Genesis OA (GO) Vertical Series Dedicated Outdoor Air System Submittal Data

Models GO V04 - 30

60Hz - R22

English Language/I-P Units

Rev.: 4 June, 2009B

CLIMATEMASTER®
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SUBMITTAL DATA - I-P UNITS

Unit Designation: _____

Job Name: _____

Architect: _____

Engineer: _____

Contractor: _____

PERFORMANCE DATA

Moisture Removal: _____ lbs/hr

Design Cooling Capacity: _____ Btuh

Design EER: _____

Design Heating Capacity: _____ Btuh

Design COP: _____

Design Outdoor Air Temp (Clg): _____ DB/WB

Design Dewpoint: _____ °F

Design Entering Water Temp (Clg): _____ °F

Design Indoor Air Temp (Clg): _____ DB/WB

Design Outdoor Air Temp (Htg): _____ DB/WB

Design Entering Water Temp (Htg): _____ °F

Design Indoor Air Temp (Htg): _____ DB/WB

Design Airflow: _____ CFM

Fan Speed or Motor/RPM/Turns: _____

Operating Weight: _____ (lb)

ELECTRICAL DATA

Power Supply: _____ Volts _____ Phase _____ Hz

Minimum Circuit Ampacity: _____

Maximum Overcurrent Protection: _____

Genesis OA (GO) Vertical Series Dedicated Outdoor Air System Submittal Data

Models GO V04 - 30

60Hz - R22

English Language/S-I Units

Rev.: 4 June, 2009B

CLIMATEMASTER®
Geothermal Heat Pump Systems

SUBMITTAL DATA - S-I UNITS

Unit Designation: _____

Job Name: _____

Architect: _____

Engineer: _____

Contractor: _____

PERFORMANCE DATA

Moisture Removal: _____ kg/hr

Design Cooling Capacity: _____ kW

Design EER: _____

Design Heating Capacity: _____ kW

Design COP: _____

Design Outdoor Air Temp (Clg): _____ DB/WB

Design Dewpoint: _____ °C

Design Entering Water Temp (Clg): _____ °C

Design Indoor Air Temp (Clg): _____ DB/WB

Design Outdoor Air Temp (Htg): _____ DB/WB

Design Entering Water Temp (Htg): _____ °C

Design Indoor Air Temp (Htg): _____ DB/WB

Design 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: _____

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CLIMATEMASTER
Geothermal Heat Pump Systems

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 Genesis OA and 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 Genesis OA (R-22 refrigerant) and 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. ClimateMaster's Genesis OA and 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.

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Selection Procedure

Reference Calculations

Heating	Cooling	
$LWT = EWT - \frac{HE}{GPM \times 500}$	$LWT = EWT + \frac{HR}{GPM \times 500}$	$LC = TC - SC$
$LAT = EAT + \frac{HC}{CFM \times 1.08}$	$LAT\ (DB) = EAT\ (DB) - \frac{SC}{CFM \times 1.08}$	$S/T = \frac{SC}{TC}$

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
EPT = external 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
IPT = internal 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 SI (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

GOV Series 60Hz - R22 Submittal Data Eng/I-P

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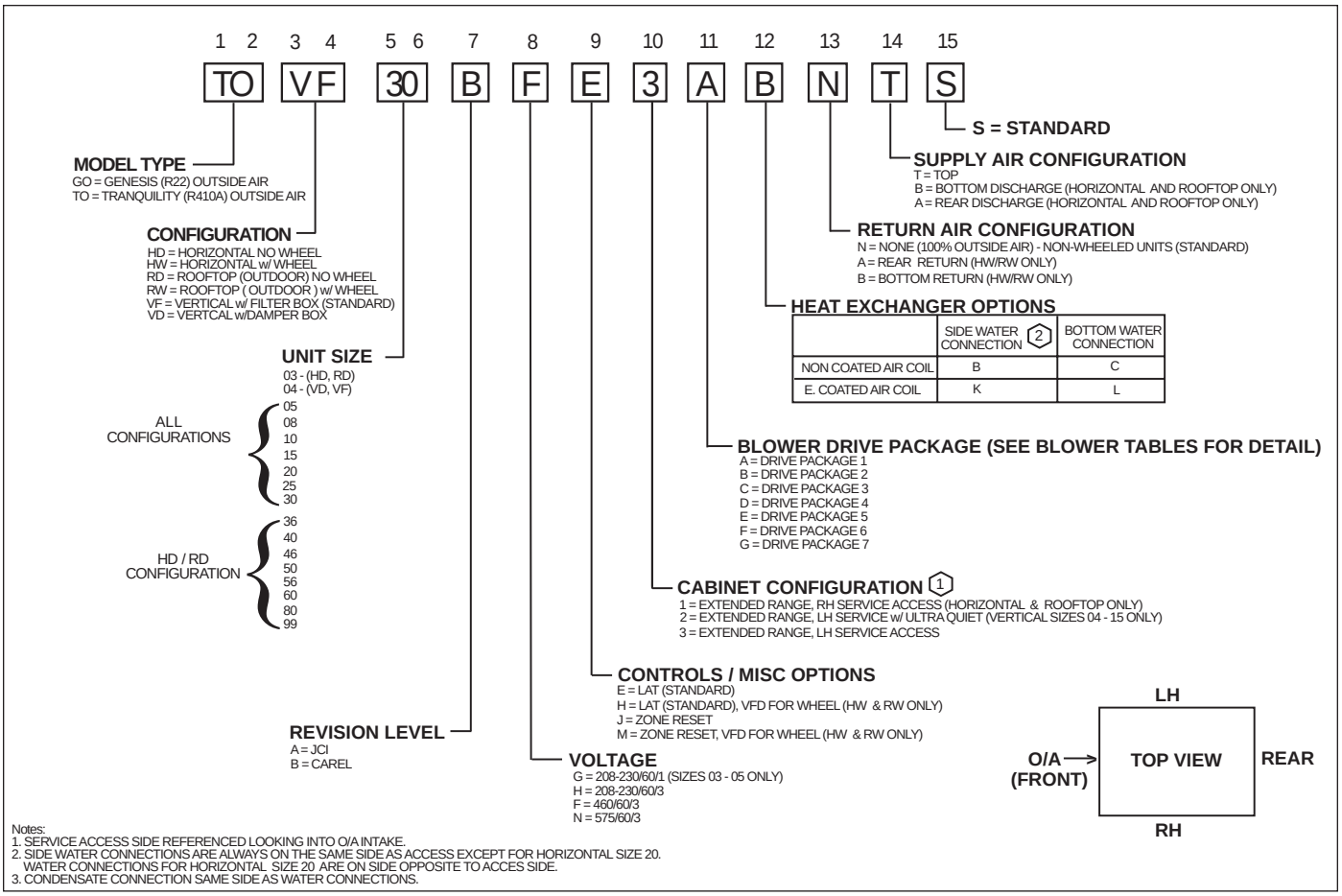
GO Series Nomenclature



Operating Limits Table

	VF/VD Models	
Air Limits	**Cooling/Dehumid Mode**	**Heating Mode**
Minimum Ambient Air	40 F [4.4 C]	40 F [4.4 C]
Maximum Ambient Air	100 F [37.8 C]	100 F [37.8 C]
Minimum Entering Air	50 F[10.0 C]	15 F [-9.4 C]
Maximum Entering Air	110 F [43 C]	80 F [26.7]
Water Limits		
Minimum Entering Water	35 F [1.7 C]	35 F [1.7 C]
Maximum Entering Water	105 F [1.7 C]	90 F [32.2 C]

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Geothermal Heat Pump Systems

Vertical Blower Data
Model 04 & 05

Airflow	Model 04 & 05			
CFM	ESP 0.5"	ESP 1"	ESP 1.5"	ESP 2"
450	A	A	N/A	N/A
500	A	A	N/A	N/A
550	A	A	C	N/A
600	A	A	C	C
650	A	A	C	C
700	A	A	C	C
750	A	C	C	C
800	A	C	C	C
850	B	C	C	C
900	B	C	C	E
950	B	C	C	E
1000	B	C	E	E
1050	B	C	E	E
1100	B	D	D	E
1150	B	D	D	G
1200	B	D	D	G
1250	B	D	D	F
1300	D	D	D	F
1350	D	D	D	F

Vertical Blower Data
Model 08

Airflow	Model 08			
CFM	ESP 0.5"	ESP 1"	ESP 1.5"	ESP 2"
850	A	A	B	D
900	A	A	B	D
950	A	A	B	D
1000	A	A	B	D
1050	A	A	C	D
1100	A	A	C	D
1150	A	A	C	D
1200	A	C	C	C
1250	A	C	C	C
1300	A	C	C	C
1350	A	C	C	C
1400	A	C	C	C
1450	C	C	C	E
1500	C	C	C	E
1550	C	C	C	E
1600	C	C	C	E
1650	C	C	E	E
1700	C	C	E	E
1750	C	C	E	E
1800	C	C	E	E

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Geothermal Heat Pump Systems

