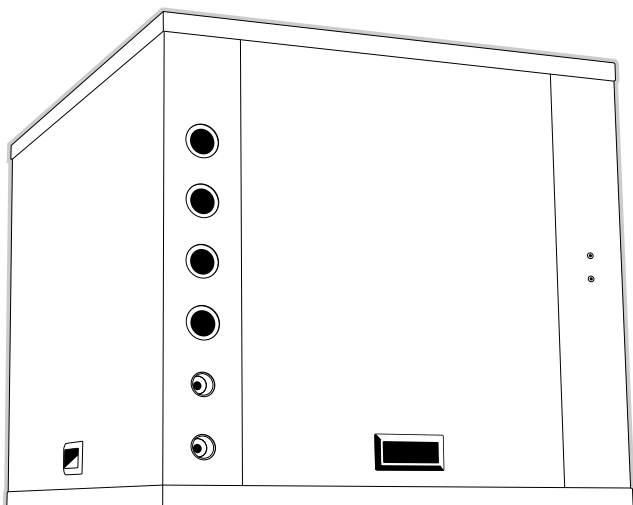


Engineering Data Submittal Manual



**MODELS WT 036 - 144
WATER-TO-WATER HEAT PUMPS**

Project Name: _____

Engineer: _____

Contractor: _____

Architect: _____

Date Received: _____

Date Submitted: _____

Unit Tag	Model Number
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Notes: _____

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ENGINEERING SPECIFICATIONS:

GENERAL:

Packaged Water-to-Water Two-Stage "WT" Series Geothermal Heat Pumps shall be constructed based on all information to follow. Equipment shall be completely assembled, piped, internally wired, charged with refrigerant, and tested.

Units shall be supplied completely factory built capable of operating over an entering water temperature range from 25° to 120°F (-3.9° to 48.9°C) (extended data tables; Heating 25F – 90F, cooling 50F – 110F) as standard. All equipment listed in this section must be rated and certified in accordance with Air-Conditioning, Heating and Refrigeration Institute/International Standards Organization (AHRI/ISO 13256-1). All equipment must be tested, investigated, and determined to comply with the requirements of the standards for Heating and Cooling Equipment UL-1995 for the United States and CAN/CSA-C22.2 NO.236 for Canada, by Intertek Testing Laboratories (ETL). The units shall have AHRI/ISO and ETL-US-C labels.

All units shall be fully quality tested by factory run testing under normal operating conditions as described herein. Quality control system shall automatically perform via computer: helium leak check of both the water and refrigerant circuits, pressure tests, double evacuation and accurately charged system, perform detailed heating and cooling mode tests, and quality cross check all operational and test conditions to pass/fail criteria.

BASIC CONSTRUCTION:

The heat pumps shall be fabricated from powder coated heavy gauge galvanized steel. This corrosion protection system shall meet the stringent 1000 hour salt spray test per ASTM B117.

All units must have a minimum of three access panels for serviceability of compressor compartment. See IOM manuals for service clearances.

All interior surfaces shall be lined with 3/8 inch (9.5mm) thick, 3-6 lb/ft³ (24 kg/m³) acoustic type closed cell, non-porous, non-fibrous

Nitrile/Vinyl insulation. Standard cabinet panel insulation must meet UL-1995 and ASTM E 84/UL 723 Flame 25 / Smoke 50 requirements, air erosion and mold growth limits of UL-181, stringent fungal resistance test per ASTM-C1071 and ASTM G21, and shall meet zero level bacteria growth per ASTM G22. The insulation shall be UL-GREENGUARD certified under the Childrens and Schools classification and approved by the Factory Mutual Research Corporation. For added protection it shall be protected with an EPA-approved antimicrobial agent.

Cabinets shall have separate holes and knockouts for entrance of line voltage and low voltage control wiring. 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 brass FPT fittings, and shall be securely mounted flush to the cabinet allowing for connection to a flexible hose without the use of a back-up wrench. All water connections and electrical knockouts must be in the compressor compartment as to not interfere with the serviceability of unit.

The unit shall be supplied with extended range internal insulation. All internal water lines and the evaporator side refrigeration tubing shall all have closed cell EPDM insulation. The water to refrigerant coaxial heat exchanger shall have 8# closed cell foam applied or closed cell EPDM oam tape wrap.

Option: Sound attenuating compressor blanket for additional noise reduction.

