneath side to provide condensation protection, and noise attenuation.

RW Outdoor cabinets shall include a rain hood and low leak isolation dampers with 24v motorized actuator

The unit shall be furnished with 4" (100mm) filter racks on both sides of the ERW and one set 4" (100mm) MERV 8 pleated filters.

Enthalpy Energy Recovery Wheel:

Wheel Design - The rotor matrix shall be manufacturer of a corrosion resistant aluminum alloy that is composed of alternating corrugated and flat, continuously wound layers of uniform widths to guarantee laminar air flow, and low static pressure loss. The matrix will have a minimum depth of 7.5 inches. Polymer, corrugated synthetic fibrous and any other non-metallic media are not acceptable. The rotor wheel should be reinforced with spokes, welded at the hub and perimeter to prevent any uneven run out during normal operations.

Desiccant Type - All corrugated surfaces must be coated with a thin non-migrating synthetic zeolite adsorbent layer; with a pore size no greater than a 4 Angstrom; prior to being formed into the media structure to insure that all surfaces are coated and that adequate latent capacity is provided. Etched or oxidized aluminum surfaces are not acceptable. Silica Gel desiccants are not acceptable due to its lack of ability to prevent cross contamination of odor causing substances. The wheels effectiveness must be documented through a certification program conducted in accordance with ASHRAE 84 and ARI 1060 standards. The certification must have been conducted by a qualified independent organization that is recognized by AHRI.

Unit Housing - The self supported housing shall be made of galvanized steel to prevent corrosion. For rotor housing 2000 mm (79 inches) and less, the rotor wheel is supported by two internal, maintenance-free, antifriction, permanently sealed bearings that are located and protected within the surrounding wheel hub. For rotor housing larger that 2000 mm (79 inches), the rotor wheel shall be supported by two maintenance-free sealed pillow block bearings that are located within the housing and protected from the air stream.

Rotor Seals - The rotor shall be sealed with horizontal and circumference felt seals to ensure an absolute minimum leakage, while maintaining a friction free operation. Circumference felt seals shall seal to the face of wheel perpendicular to airflow to minimize wheel bypass of air. Brush seal are not acceptable. A purge shall be provided to minimize cross-contamination (not available on 2 & 3 ton systems).

Drive System - The rotor wheel must be driven by a self-adjusting belt system, which includes an A/C motor, nylon reinforced belt with linkage, and a spring-tensioned motor plate. The A/C motor must be capable of performing under constant and variable speed applications.

Certification - The wheels effectiveness must be clearly documented through a certification program conducted in accordance with ASHRAE 84 standards and ARI 1060. The certification must have been conducted by a qualified independent organization that is recognized by AHRI.

Optional Frost Protection: **The manufacture shall provide a Variable Frequency Drive (VFD). The VFD shall drive the wheel at maximum speed until the exhaust air's relative humidity reaches 95% to eliminate wheel frosting. The VFD shall vary the wheel speed to maintain the RH maximum to optimize energy recovery.**

Supply and Exhaust Fan and Motor Assemblies:

The assembly shall include a fan, housing and solid steel fan shaft encased in ball bearings. Unit shall have a belt drive fan assembly, fan pulley and adjustable motor sheave with v-belt drive. Fan shall be forward curved, low speed centrifugal that has been statically and dynamically balanced, and tested in accordance with current A.M.C.A. standards bulletin 210. Fan bearings shall be permanently lubricated type and be self-aligning. The motor shall be a single- or three-phase (as specified), high efficiency, ball bearing, open type with internal thermal overload protection. The motor shall be mounted on an adjustable base for proper belt tension. The fan and motor assembly must be capable of overcoming the external static pressures as shown on the schedule. Airflow/Static pressure rating

of the unit shall be based on a wet coil and a clean filter in place.

Refrigerant Circuit:

Units shall have a sealed refrigerant circuit including a high efficiency HFC-410A scroll compressor(s) designed for heat pump operation, a thermostatic expansion valve for refrigerant metering, an enhanced corrugated aluminum lanced fin and rifled copper tube refrigerant to air heat exchanger, plate refrigerant to water heat exchanger, plate water to refrigerant evaporator, hot gas reheat/ heat pump heating coil, liquid receiver, modulating HGRH controls and safety controls including a high pressure switch, low pressure switch (loss of charge), water coil low temperature sensor, and air coil low temperature sensor. The unit shall be provided with a refrigerant receiver. The receiver will assist the unit in operating at the highest efficiency over the entire operating range of load conditions.