Vertical Blower Data
Model 10

Airflow	Model 10			
CFM	ESP 0.5"	ESP 1"	ESP 1.5"	ESP 2"
1150	A	A	B	B
1200	A	A	B	B
1250	A	B	B	B
1300	A	B	B	B
1350	A	B	B	B
1400	A	B	B	B
1450	A	B	B	B
1500	A	B	B	C
1550	A	B	B	C
1600	B	B	B	C
1650	B	B	B	C
1700	B	B	B	C
1750	B	B	C	C
1800	B	B	C	C
1850	B	B	C	C
1900	B	B	C	C
1950	B	C	C	C
2000	B	C	C	D
2050	B	C	C	D
2100	B	C	C	D
2150	B	C	C	D
2200	C	C	D	D
2250	C	C	D	D
2300	C	C	D	D
2350	C	C	D	D
2400	C	D	D	D

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Geothermal Heat Pump Systems

Vertical Blower Data
Model 15

Airflow	Model 15			
CFM	ESP 0.5"	ESP 1"	ESP 1.5"	ESP 2"
1600	A	A	A	B
1650	A	A	A	B
1700	A	A	A	B
1750	A	A	A	B
1800	A	A	A	B
1850	A	A	A	B
1900	A	A	B	B
1950	A	A	B	B
2000	A	A	B	B
2050	A	A	B	B
2100	A	B	B	D
2150	A	B	B	D
2200	A	B	B	D
2250	A	B	B	D
2300	B	B	D	D
2350	B	B	D	D
2400	B	B	D	D
2450	B	B	D	D
2500	B	D	D	F
2550	B	D	D	F
2600	B	D	D	F
2650	B	D	E	F
2700	B	D	E	F
2750	C	E	E	F
2800	C	E	E	F
2850	C	E	E	F
2900	C	E	G	F
2950	C	E	G	G*
3000	C	E	G	G*
3050	C	E	G	G*
3100	E	E	G	G*
3150	E	E	G	G*
3200	E	G	G	G*
3250	E	G	G	G*
3300	E	G	G	G*
3350	E	G	G	G*
3400	E	G	G	G*

* 1.9" WC MAX

CLIMATEMASTER
Geothermal Heat Pump Systems

Vertical Blower Data
Model 20

Airflow	Model 20			
CFM	ESP 0.5"	ESP 1"	ESP 1.5"	ESP 2"
2550	A	B	N/A	N/A
2600	A	B	C	N/A
2650	A	B	C	N/A
2700	A	B	C	N/A
2750	A	B	C	C
2800	A	B	C	C
2850	A	B	C	C
2900	B	B	C	D
2950	B	B	C	D
3000	B	C	C	D
3050	B	C	C	D
3100	B	C	D	D
3150	B	C	D	D
3200	B	C	D	D
3250	B	C	D	D
3300	B	C	D	D
3350	B	C	D	D
3400	B	C	D	D
3450	B	C	D	D
3500	C	D	D	D
3550	C	D	D	D
3600	C	D	D	E
3650	C	D	D	E
3700	C	D	D	E
3750	C	D	D	E
3800	C	D	D	E
3850	C	D	D	E
3900	D	D	E	E
3950	D	D	E	E
4000	D	D	E	E
4050	D	D	E	E
4100	D	D	E	E
4150	D	D	E	E
4200	D	D	E	F
4250	D	D	E	F
4300	D	E	E	F
4350	D	E	E	F
4400	D	E	E	F
4450	D	E	E	F
4500	D	E	E	F
4550	D	E	E	F
4600	E	E	F	F
4650	E	E	F	F
4700	E	E	F	F
4750	E	E	F	G
4800	E	E	F	G
4850	E	E	F	G
4900	E	F	F	G
4950	E	F	F	G
5000	E	F	F	G

CLIMATEMASTER
Geothermal Heat Pump Systems

Vertical Blower Data
Model 25

Airflow	Model 25			
CFM	ESP 0.5"	ESP 1"	ESP 1.5"	ESP 2"
3100	A	B	C	D
3150	A	B	C	D
3200	B	B	C	D
3250	B	B	C	D
3300	B	C	C	D
3350	B	C	C	D
3400	B	C	D	D
3450	B	C	D	D
3500	B	C	D	D
3550	B	C	D	D
3600	B	C	D	D
3650	B	C	D	D
3700	B	C	D	D
3750	B	C	D	D
3800	C	C	D	D
3850	C	C	D	D
3900	C	D	D	E
3950	C	D	D	E
4000	C	D	D	E
4050	C	D	D	E
4100	C	D	D	E
4150	C	D	D	E
4200	C	D	D	E
4250	C	D	E	E
4300	D	D	E	E
4350	D	D	E	E
4400	D	D	E	E
4450	D	D	E	E
4500	D	D	E	E
4550	D	D	E	E
4600	D	D	E	F
4650	D	D	E	F
4700	D	E	E	F
4750	D	E	E	F
4800	D	E	E	F
4850	D	E	E	F
4900	D	E	E	F
4950	D	E	E	F
5000	D	E	F	F
5050	D	E	F	F
5100	E	E	F	F
5150	E	E	F	F
5200	E	E	F	G
5250	E	E	F	G
5300	E	E	F	G
5350	E	E	F	G
5400	E	F	F	G

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Geothermal Heat Pump Systems

Vertical Blower Data
Model 25

Airflow	Model 25			
CFM	ESP 0.5"	ESP 1"	ESP 1.5"	ESP 2"
5450	E	F	F	G
5500	E	F	F	G
5550	E	F	F	G
5600	E	F	G	G
5650	E	F	G	G
5700	F	F	G	G
5750	F	F	G	G
5800	F	F	G	G
5850	F	F	G	G
5900	F	G	G	G
5950	F	G	G	G
6000	F	G	G	G

CLIMATEMASTER
Geothermal Heat Pump Systems

Vertical Blower Data
Model 30

Airflow	Model 30			
CFM	ESP 0.5"	ESP 1"	ESP 1.5"	ESP 2"
3750	A	B	C	C
3800	A	B	C	C
3850	A	B	C	C
3900	A	B	C	C
3950	A	B	C	C
4000	B	B	C	C
4050	B	B	C	C
4100	B	C	C	D
4150	B	C	C	D
4200	B	C	C	D
4250	B	C	C	D
4300	B	C	C	D
4350	B	C	C	D
4400	B	C	C	D
4450	B	C	C	D
4500	B	C	D	D
4550	B	C	D	D
4600	C	C	D	D
4650	C	C	D	D
4700	C	C	D	D
4750	C	C	D	D
4800	C	C	D	D
4850	C	C	D	D
4900	C	C	D	E
4950	C	C	D	E
5000	C	D	D	E
5050	C	D	D	E
5100	C	D	D	E
5150	C	D	D	E
5200	C	D	D	E
5250	C	D	E	E
5300	C	D	E	E
5350	C	D	E	E
5400	D	D	E	E
5450	D	D	E	E
5500	D	D	E	F
5550	D	D	E	F
5600	D	D	E	F
5650	D	D	E	F
5700	D	E	E	F
5750	D	E	E	F
5800	D	E	E	F
5850	D	E	E	F
5900	D	E	F	F
5950	D	E	F	F
6000	E	E	F	F
6050	E	E	F	F