REFRIGERANT CIRCUIT:

All units shall contain R-410A sealed refrigerant circuit including a high efficiency two-stage unloading scroll compressor designed for heat pump operation, a thermostatic expansion valve for refrigerant metering, reversing valve, coaxial refrigerant to water heat exchangers (source and load), and safety controls (see controls section). Refrigerant access ports shall be factory installed on high and low pressure refrigerant lines to facilitate field service. All units have factory installed bi-directional filter/

ENGINEERING SPECIFICATIONS:

drier for added moisture protection. All dual compressor models shall be complete and independent circuits with each having its own reversing valve, expansion valve, compressor and heat exchangers.

Hermetic compressors shall be internally sprung. The compressor shall have a dual level vibration isolation system. The compressor will be mounted on EPDM rubber grommets secured to a large heavy gauge compressor mounting plate, which is then mounted to the cabinet base with specially engineered sound-tested PU foam vibration isolation pads for maximized vibration attenuation. Compressor shall have thermal overload protection. Compressor discharge and suction refrigerant lines to have shock loops directly at compressor for additional vibration elimination.

Refrigerant to water heat exchangers (source and load water coils) shall be of copper inner water tube and steel refrigerant outer tube coaxial design, shall have enhanced rifled and knurled inner tube, rated to withstand 625 PSIG (4309 kPa) working refrigerant pressure and 500 PSIG (3445 kPa) working water pressure, and designed to have a low water pressure drop (max. 15ft.hd.).

Refrigerant metering shall be accomplished by thermostatic expansion valve only. Expansion valves shall be dual port balanced types with external equalizer for optimum refrigerant metering. The expansion valves must be bi-directional without the use of check valves. Units shall be designed and tested for operating ranges of entering water temperatures from 25° to 120°F (-3.9° to 48.9°C). Reversing valve shall be four-way solenoid activated refrigerant valve, which shall default to heating mode should the solenoid fail to function.

Option: The unit will be supplied with a cupronickel coaxial water to refrigerant heat exchanger (source heat exchanger only).

Option: The unit shall be supplied with a hot water generator (desuperheater) heat exchanger, which shall be double wall and vented.

ELECTRICAL:

A control box shall be located within the unit compressor compartment and shall contain a 75VA transformer, 24 volt activated, 2 or 3 pole compressor contactor, terminal block for thermostat wiring and solid-state controller for complete unit operation and control. Reversing valve wiring shall be routed through this electronic controller. Units shall be name-plated for use with time delay fuses or HACR circuit breakers. Unit controls shall be 24 Volt and provide heating or cooling as required by the remote aquastat/sensor.

Source pump high voltage terminal block including minimum 7amp circuit breaker protection to be provided for field wiring of source pumps.

A detachable low voltage thermostat terminal strip with screw terminals to be provided for field wiring.

SOLID STATE CONTROL BOARD SYSTEM:

Units shall have a solid-state control system. The control system microprocessor board shall be specifically designed to protect against building electrical system noise contamination, EMI, and RFI interference. The control system shall interface with a heat pump type 24V thermostat. The control system shall have the following features:

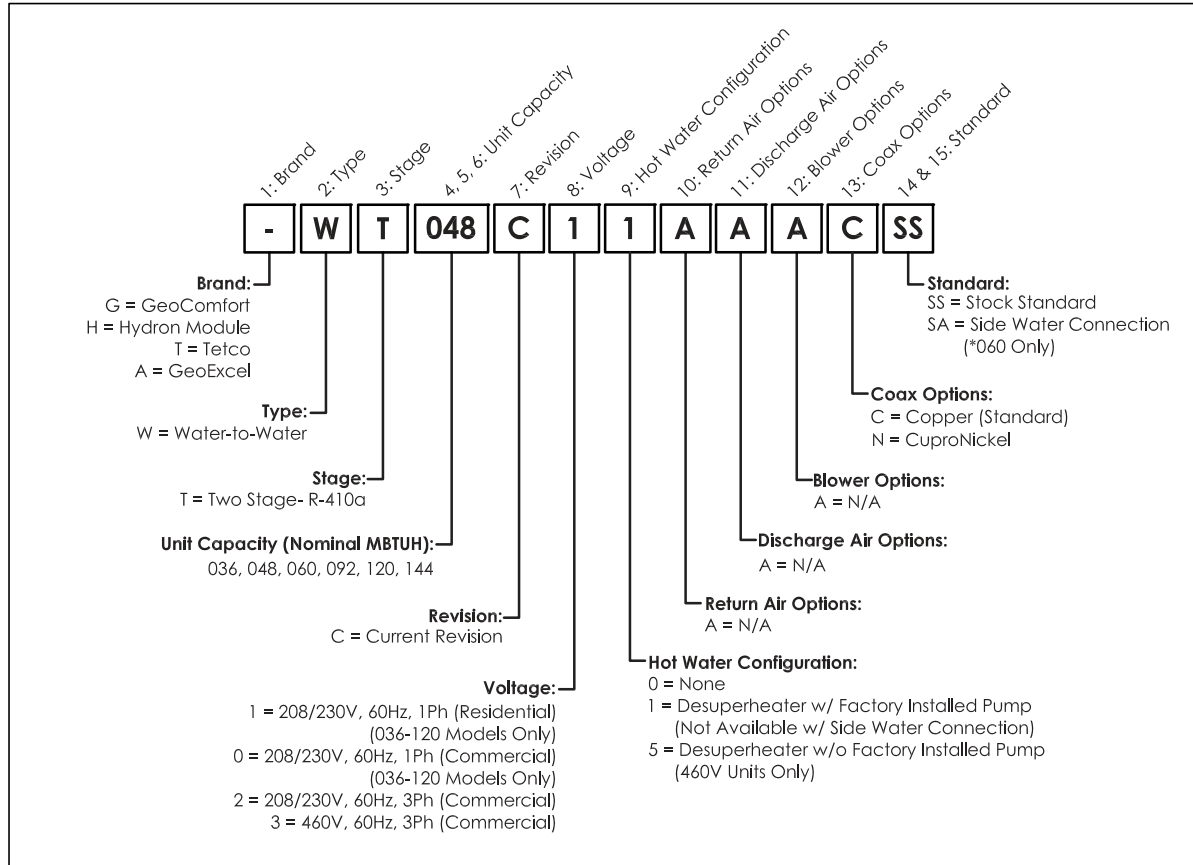
- Anti-short cycle time delay on compressor operation (5 minutes).
- Random start on power up mode.
- Low voltage protection.
- High voltage protection.
- Unit shutdown on high or low refrigerant pressures.
- Unit shutdown on low temperature (low source coil temp OR low air coil temp).
- Condensate overflow electronic protection.
- Option to reset unit at thermostat or disconnect (soft or hard reset functions)
- Fault retry logic. The same fault trip has to occur 3 times before a hard lockout. If a fault occurs 3 times sequentially without thermostat meeting temperature, then lockout requiring manual reset will occur. A soft or hard reset will restart the unit.

ENGINEERING SPECIFICATIONS:

- Ability to defeat time delays for servicing (test mode).
- Light emitting diode (LED) on circuit board to indicate high pressure, low pressure, low/high voltage, low water/air temperature, condensate overflow, high discharge gas temperature, faulty temperature sensor(s), and control voltage status.
- The low-pressure switch shall not be monitored for the first 90 seconds after a compressor start command to prevent nuisance safety trips.
- 24V output to cycle a motorized water valve or other device with compressor contactor.
- Water coil (evaporator) low temperature sensing selectable for water or anti-freeze.
- High discharge gas temperature sensing and protection.
- Smart desuperheater operation and logic to eliminate any heat transfer from the water tank to the source loop during cooling mode.

ENGINEERING SPECIFICATIONS:

MODEL NOMENCLATURE DECODER:



AHRI PERFORMANCE DATA:

MODEL	TYPE	F/L COOL	F/L EER	F/L HEAT	F/L COP	P/L COOL	P/L EER	P/L HEAT	P/L COP
WT036	GW	44,300	20.6	44,900	3.6	34,600	24.5	33,300	3.5
	GL	42,000	16.0	36,400	3.0	33,300	20.6	29,200	3.1
WT048	GW	54,300	19.8	55,100	3.6	40,800	23.0	40,500	3.4
	GL	49,400	15.1	44,100	3.0	38,800	19.2	35,700	3.1
WT060	GW	62,700	19.0	66,200	3.6	47,800	21.4	49,500	3.5
	GL	57,800	14.6	53,200	3.0	46,100	18.1	44,400	3.1
WT092	GW	107,100	19.8	117,000	3.8	78,500	22.2	82,300	3.5
	GL	100,200	15.2	92,400	3.1	75,700	18.6	75,700	3.1
WT120	GW	124,400	20.1	124,900	3.5	NA	NA	NA	NA
	GL	114,800	15.4	97,400	2.8	NA	NA	NA	NA
WT144	GW	134,000	17.2	140,800	3.3	NA	NA	NA	NA
	GL	124,500	13.5	109,400	2.7	NA	NA	NA	NA