Access fittings shall be factory installed on high and low pressure refrigerant lines to facilitate field service. Activation of any safety device shall prevent compressor operation via a microprocessor lockout circuit. The lockout circuit shall be reset at the contractor supplied disconnect switch. **100% OA WSHP units that utilize a reversing operation shall not be acceptable.**
Unit refrigeration circuit shall allow entering OA as low as 15°F (-10°C) without the use of preheat. **Units not capable of operation with OA down to this temperature will not be accepted.**

Evaporator Dehumidifier Coil:

Fins shall be die formed, lanced, aluminum with extruded fin collars to provide maximum heat transfer, and shall be damage resistant. Fin spacing shall be 10 FPI (fins per inch) [3.94 fins per 10 mm]. Coil tubing shall be fabricated from seamless drawn copper. The inner tubing shall be rifled to produce turbulent refrigeration flow and to enhance the heat transfer process. The tubes shall be hydraulically expanded into the fins to form a permanent metal-to-metal bond for maximum heat transfer and stability. The coil shall be six (6) rows deep. All air coils shall be leak tested with 625-psig (4309 kPa) nitrogen. After testing, coils must be sealed.

Optional Coil Coating: Coils will be protected with Electrofin E-coating to resist chemicals and corrosion. The coating shall be applied to both the tubing and fins. The coil must be sealed, electrostatically charged and dip-coated.

Condenser (Reheat Coil):

The reheat coil shall be positioned with a 5" (127 mm) minimum clearance from the DX coil to water avoid re-evaporation. **Direct connection of the reheat coil to the DX coil is not allowed.** Fins shall be die-formed, aluminum with extruded fin collars to provide maximum heat transfer, and shall be damage-resistant. Fin spacing shall be 12 FPI (fins per inch) [4.72 fins per 10 mm]. Coil tubing shall be fabricated from seamless drawn copper. The tubes shall be hydraulically expanded into the fins to form a permanent metal-to-metal bond for maximum heat transfer and stability. The coil shall be a minimum of two (2) rows deep. All air coils shall be leak tested with 625-psig (4,309 kPa) nitrogen. After testing, coils must be sealed.

Optional Coil Coating: Coils will be protected with Electrofin E-coating to resist chemicals and corrosion. The coating shall be applied to both the tubing and fins. The coil must be sealed, electrostatically charged and dip-coated.

Water Condenser and Water to Refrigerant Evaporator:

This WSHP unit(s) shall be equipped with two (2) brazed plate water to refrigerant heat exchangers. The plate water to refrigerant evaporator shall be piped in series with the water condenser. The water condenser must be first in series with respect to incoming water flow from the water loop. The water to refrigerant condenser allows the refrigerant energy to be released into the water loop during cooling operation and it also shall operate as a condenser in the heat pump heating mode to discharge any overage of compressor energy generated and not needed to control unit Leaving Air Temperature (LAT). In the heat pump heating mode the excess of refrigerant energy will discharged into the water loop and acts as a water heating "supercharger" heating the water before

the water to refrigerant evaporator extracts the energy for heating (heat of extraction). This process is patented.

The system shall be designed for simultaneous heat of rejection to both the hot gas reheat coil and the water condenser while controlling the LAT within ±0.2°F (±0.1°C). The plate water to refrigerant evaporator and the plate refrigerant to water condenser shall both be constructed as a brazed plate heat exchanger. The heat exchanger shall consist of stainless steel plates, copper-brazed together to allow a maximum working temperature of 350°F (177°C). The heat exchanger shall be factory leak-tested with helium at 625 psig (4,309 kPa) for quality assurance and, must have a maximum working pressure of 450 psi (3,103 kPa). The brazed plate heat exchangers shall be UL listed. The head pressure shall be controlled by the system's internal flooding valve.

Compressor(s):

Compressors: (3 to 5 HP): The compressor shall be a heavy–duty scroll-type, single compressor complete with start kit on single-phase motors. The compressor shall be equipped with low- and high-pressure safety switches, with internal protection from overheating. The compressors shall be externally vibration isolated. A standard factory two (2)-year compressor warranty shall be included. The unit must include hot gas bypass for each system compressor.

Compressors: (8 to 30 HP): The compressors shall be a tandem pair, heavy-duty scroll-type. A factory-mounted sensor that will deactivate one compressor when the load reaches the mid-range of the system's capacity, shall stage the compressors. The compressors must be equipped with high- and low-pressure safety switches, with internal protection from overheating. The compressors shall be externally vibration isolated. A standard factory two (2)-year compressor warranty shall be included. The unit must include hot gas bypass for each system compressor.

Drain Pan:

The drain pan shall be 20-gauge (0.812 mm) stainless steel, sloped, and positioned under the evaporator coil. It shall be silver-soldered, welded and securely attached to the evaporator end plates to avoid shifting. The drain pan shall be fitted with a minimum 1" MPT non-corrosive plastic drain connection and an internal P-Trap. The drain pan shall meet all the requirements of ASHRAE 62. Drain pan shall be fully insulated. Drain outlet shall be located at the pan as to allow complete and unobstructed drainage of condensate.