CLIMATEMASTER
Geothermal Heat Pump Systems

Vertical Blower Data
Model 30 - Continued

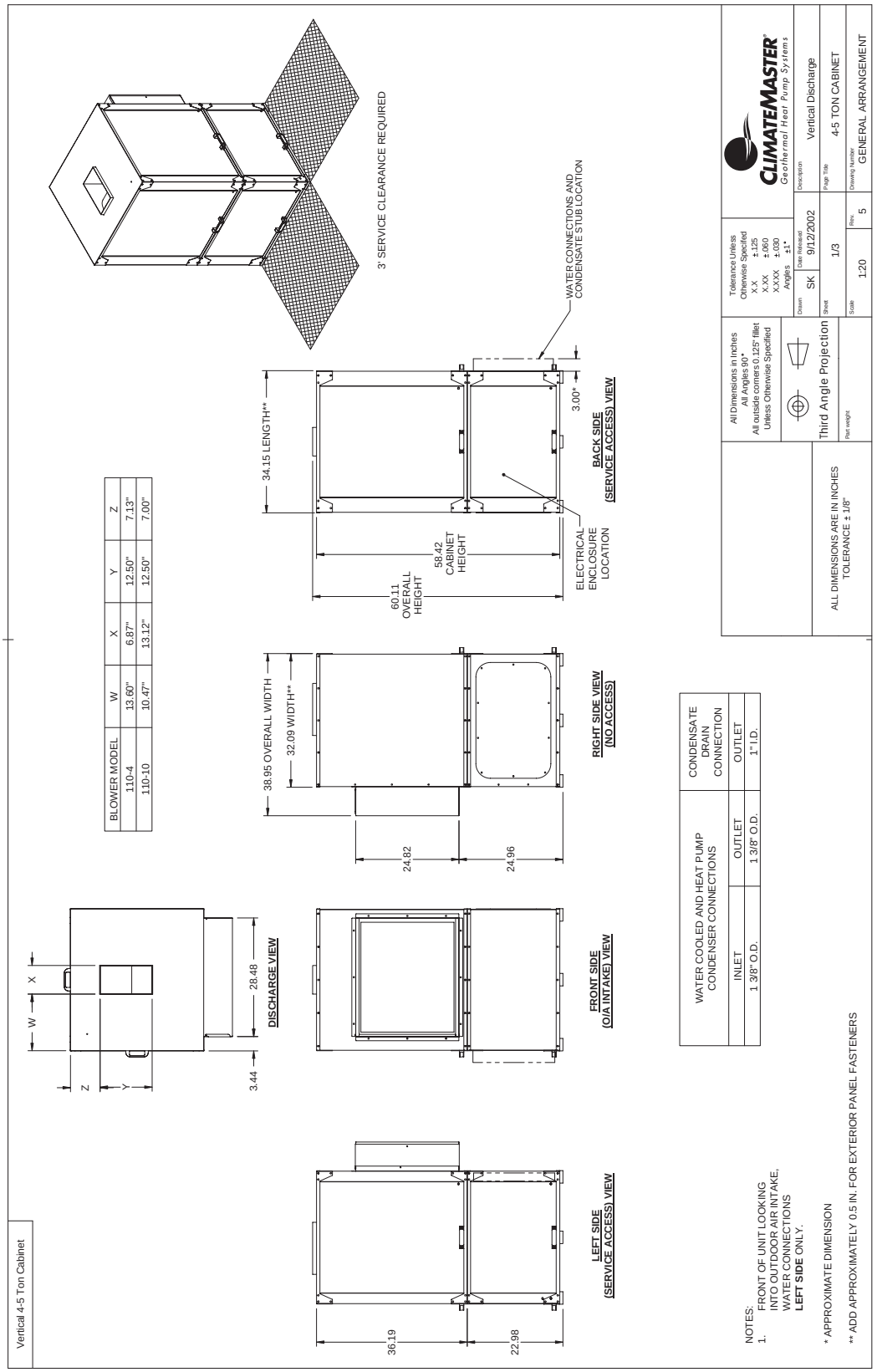
Airflow	Model 30			
CFM	ESP 0.5"	ESP 1"	ESP 1.5"	ESP 2"
6100	E	E	F	F
6150	E	E	F	F
6200	E	F	F	F
6250	E	F	F	F
6300	E	F	F	F
6350	E	F	F	F
6400	E	F	F	F
6450	E	F	F	F
6500	E	F	F	F
6550	E	F	F	F
6600	F	F	F	F
6650	F	F	F	F
6700	F	F	F	F
6750	F	F	F	F

Blower Motor HP and Blower Wheel size table

	Drive Selection/Blower Wheel Size						
	A	B	C	D	E	F	G
Model	Motor Horse Power						
04	0.5/11-4	0.5/11-10	1.0/11-4	1.0/11-10	1.5/11-4	1.5/11-10	2.0/11-4
05	0.5/11-4	0.5/11-10	1.0/11-4	1.0/11-10	1.5/11-4	1.5/11-10	2.0/11-4
08	0.5/11-10	1.0/11-4	1.0/11-10	1.5/11-4	1.5/11-10	N/A	N/A
10	0.5/11-10	1.0/11-10	1.5/11-10	2.0/11-10	N/A	N/A	N/A
15	1.0/11-10	1.5/11-10	1.5/12-12	2.0/11-10	2.0/12-12	3.0/11-10	3.0/12-12
20	1.0/18-T2	1.5/18-T2	2.0/18-T2	3.0/18-T2	5.0/18-T2	5.0/18-T2	7.5/18-T2
25	1.0/18-T2	1.5/18-T2	2.0/18-T2	3.0/18-T2	5.0/18-T2	5.0/18-T2	7.5/18-T2
30	1.0/18-T2	1.5/18-T2	2.0/18-T2	3.0/18-T2	5.0/18-T2	5.0/18-T2	7.5/18-T2

CLIMATEMASTER
Geothermal Heat Pump Systems

Vertical Dimensional Data
Model 04 & 05



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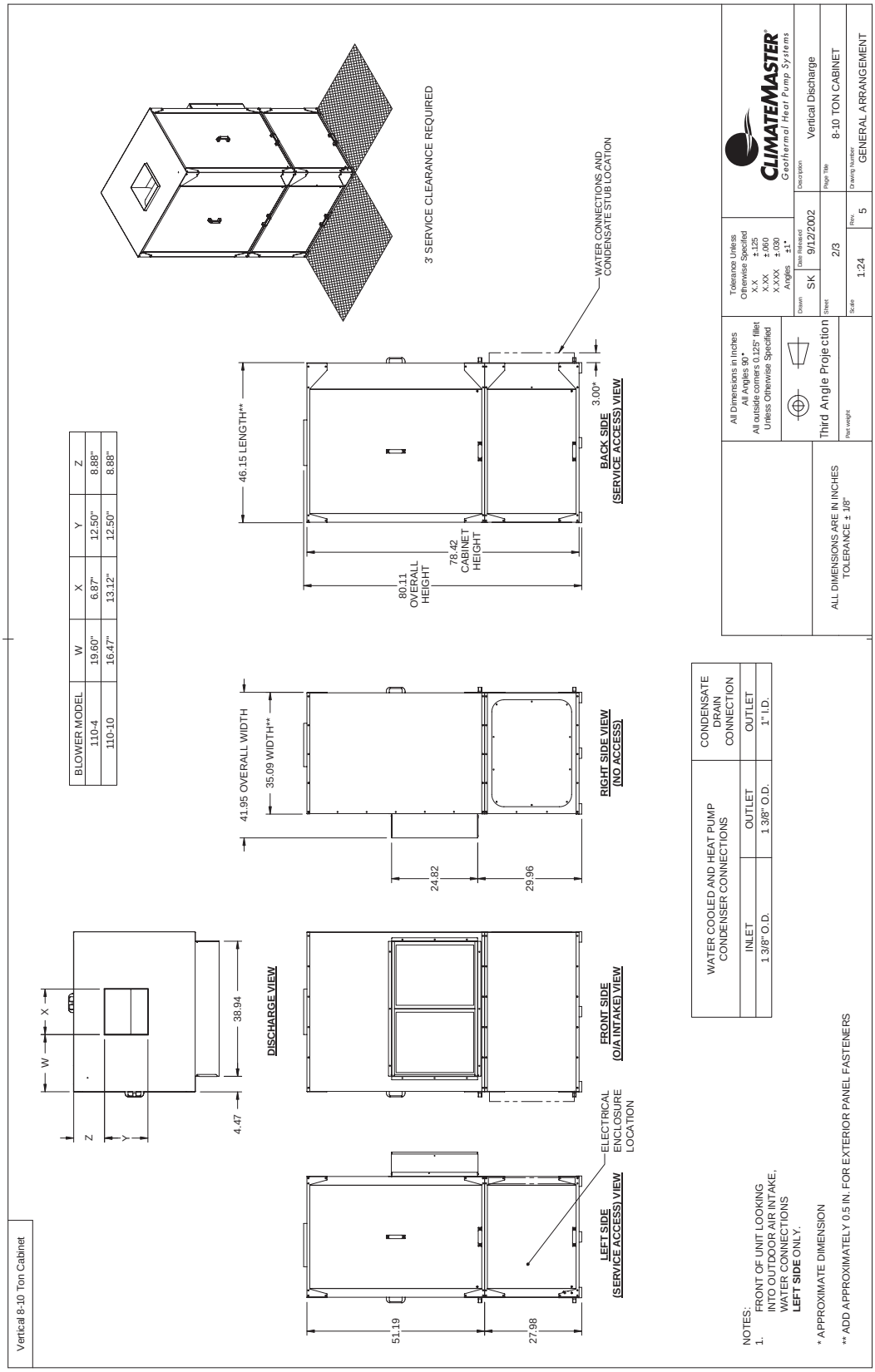
Vertical Dimensional Data
Model 08 & 10



BLOWER MODEL	W	X	Y	Z
110-4	19.60"	6.87"	12.50"	8.88"
110-10	16.47"	13.12"	12.50"	8.88"

WATER COOLED AND HEAT PUMP CONDENSER CONNECTIONS		CONDENSATE DRAIN CONNECTION
INLET	OUTLET	OUTLET
1 3/8" O.D.	1 3/8" O.D.	1" I.D.