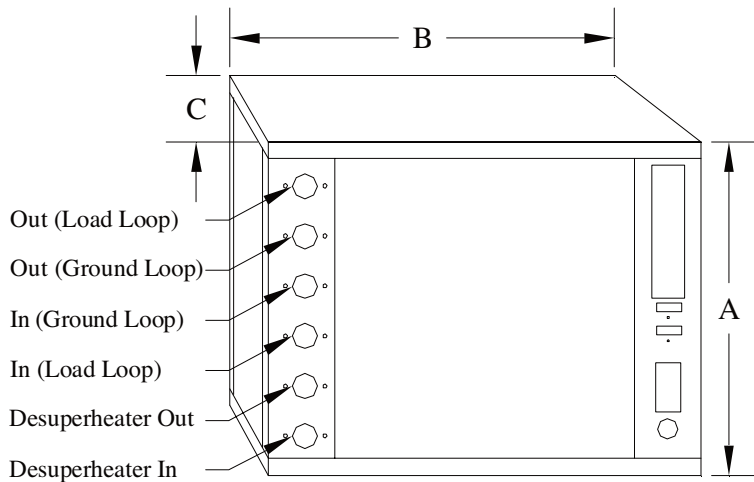
Ground Loop (GL) Notes:
 Rated in accordance with ISO Standard 13256-2 which includes Pump Penalties.
 Heating capacities based on 32°F EST & 104°F ELT.
 Cooling capacities based on 77°F EST & 53.6°F ELT.
 Entering load temperature over 120°F heating and under 45°F Cooling is not permissible.
 Floor heating is most generally designed for 85°F entering load temperature.

Ground Water (GW) Notes:
 Rated in accordance with ISO Standard 13256-2 which includes Pump Penalties.
 Heating capacities based on 50°F EST & 104°F ELT.
 Cooling capacities based on 59°F EST & 53.6°F ELT.
 Entering load temperature over 120°F heating and under 45°F Cooling is not permissible.
 Floor heating is most generally designed for 85°F entering load temperature.

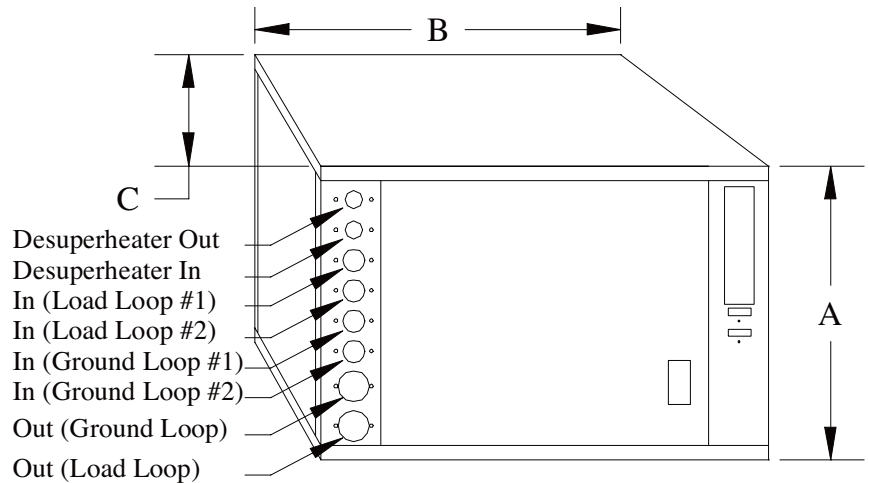
Notice:*Model 144 is available in 3-Phase Only and is outside the scope of the ENERGY STAR program and AHRI listing.