Electrical:

The electrical control panel shall be easily accessible on one side so that all service can be performed from the side of the unit. It shall be of adequate size so as to house all electrical controls and devices.

The unit shall be provided with single-point power connection, factory wired to the power connection lug set. Unit to include power terminal block to power heat tape for water-to-refrigerant heat exchangers (separate 115 vac circuit required by others).

The electrical controls shall include low voltage transformers to supply 24 VAC control power, clearly labeled high- and low-voltage terminal strips, high- and low-pressure control (with manual reset of the high-pressure cutout and automatic reset of low pressure cutout), and an anti–shortcycling timer delay to protect against compressor cycling.

Option: Disconnect Switch, Non-Fused

Option: Disconnect Switch, Non-Fused and 115 VAC GFI convenience outlet (separate 115 vac circuit required by others).

Controls:

The unit shall include factory mounted temperature and humidity sensors in the filter section, pre-wired to controller in panel for actuation of compressor in ambient temperatures above 55°F (12.7 °C) dew point (programmable).

The unit must be supplied with the necessary controls as defined in the unit's Sequence of Operation for proper temperature and humidity control of the space. See plans and/or other documentation for the detailed sequence of operation of this unit.

Warranty:

ClimateMaster shall warranty equipment for a period of 24 months from date of shipment.

Option: Extended 3-year compressor warranty covers compressor for a total of 5 years.

Performance Sheet

SUBMITTAL DATA - S-I UNITS

Unit Designation: _____

Job Name: _____

Architect: _____

Engineer: _____

Contractor: _____

PERFORMANCE DATA

Cooling Capacity: _____ kW

EER: _____

Heating Capacity: _____ kW

COP: _____

Ambient Air Temp: _____ °C

Entering Water Temp (Clg): _____ °C

Entering Air Temp (Clg): _____ °C

Entering Water Temp (Htg): _____ °C

Entering Air Temp (Htg): _____ °C

Airflow: _____ l/s

Fan Speed or Motor/RPM/Turns: _____

Operating Weight: _____ (kg)

ELECTRICAL DATA

Power Supply: _____ Volts

_____ Phase _____ Hz

Minimum Circuit Ampacity: _____

Maximum Overcurrent Protection: _____

SUBMITTAL DATA - I-P UNITS

Unit Designation: _____

Job Name: _____

Architect: _____

Engineer: _____

Contractor: _____

PERFORMANCE DATA

Cooling Capacity: _____ Btuh

EER: _____

Heating Capacity: _____ Btuh

COP: _____

Ambient Air Temp: _____ °F

Entering Water Temp (Clg): _____ °F

Entering Air Temp (Clg): _____ °F

Entering Water Temp (Htg): _____ °F

Entering Air Temp (Htg): _____ °F

Airflow: _____ CFM

Fan Speed or Motor/RPM/Turns: _____

Operating Weight: _____ (lb)

ELECTRICAL DATA

Power Supply: _____ Volts

_____ Phase _____ Hz

Minimum Circuit Ampacity: _____

Maximum Overcurrent Protection: _____

Notes:

Revision History

Date:	Item:	Action:
11/15/16	Document Design Update	Updated
06/1/12	Engineering Specifications	Updated
05/11/12	All	Added revision C & addition options
04/07/11	Engineering Specifications NOTICE	Updated
02/03/11	TOHD/RD Physical Data Table	Updated
01/03/11	Format - All Pages	Updated
07/26/10	Wiring Diagrams	Updated
07/26/10	Compressor Mounting Information and Graphics Engineering Specifications	Updated to Reflect Spring/Grommet Change
07/09/10	Engineering Specifications	Updated Electrical Section
06/11/10	Format - All Pages	Updated
06/08/10	TO Series Nomenclature	Updated Configuration, HD/RD Configuration & Notes
06/08/10	Updated for Commercial Cd	Ongoing literature updates, formatting, etc.
06/04/09	Stand-Alone and Big Book Submittals	Consolidated
02/06/09	Engineering Specifications	Updated
07/25/08	Blower Motor and Wheel Table	Added
04/25/08	Data Models	Consolidated
04/24/08	Decoder	Updated
04/18/08	Physical Data Tables	Added
04/18/08	Horizontal Data	Consolidated Tables
04/18/08	Nomelclature Page	Added Table
11/08/07	Specifications	Updated
11/08/07	Controls	Updated
11/08/07	Sequence of Operation	Updated
11/08/07	Dimensional Data	Updated
11/08/07	Blower Data	Updated and reformatted
10/30/06	Specifications	Updated
09/01/06	First Published	

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