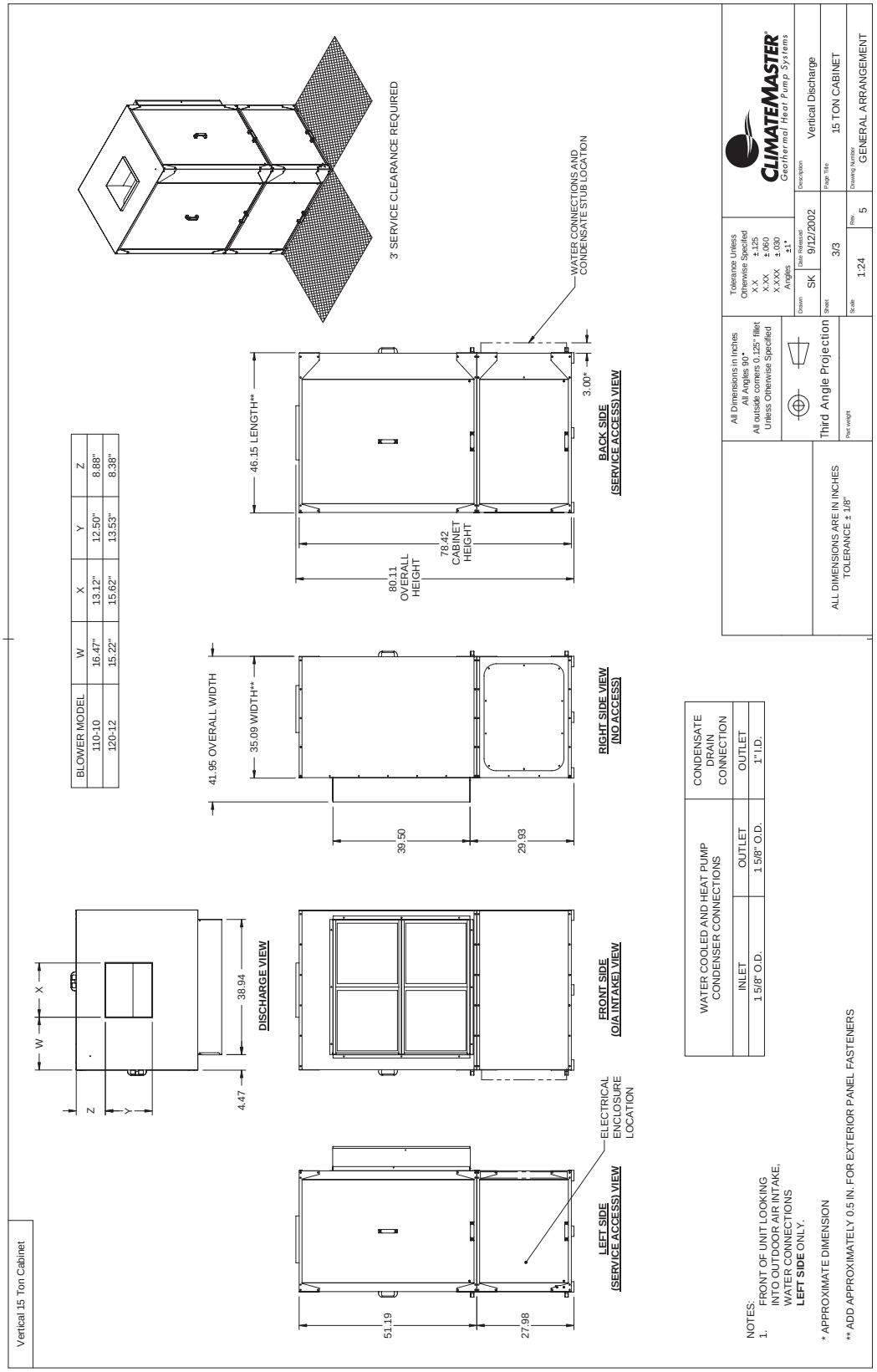
NOTES:
1. FRONT OF UNIT LOOKING INTO OUTDOOR AIR INTAKE, WATER CONNECTIONS **LEFT SIDE** ONLY.

* APPROXIMATE DIMENSION

** ADD APPROXIMATELY 0.5 IN. FOR EXTERIOR PANEL FASTENERS

CLIMATEMASTER
Geothermal Heat Pump Systems

Vertical Dimensional Data
Model 15



BLOWER MODEL	W	X	Y	Z
110-10	16.47"	13.12"	12.50"	8.88"
120-12	15.22"	15.62"	13.53"	8.38"

WATER COOLED AND HEAT PUMP CONDENSER CONNECTIONS		CONDENSATE DRAIN CONNECTION
INLET	OUTLET	OUTLET
1.5/8" O.D.	1.5/8" O.D.	1" I.D.

NOTES:
1. FRONT OF UNIT LOOKING INTO OUTDOOR AIR INTAKE, WATER CONNECTIONS **LEFT SIDE** ONLY.

* APPROXIMATE DIMENSION

** ADD APPROXIMATELY 0.5 IN. FOR EXTERIOR PANEL FASTENERS

All Dimensions in Inches
All Angles 90°
All outside corners 0.125" fillet
Unless Otherwise Specified

Third Angle Projection

Tolerance Unless Otherwise Specified
X.X ±.125
X.XX ±.060
X.XXX ±.030
Angles ±1°

Drawn: SK | Date Released: 9/12/2002
Sheet: 3/3 | Description: Vertical Discharge
Scale: 1:24 | Rev: 5
Part weight | Page Title: 15 TON CABINET
Drawing Number: GENERAL ARRANGEMENT

ALL DIMENSIONS ARE IN INCHES
TOLERANCE ± 1/8"

Vertical 15 Ton Cabinet

CLIMATEMASTER
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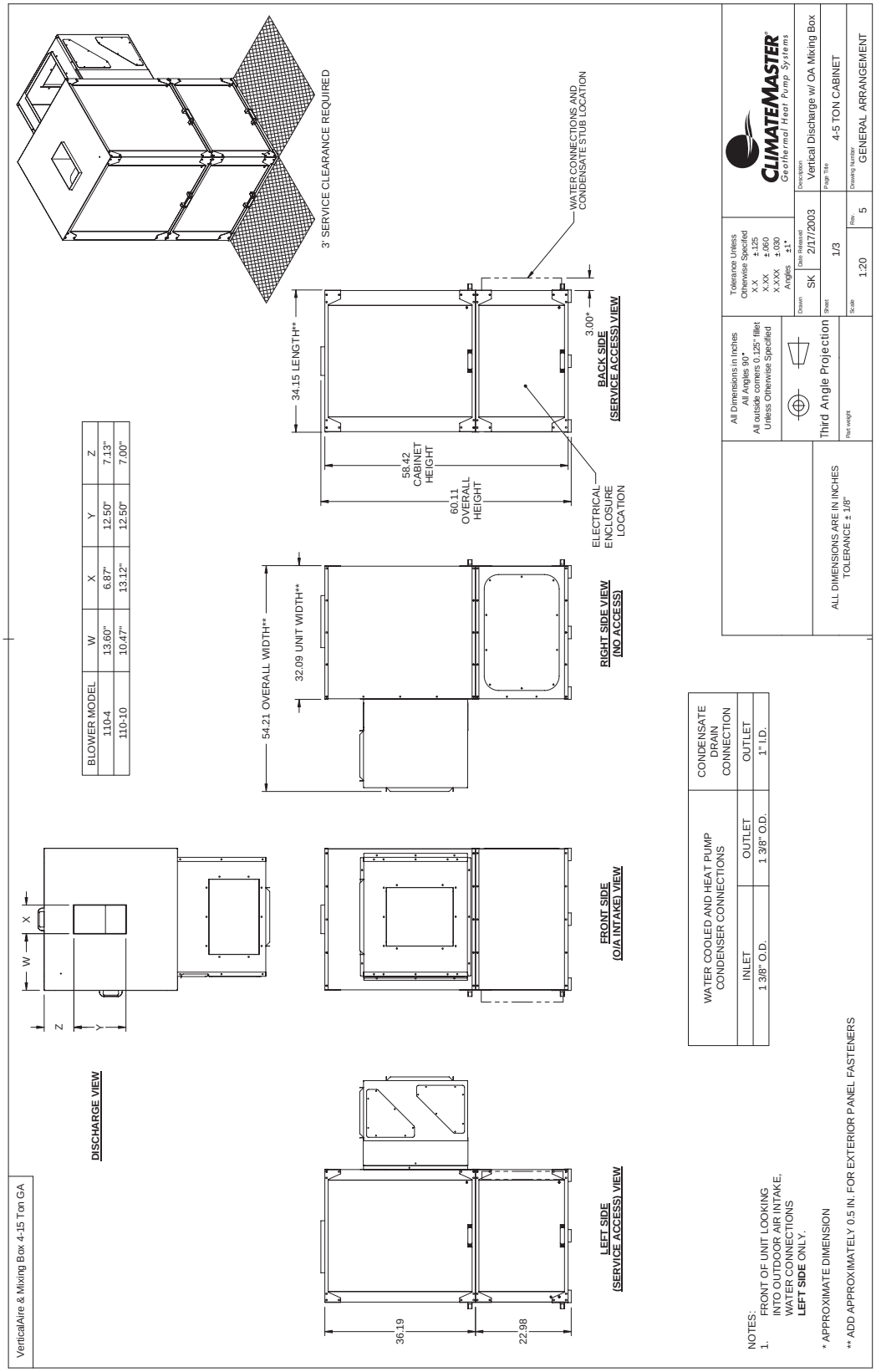
Vertical Dimensional Data
Model 4 - 5