ENGINEERING SPECIFICATIONS:

UNIT DIMENSIONAL DATA, SINGLE COMPRESSOR:



UNIT DIMENSIONAL DATA, DUAL COMPRESSOR:



Single Compressor Units

Model	Dimensional Data			Source Loop**		Load Loop		Weight	Factory Charge (oz)
	A	B	C	IN	OUT	IN	OUT		
036	24	26	34	1"	1"	1"	1"	315	65
048	24	26	34	1"	1"	1"	1"	345	73
060	24	26	36	1"	1"	1"	1"	390	101

Dual Compressor Units

Model	Dimensional Data			Ground Loop		Load Loop		Weight	Factory Charge (oz)
	A	B	C	IN*	OUT	IN*	OUT		
092	24	30	48	1"	1.25"	1"	1.25"	550	68 EA
120	24	30	48	1"	1.5"	1"	1.5"	670	76 EA
144	24	30	48	1"	1.5"	1"	1.5"	670	81 EA

* There are two "IN" connections, but only one "Out" connection

** GeoComfort residential models only - 1" double o-ring fittings

ENGINEERING SPECIFICATIONS:

SINGLE COMPRESSOR UNIT ELECTRICAL DATA:

Model	Voltage Code/ HWG Option	60 Hz Power		Compressor		HWG Pump FLA	Ext. Loop Pump FLA	Total Unit FLA	Min Circuit AMPS	Max Fuse HACR	Min AWG	Max Ft
		Volts	Phase	LRA	RLA							
WT036	00	208/230	1	104.0	21.2	0.0	0.0	21.2	26.5	45	10	78
	01	208/230	1	104.0	21.2	0.5	0.0	21.7	27.0	45	10	76
	10	208/230	1	104.0	21.2	0.0	4.0	25.2	30.5	50	8	101
	11	208/230	1	104.0	21.2	0.5	4.0	25.7	31.0	50	8	99
	20	208/230	3	83.1	14.0	0.0	0.0	14.0	17.5	30	14	46
	21	208/230	3	83.1	14.0	0.5	0.0	14.5	18.0	30	14	44
	30/35	460	3	41.0	6.4	0.0	0.0	6.4	8.0	10	14	100
WT048	00	208/230	1	152.9	27.1	0.0	0.0	27.1	33.9	60	8	94
	01	208/230	1	152.9	27.1	0.5	0.0	27.6	34.4	60	8	92
	10	208/230	1	152.9	27.1	0.0	5.5	32.6	39.4	60	8	78
	11	208/230	1	152.9	27.1	0.5	5.5	33.1	39.9	60	8	77
	20	208/230	3	110.0	16.5	0.0	0.0	16.5	20.6	35	12	60
	21	208/230	3	110.0	16.5	0.5	0.0	17.0	21.1	35	12	58
	30/35	460	3	52.0	7.2	0.0	0.0	7.2	9.0	15	14	89
WT060	00	208/230	1	179.2	29.7	0.0	0.0	29.7	37.1	60	8	86
	01	208/230	1	179.2	29.7	0.5	0.0	30.2	37.6	60	8	84
	10	208/230	1	179.2	29.7	0.0	5.5	35.2	42.6	70	6	115
	11	208/230	1	179.2	29.7	0.5	5.5	35.7	43.1	70	6	114
	20	208/230	3	136.0	17.6	0.0	0.0	17.6	22.0	40	12	56
	21	208/230	3	136.0	17.6	0.5	0.0	18.1	22.5	40	12	55
	30/35	460	3	66.1	8.5	0.0	0.0	8.5	10.6	14	14	75

Notes:

1. All line and low voltage wiring must adhere to the National Electrical Code and Local Codes, whichever is the most stringent.
 2. Wire length based on a one way measurement with a 2% voltage drop.
 3. Wire size based on 60°C copper conductor and minimum circuit ampacity.
 4. All fuses class RK-5
- * The external loop pump FLA is based on a maximum of three UP26-116F-230V pumps (1/2hp) for 048 - 060 and two pumps for 034

NOTE: PROPER POWER SUPPLY EVALUATION

When any compressor bearing unit is connected to a weak power supply, starting current will generate a significant “sag” in the voltage which reduces the starting torque of the compressor motor and increases the start time. This will influence the rest of the electrical system in the building by lowering the voltage to the lights. This momentary low voltage causes “light dimming”. The total electrical system should be evaluated with an electrician and HVAC technician. The evaluation should include all connections, sizes of wires, and size of the distribution panel between the unit and the utility’s connection. The transformer connection and sizing should be evaluated by the electric utility provider.