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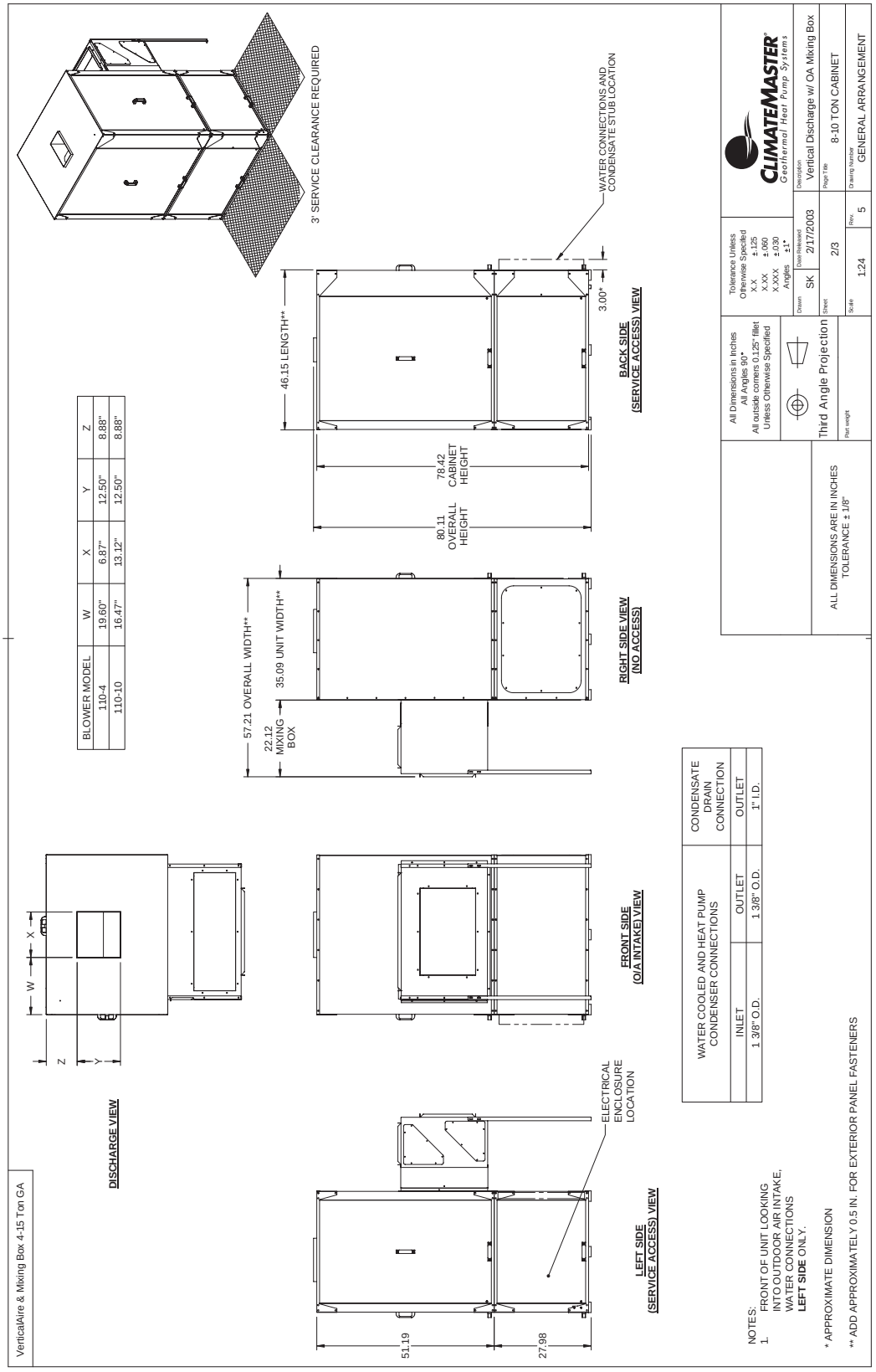
Geothermal Heat Pump Systems

Vertical Dimensional Data
Model 8 - 10



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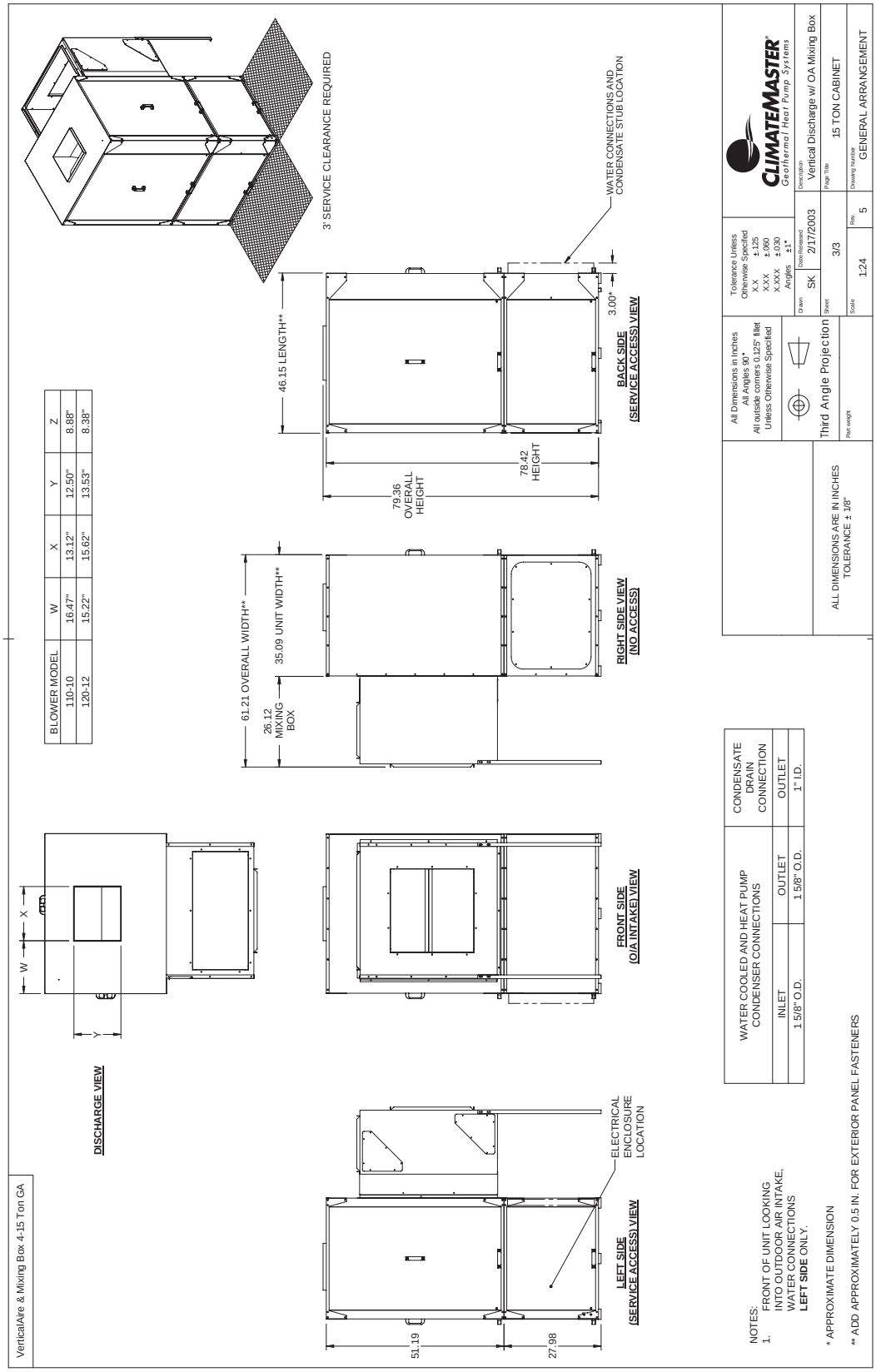
Vertical Dimensional Data
Model 15



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Geothermal Heat Pump Systems

Physical Data Table

Model	4	5	8	10
Fan motor available H.P.	0.5/1.0/1.5/2.0	0.5/1.0/1.5/2.0	0.5/1.0/1.5	0.5/1.0/1.5/2.0
Blower wheel size	11-04/11-10	11-04/11-10	11-04/11-10	11-10
Compressor type/qty	Scroll, 1 ea.		Scroll, 2ea. (1 tandem set)	
Factory charge lb/unit				
R-22 Genesis units	12 [192]	14 [224]	18 [288]	24 [384]
Water Connection Size " O.D.	7/8"	1/18"	1 3/8"	1 3/8"
Water Flow Rate GPM	17	19	26	34
Water Pressure Drop PSI/Ft	5.3/12.23	4.0/9.23	5.4/12.46	6.6/15.22
Condensate Connection Size	1"	1"	1"	1"
Miscellaneous Data				
Filter qty/size	(1) 25 X 29 X 4	(1) 25 X 29 X 4	(2) 20 X 25 X 4	(2) 20 X 25 X 4
Filter Type	Merv 11, Pleated			
Operating Weight	626	643	940	1002
Shipping Weight	639	666	965	1033

Model	15	20	25	30
Fan motor available H.P.	1.0/1.5/20./3.0	1.0/1.5/20./3.0/5.0/7.5	1.0/1.5/20./3.0/5.0/7.5	1.0/1.5/20./3.0/5.0/7.5
Blower wheel size	11-10/12-12	APAF18-T2	APAF18-T2	APAF18-T2
Compressor type/qty	Scroll, 2ea. (1 tandem set)			
Factory charge lb/unit				
R-22 Genesis units	36 [576	56 [896]	67 [1072]	79 [1264]
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	9.4/21.68	6.2/14.30	6.2/14.30	7.1/16.38
Condensate Connection Size	1"	1"	1"	1"
Miscellaneous Data				
Filter qty/size	(4) 20 X 20 X 4	(3) 20 X 24 X 4 (3) 24 X 24 X 4	(3) 20 X 24 X 4 (3) 24 X 24 X 4	(3) 20 X 24 X 4 (3) 24 X 24 X 4
Filter Type	Merv 11, Pleated			
Operating Weight	1401	2467	2652	2771
Shipping Weight	1444	2569	2742	2886

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.

CLIMATEMASTER
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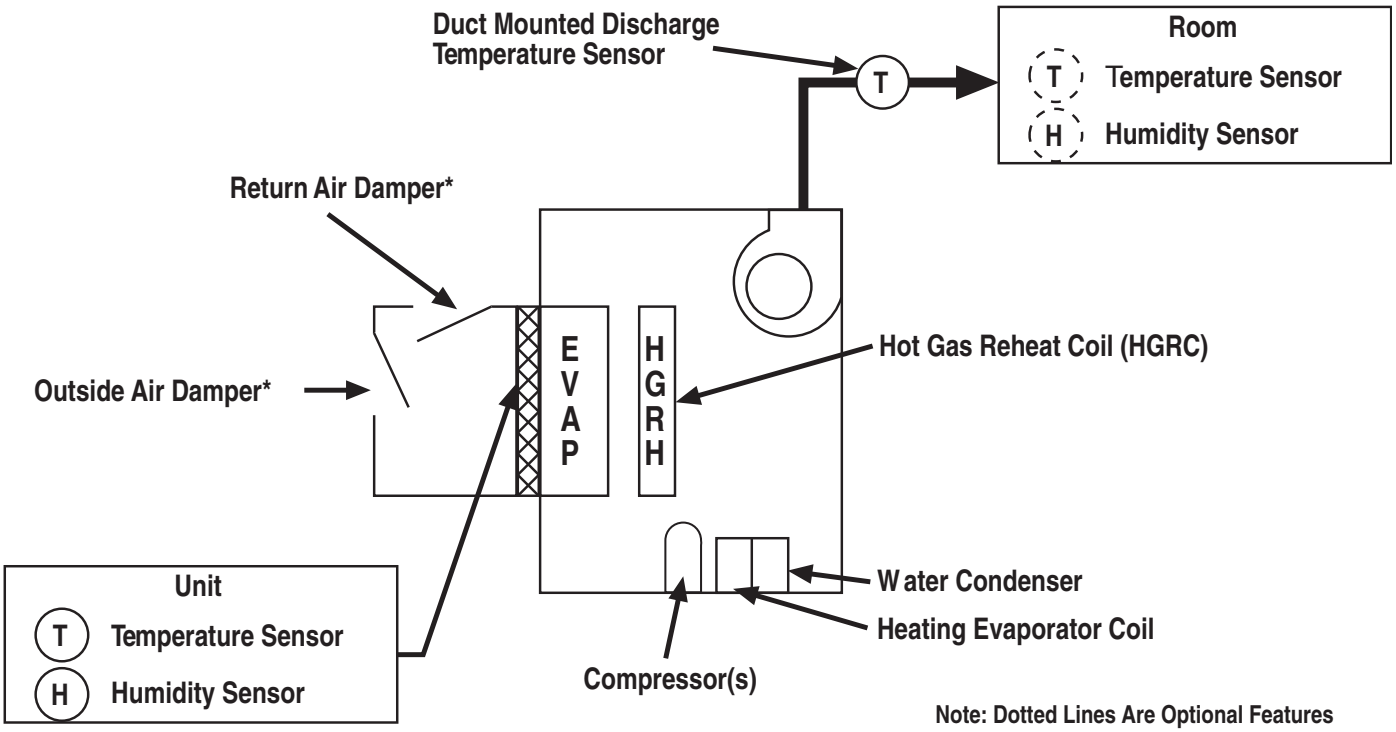
Sequence of Operation



Sensor Control Definitions and Location

Unit Temperature and Humidity Sensors
A temperature and humidity sensor shall be located before the evaporator coil. The sensors feed back to the unit microprocessor the dry bulb temperature and relative humidity entering the evaporator (mixed air conditions for damper box applications).

Leaving Temperature Sensor
The supply air sensor shall be located in the supply air ductwork (by others). The sensor feeds back to the unit microprocessor the discharge air dry bulb temperature.

Space Temperature Sensor (Optional)
The room temperature sensor shall be located in the conditioned room. The sensor feeds back to the unit microprocessor the room air dry bulb temperature. A space temperature sensor is required for room reset of leaving air temperature and/or unoccupied space temperature control options

Space Humidity Sensor (Optional)
The humidity sensor shall be located in the conditioned room. The sensor feeds back to the unit microprocessor the room relative humidity (RH). A space RH sensor will be required with the unoccupied space humidity control option.

* = Damper(s) box available for vertical units only.
Damper/Mixing box for horizontal units supplied and installed by others.
Damper/Mixing box not compatible with rooftop units or horizontal units with an ERV wheel.

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Geothermal Heat Pump Systems

Control Features, Selections, and Sequence of Operation

Control Features:

Standard Control features include:

- **Emergency System Shutdown (ESS)**
  Emergency System Shutdown shall be controlled by a customer supplied smoke detector or other dry contact. Upon opening of the remote contact the ESS mode will be initiated and all fan(s), motor(s), and compressor(s) will be immediately deactivated and will remain off as long as the ESS signal remains. Upon closure of the remote contact the ESS mode will be terminated and the DOAS unit will return the unit to the normal mode of operation.
- **Exhaust Fan Interlock**
  Exhaust Fan Interlock shall be provided by a dry contact on the DOAS unit to enable/disable a remote exhaust fan by others. The Exhaust Fan Interlock will cycle with the DOAS unit supply air blower demand to provide exhaust air during the 100% OA mode. Supply air blower operation will be controlled by the unit DDC controller and will be determined by the Control Type selected and the mode of operation.
- **Controller Interface/Display Module**
  The DOAS Controller Interface/Display Module is a user-operated interface to provide information on unit status, Entering Air Temperature, Entering Air RH, and unit LAT. The interface module is furnished as a standard accessory and is required to access user adjustable set points, differentials, time schedule(s), etc. when not connected to an active DDC network. The Display Module requires field installation and can be mounted on or near the DOAS unit or in a remote location up to 330 ft [100 m] from the DOAS unit. Installation will require a twisted pair wire with shield.

- The DOAS unit DDC controller is compatible with most Building Management Systems (BMS) and is available in a variety of communication protocols.

  REV B: A Carel Controls DDC controller is factory provided as standard. The Carel controller is a native Carel protocol. Additional protocol options are available by ordering an accessory Interface Card with the appropriate protocol selection. Selections should be noted when ordering a DOAS unit and include;
  - BACnet MS/TP
  - BACnet Ethernet
  - Modbus
  - LON works

Damper/Mixing Box

- Vertical units may be ordered with a factory provided damper box with actuator. The damper box will be shipped assembled but field assembly to the DOAS unit will be required.

  OA and RA dampers will operate together from a single actuator and will be controlled by the DOAS unit DDC controller. Damper positions will be preset based on the customer specified OA and RA CFM. Damper settings are approximate and are not guaranteed. Air test and balance of the OA and RA should be conducted after installation is complete to insure proper air balance. Customer supplied damper/mixing boxes are acceptable on vertical and horizontal indoor mounted DOAS units **not** equipped with an Energy Recovery Wheel (model HW). Damper/Mixing boxes are not compatible with Roof mounted DOAS units (model RD/RW). All field assembly, adjustment, and air balance is to be provided by others.

Required/Optional Control Accessories

- **Outside Air Temperature/Humidity Sensor**
  An Outside Air (OA) sensor is required for proper DOAS unit operation. A combination Temp/RH sensor will be

CLIMATEMASTER
Geothermal Heat Pump Systems

Control Features, Selections, and Sequence of Operation

factory installed on the entering airside of the unit. On DOAS units with an Energy Recovery Wheel the sensor will be mounted upstream of the OA entering the wheel.

Control Features (cont):

- **Leaving Air Temperature Sensor**
  A Leaving Air Temperature sensor will be required with the LAT control option to maintain the LAT at the design set point. The LAT sensor will ship as an accessory item and requires field installation in the supply air duct to the space. The sensor must be installed in a convenient location that will allow accurate sensing of the SA Temperature, more than 5 linear feet from the fan outlet, and must NOT be within “line of sight” of any Auxiliary heater (if used).
  The LAT sensor will be included as standard on DOAS units equipped with the Carel Controller. DOAS units with the optional JCI Controller will require selection of the LAT sensor as an accessory item and must be ordered separately from the unit.

- **Space Temperature Sensor**
  A space Temperature sensor will be required when the Room Reset of LAT option is selected and/or when temperature control is desired during the Unoccupied mode. The sensor will be used to communicate the space temperature to the DOAS unit controller. A wall mounted space temperature sensor is offered for each controller type and should be selected and ordered when the DOAS unit is ordered with the RRLAT option or when a damper box will be used and control of the space temperature is desired during the Unoccupied mode.
  The space temperature sensor will ship as an accessory and requires field installation into the space for which it is intended to control. A duct mounted temperature sensor will only be acceptable provided the supply blower(s) operates continuously. Multiple space sensors may be used for averaging of up to four (4) separate zones.

- **Space Humidity Sensor**
  A Space Humidity sensor will be required when space RH control is desired during the Unoccupied mode. The RH sensor will be used to determine the space relative humidity and start the DOAS unit in the Cooling/ Dehumidification mode. A wall mounted humidity sensor is offered for each control type and should be selected and ordered when the DOAS unit is ordered. The Space Humidity sensor will ship as an accessory and requires field installation into the space for which it is intended to control. A duct mounted humidity sensor will be acceptable provided the supply blower(s) operates continuously.

Control Type Selections:

Control selections are based on desired operation of the DOAS unit during various parts of the day. DOAS units can operate in the Occupied mode continuously for 24 hour conditioning to meet Outdoor Air (OA) or Make-up Air (MA) requirements or can operate on a time schedule to provide Occupied and Unoccupied operation.

The DOAS unit can shut down during an Unoccupied mode or continue to condition the space Temperature and/or Relative Humidity by re-circulation of the space return air through a field installed damper box.

One of these Control Types must be selected when the unit is ordered. Field installed sensors, controls, and wiring may be required.

Control selection options include;

- Leaving Air Temperature (LAT)
- Room Reset of LAT (RRLAT)
- Unoccupied Temperature and/or Humidity Control.

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Geothermal Heat Pump Systems

Control Features, Selections, and Sequence of Operation

Leaving Air Temperature (LAT) Control Option

Occupied Mode:

The standard Occupied Control Type is Leaving Air Temperature (LAT) control. Upon initiation of the Occupied mode the Outside Air Damper will be commanded open. After confirmation the OA Damper is in the open position (end switch) the DOAS unit fan(s) will be enabled and will operate continuously until the next scheduled Unoccupied mode.

Compressor(s) will be staged ON and OFF dependent on the Outside Air (OA) and LAT conditions. The LAT sensor will require field mounting in the Supply Air duct at a convenient location that will sense an accurate supply Air temperature.

Factory supplied Variable Frequency Drives (VFD) for the blower motor(s) is not available. Discharge Air CFM from the DOAS unit will be constant and at the design CFM specified in the unit selection program. Field balance of the Supply Air CFM by others will be required.

The DOAS unit controller uses a PID feed back loop to modulate a hot gas reheat valve in small incremental steps to provide a constant LAT (+/- .2 °F). Discharge Air will be at or below the design Leaving Air Dew point (LADP) as specified in the unit selection program.

- Sequence of Operation

Cooling/Dehumidification Mode:

- The Cooling/Dehumidification mode demand will initiate compressor staging based on OA conditions to cool and dehumidify the supply air at or below the design LADP and will reheat the air as needed to maintain the design LAT as specified in the unit selection program.

- Compressor(s) will activate when;
  - The OA Dew point is above the system set point of 60 F [16 °C] or,

  - When the OA temperature is above 70 F db [21 °C], even if the air OA Dew point is below the design Dew point set point.

    The hot refrigerant gas reheat coil on the airside will provide reheat as required to maintain the design LAT. Refrigerant not fully condensed in the reheat coil will be condensed in the water-cooled heat exchanger.

Leaving Air Temperature (LAT) Control Option (cont)

Air Heating Mode:

- When Cooling or Dehumidification is not required AND the LAT is below the design set point the DOAS unit will operate in the Air Heating mode. In the Air Heating mode the DOAS unit will divert low-pressure refrigerant from the airside coil to a waterside heat exchanger. No cooling or dehumidification of the OA will be provided in the Air Heating Mode. The hot refrigerant gas reheat coil on the airside will provide heating as required. Refrigerant not fully condensed in the reheat coil will be condensed in the water-cooled heat exchanger. Only the required amount of heat to maintain the LAT will be rejected into the air stream. Heat not required to maintain the LAT will be rejected back into building water loop for use elsewhere. In some of the coldest locations an Auxiliary Heater may be required to insure the design LAT can be maintained. The DOAS selection software program will display a notice if Aux. Heat is required as well as the recommended capacity for the heater in kW and BTU. Auxiliary heater(s) should be installed in the Supply Air stream after the DOAS unit SA blower and can be enabled/disabled by the DOAS unit through an Aux Heat Relay dry contact closure? Auxiliary heater(s) must be field provided and

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Control Features, Selections, and Sequence of Operation

installed by others. Aux heater types may include Electric, Gas fired, Hot Water, Steam, etc.

Control Type Selections (cont):

Unoccupied Mode:

When the DOAS unit Unoccupied mode is initiated the compressor(s) and blower fan(s) will be commanded off. The OA Damper will be commanded to the closed position and the unit will remain shut down until the next scheduled Occupied mode.

Room Reset of LAT (RRLAT)

The RRLAT control option will be active only when the DOAS unit is in the Occupied mode.

The RRLAT control option requires a space mounted temperature sensor. The sensor is available as an accessory item and must be selected when the unit is ordered. Multiple space sensors may be used (up to four (4) maximum). Multiple sensors will be averaged.

The DOAS unit controller utilizes a PID feed back loop to reset the LAT based on the Space temperature. As the Space Temperature increases from set point the LAT will be incrementally lowered to help offset the space heat gain. As the Space Temperature decreases from set point the LAT will be incrementally raised to help offset the space heat loss. The DOAS unit controller has the capability to reset the LAT to the full Cooling (no reheat) and full Heating (no Dehumidification) modes.

Selection of the RRLAT control option may have a positive effect on the space conditioning equipment. By helping to offset some of the heat gain/loss the space conditioning equipment may operate less, or not be required on mild days, and may allow the space conditioning equipment to be downsized. Heat gain/loss calculations to determine the effect on the space conditioning equipment with the DOAS RRLAT control option will be required. The RRLAT control option will work best in a large zone with a dedicated DOAS unit. A DOAS unit applied to several small zones with mis-matched loads may lead to overcooling or over heating of some zones. Multiple space sensors should be used to average the zone temperatures.

- **Sequence of Operation:**

- When the Space Temperature is equal to the space set point the DOAS unit will maintain the design LAT.
- When the Space Temperature is greater than the space set point the DOAS controller will incrementally lower the LAT set point to help offset the heat gain and maintain the space temperature.
- When the Space Temperature is less than the space set point the DOAS controller will incrementally raise the LAT set point to help offset the heat loss and maintain the space temperature.

Unoccupied Temperature and/or Humidity Control

Unoccupied Space Temperature Control will require a space mounted Temperature sensor. Multiple space sensors may be used (up to four (4) maximum). Multiple space temperature sensors will be averaged.

Unoccupied Space Humidity Control will require a space mounted Humidity sensor. Only one space humidity sensor per DOAS unit may be used.

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Control Features, Selections, and Sequence of Operation

Control Type Selections (cont):

Both sensors may be used for Unoccupied Space Temperature and Humidity Control.

Sensors are available as accessories and must be ordered with the DOAS unit.

NOTE: Unoccupied Temp and/or RH Control requires a field installed damper or mixing box. Control for operation of one damper actuator by the DOAS unit is provided. A factory assembled Damper Box is available as an option for Vertical units only. Damper box requires field assembly to the DOAS unit.

- **Sequence of Operation:**

Unoccupied Temperature Control:

- When the Space Temperature is above the Unoccupied Space Set point of 85 °F [29 °C] (field adjustable) the fan(s) and compressor(s) will be commanded on and the DOAS unit will operate in the full Cooling mode until the Space Temperature falls below the space set point minus the Unoccupied Cooling Differential.

- When the Space Temperature is below the Unoccupied set point of 65°F [18 °C] (field adjustable) the DOAS unit will operate in the full Air Heating mode until the space temperature rises above the set point plus the heating Unoccupied Differential.

Unoccupied Humidity Control:

- When the Space relative Humidity (RH) is above the set point of 60% RH the fan(s) and compressor(s) will be commanded on and the DOAS unit will operate in the Air Reheat mode until the Space RH drops below the space set point minus the Unoccupied Humidity Differential.

Unoccupied Temperature and Humidity Control:

- When both Space Temperature and Humidity sensors are used the DOAS unit will operate as described above for both modes. The Cooling mode will have priority over the Dehumidification mode. If both the Space Temperature and Space RH are above set point the full Cooling mode will be initiated until the cooling demand is satisfied. When the Cooling demand is satisfied the DOAS unit will then operate in the Air Reheat mode until the Dehumidification demand is satisfied or the Cooling demand is again initiated.

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MODEL "GOV" SIZE 04-15 100% OUTDOOR AIR
WATER SOURCE HEAT PUMP SPECIFICATIONS
Rev. October 30, 2006

General:
Furnish and install ClimateMaster "Genesis" Vertical 100% OA Water Source Heat Pumps, as indicated on the plans. Equipment shall be completely assembled, piped and internally wired. 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.

Vertical 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 rated and in accordance with American Refrigeration Institute / International Standards Organization (ARI / ISO). The units shall have ETL labels. 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:
Vertical Units 4 to 15 ton (14 to 53 kW) sizes shall be in the following air flow arrangement: Front Return/Top Discharge, as shown on the plans. If units with these arrangements are not used, the contractor is responsible for any extra costs incurred by other trades. All vertical units must have a minimum of two access sides for serviceability of compressor compartment and filter removal.

The heat pumps shall be fabricated from heavy gauge galvanized steel. All interior surfaces shall be lined with 1 inch (25.4 mm) thick, solid polymer foam insulation with a minimum "R" value of 5. ***Unit insulation must meet these stringent requirements or unit(s) will not be accepted.***

All vertical units covered in this specification must fit into a standard 36" (914 mm) door opening with the filter box removed. ***If units with these factory installed provisions are not used, the contractor is responsible for any extra costs to field install these provisions, and/or the extra costs for his sub-contractor to install these provisions.***

The contractor shall purchase one spare set of filters and replace factory shipped filters on completion of start-up. Filters shall be standard sizes. If units utilize non-standard filter sizes then the contractor shall provide 12 spare filters for each unit.

All factory-installed wiring passing through factory knockouts and openings shall be protected from sheet metal edges at openings by plastic ferrules. Supply and return water connections shall be copper sweat fittings, and shall be securely mounted flush to the cabinet corner post allowing for connection to an EPT fitting and a flexible hose without the use of a back-up wrench. ***Water connections that protrude through the cabinet or require the use of a backup wrench shall not be allowed.*** All water connections and electrical knockouts must be in the compressor compartment corner post as to not interfere with the serviceability of unit. Contractor shall be responsible for any extra costs involved in the installation of units that do not have these features. Contractor must ensure that units can be easily removed for servicing and coordinate locations of electrical conduit and lights with the electrical contractor.

Option: UltraQuiet package shall consist of high technology sound attenuating material mounted in the compressor compartment that is strategically applied to further dampen and attenuate sound transmissions.

Fan and Motor Assembly:
Units shall have a belt-drive centrifugal fan. The blower housing shall be made of galvanized steel and mounted on permanently lubricated sealed ball bearings. The blower assembly shall be forward curved, centrifugal; it shall be dynamically and statically balanced. The blower housing shall be vibration isolated. Blower Discharge shall be top.

Blower Pulley Assembly:
The drive pulley and the blower pulley will be made of cast iron. The motor sheave shall be a variable pitch-type to allow for field adjustment of airflow and external static pressure, and must be dynamically and statically balanced with a stainless steel fan shaft. The drive overload service factor is a minimum of 1.2.

Blower Motor:
The motor will be TEFC class B insulated, continuous-duty, 40°C (104°F) ambient, three-phase overloads. The motor shall be UL listed.

Airflow / Static pressure rating of the unit shall be based on a wet coil and a clean filter in place. ***Ratings based on a dry coil and / or no filter, or on an ESP less than specified in the schedule shall NOT be acceptable.***

Optional Filter/DamperBox: The unit will be provided with a combination filter/damper box with motorized dampers. The motorized dampers shall have a two position, 24-volt motor-operator (power open / spring return). The dampers shall be low leak-type with side seals and blade seals. Operation shall be 100% return air during unoccupied operation / 100% outside air during occupied operation. Control must be capable of nighttime setback for dehumidification of return air during unoccupied operation.

Refrigerant Circuit:
Units shall have a sealed refrigerant circuit including a high efficiency 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 420-psig (2,896 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 420-psig (2,896 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).

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Geothermal Heat Pump Systems

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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.

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" EPT 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 must be designed 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.

The electrical controls will include a low-voltage transformer 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.

Controls:
The unit shall include factory mounted temperature and humidity sensors in the filter section / filter damper box section, pre-wired to the controller in the panel for actuation of compressor in ambient temperatures above the user-selected dewpoint. This unit's selection set point shall be 55°F (12.7°C) Dew Point.

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.

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General:
Furnish and install ClimateMaster "Genesis" Vertical 100% OA Water Source Heat Pumps, as indicated on the plans. Equipment shall be completely assembled, piped and internally wired. 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.

Vertical 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 rated and in accordance with American Refrigeration Institute / International Standards Organization (ARI / ISO). The units shall have ETL labels. 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:
Vertical Units 20 to 30 ton (85 to 102 kW) sizes shall be in the following air flow arrangement: front intake/Top Discharge, as shown on the plans. ***If units with these arrangements are not used, the contractor is responsible for any extra costs incurred by other trades.*** All vertical units must have a minimum of two access sides for serviceability of compressor compartment and filter removal.

The heat pumps shall be fabricated from heavy gauge galvanized steel double wall construction. The insulation shall be 1" (24.5 mm) solid foam in the double wall cabinet with a minimum R factor of 5.0.

All vertical units covered in this specification must fit through a standard 56" (142 mm) double door opening with the filter box removed. ***If units with these factory installed provisions are not used, the contractor is responsible for any extra costs to field install these provisions, and/or the extra costs for his sub-contractor to install these provisions.***

The contractor shall purchase one spare set of filters and replace factory shipped filters on completion of start-up. Filters shall be standard sizes. If units utilize non-standard filter sizes then the contractor shall provide 12 spare filters for each unit.

All factory-installed wiring passing through factory knockouts and openings shall be protected from sheet metal edges at openings by plastic ferrules. Supply and return water connections shall be copper sweat fittings, and shall be securely mounted stubbed-out of the cabinet's intake panel side above the OA intake, allowing for connection To the WSHP loop. The condensate drain piping connection shall be CPVC connection and can be right or left hand connection. ***Water connections that protrude through the cabinet or require the use of a backup wrench shall not be allowed.*** All water connections and electrical knockouts must be in the compressor compartment corner post as to not interfere with the serviceability of unit. Contractor shall be responsible for any extra costs involved in the installation of units that do not have these features. Contractor must ensure that units can be easily removed for servicing and coordinate locations of electrical conduit and lights with the electrical contractor.

Option: UltraQuiet package shall consist of high technology sound attenuating material mounted in the compressor compartment that is strategically applied to further dampen and attenuate sound transmissions.

Fan and Motor Assembly:
The blower housing shall be a heavy gauge welded steel frame and painted with an anticorrosive paint. The shaft bearings shall be self-aligning, deep groove ball type, in pillow block housings. The blower shall be a backward incline plenum fan. The fan shall be dynamically and statically balanced. The fan shaft shall be made with hardened steel, precision ground and polished, and incorporates keyways for the wheel hub and sheaves. The blower shall be vibration isolated. Blower Discharge shall be top.

Blower Pulley Assembly:
The drive pulley and the blower pulley will be made of cast iron. The motor sheave shall be a variable pitch-type to allow for field adjustment of airflow and external static pressure, and must be dynamically and statically balanced with a stainless steel fan shaft. The drive overload service factor is a minimum of 1.2.

Blower Motor:
The motor will be TEFC class B insulated, continuous-duty, 40°C (104°F) ambient, three-phase overloads. The motor shall be UL listed.

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Airflow / Static pressure rating of the unit shall be based on a wet coil and a clean filter in place. ***Ratings based on a dry coil and / or no filter, or on an ESP less than specified in the schedule shall NOT be acceptable.***

Optional Filter/DamperBox: The unit will be provided with a combination filter/damper box with motorized dampers. The motorized dampers shall have a two position, 24-volt motor-operator (power open / spring return). The dampers shall be low leak-type with side seals and blade seals. Operation shall be 100% return air during unoccupied operation / 100% outside air during occupied operation. Control must be capable of nighttime setback for dehumidification of return air during unoccupied operation.

Refrigerant Circuit:
Units shall have a sealed refrigerant circuit including a high efficiency tandem 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.***

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 420-psig (2,896 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 at the discharge of the unit after the fan. Direct connection of the reheat coil to the DX coil is not acceptable. 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 420-psig (2,896 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: 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-solder, welded and securely attached to the evaporator end plates to avoid shifting. The drain pan shall be fitted with a minimum 1" EPT 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 the back-side (opposite side of the connections) so that all service can be performed from that and one side of the unit. It must be designed 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.

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Revision History

Date:	Item:	Action:
04 June, 2009	Stand-Alone and Big Book Submittals	Consolidated
06 Feb, 2009	Engineering Specifications	Verbiage Updated
06 Feb, 2009	Vertical Dimensional Data	Drawings Added
23 July, 2008	Blower Wheel Size Table on Pg 16	Added
13 May, 2008	Vertical 4-5, 8-10 & 15 Ton Drawings	Updated
23 April, 2008	Decoder	Updated
23 April, 2008	Verbiage	Updated
23 April, 2008	Two Vertical Blower Data Tables	Consolidated
23 April, 2008	GO/TOVF/VF Data Table	Added
08 Nov, 2007	Specifications	Updated
08 Nov, 2007	Controls	Updated
08 Nov, 2007	Sequence of Operation	Updated
08 Nov, 2007	Dimensional Data	Updated
08 Nov, 2007	Blower Data	Updated and reformatted
30 Oct, 2007	Specifications	Updated
15 Sep, 2007	First Published	