ENGINEERING SPECIFICATIONS:

DUAL COMPRESSOR UNIT ELECTRICAL DATA:

Model	Voltage Code/ HWG Option	60 Hz Power		Compressor		HWG Pump FLA	Ext. Loop Pump FLA	Total Unit FLA	Min Circuit AMPS	Max Fuse HACR	Min AWG	Max Ft
		Volts	Phase	LRA	RLA							
WT092	00	208/230	1	152.9 ea.	27.1 ea.	0.0	0.0	54.2	61.0	80	4	119
	01	208/230	1	152.9 ea.	27.1 ea.	0.5	0.0	54.7	61.5	80	4	117
	10	208/230	1	152.9 ea.	27.1 ea.	0.0	0.0	54.2	61.0	80	4	119
	11	208/230	1	152.9 ea.	27.1 ea.	0.5	0.0	54.7	61.5	80	4	117
	20	208/230	3	110.0 ea.	16.5 ea.	0.0	0.0	33.0	37.1	50	8	77
	21	208/230	3	110.0 ea.	16.5 ea.	0.5	0.0	33.5	37.6	50	8	76
	30/35	460	3	52.0 ea.	7.2 ea.	0.0	0.0	14.4	16.2	20	14	44
WT120	00	208/230	1	178.0 ea.	28.3 ea.	0.0	0.0	56.6	63.7	90	4	113
	01	208/230	1	178.0 ea.	28.3 ea.	0.5	0.0	57.1	64.2	90	4	112
	10	208/230	1	178.0 ea.	28.3 ea.	0.0	0.0	56.6	63.7	90	4	113
	11	208/230	1	178.0 ea.	28.3 ea.	0.5	0.0	57.1	64.2	90	4	112
	20	208/230	3	136.0 ea.	19.2 ea.	0.0	0.0	38.4	43.2	60	6	106
	21	208/230	3	136.0 ea.	19.2 ea.	0.5	0.0	38.9	43.7	60	6	104
	30/35	460	3	66.1 ea.	8.7 ea.	0.0	0.0	17.4	19.6	25	14	37
WT144	20	208/230	3	149.0 ea.	22.4 ea.	0.0	0.0	44.8	50.4	70	6	91
	21	208/230	3	149.0 ea.	22.4 ea.	0.5	0.0	45.3	50.9	70	6	90
	30/35	460	3	75.0 ea.	10.6 ea.	0.0	0.0	21.2	23.9	30	12	47

Notes:

1. All line and low voltage wiring must adhere to the National Electrical Code and Local Codes, whichever is the most stringent.
2. Wire length based on a one way measurement with a 2% voltage drop.
3. Wire size based on 60°C copper conductor and minimum circuit ampacity.
4. All fuses class RK-5

* **Data for reference only. Single-Phase model no longer available.**

PHYSICAL DATA

MODEL	036	048	060	092	120	144
COMPRESSOR TYPE	Two Stage Unloading Scroll			Two Single Stage Scrolls	Dual Two Stage Scrolls	
Refrigerant Type	R 410-A					
Refrigerant Charge*	66	80	84	68 ea	76 ea	81 ea
Heat Exchanger (Source)	Copper Coaxial Tube in Tube					
Source Option	Cupro-Nickel Coaxial Tube in Tube					
Unit Weight (nominal) - lbs	315	340	385	550	670	670

*Always refer to unit data plate during maintenance or repair

ENGINEERING SPECIFICATIONS:

WATER FLOW SELECTION:

Proper flow rate is crucial for reliable operation of geothermal heat pumps. The performance data shows three flow rates for each entering water temperature (EWT column). The general "rule of thumb" when selecting flow rates is the following:

- Top flow rate: Open loop systems (1.5 to 2.0 gpm per ton)
- Middle flow rate: Minimum closed loop system flow rate (2.25 to 2.50 gpm/ton)
- Bottom flow rate: Nominal (optimum) closed loop system flow rate (3.0 gpm/ton)

Although the industry standard is adequate in most areas of North America, it is important to consider the application type before applying this "rule of thumb." Antifreeze is generally required for all closed loop (geothermal) applications. Extreme Southern U.S. locations are the only exception. Open loop (well water) systems cannot use antifreeze, and must have enough flow rate in order to avoid freezing conditions at the Leaving Source Water Temperature (LWT) connection.

Calculations must be made for all systems without antifreeze to determine if the top flow rate is adequate to prevent LWT at or near freezing conditions. The following steps should be taken in making this calculation:

- Determine minimum EWT based upon your geographical area.
- Go to the performance data table for the heat pump model selected and look up the Heat of Extraction (HE) at the "rule of thumb" water flow rate (GPM) and at the design Entering Air Temperature (EAT).
- Calculate the temperature difference (TD) based upon the HE and GPM of the model.
- $TD = HE / (GPM \times 485)$.
- Calculate the LWT.
- $LWT = EWT - TD$.
- If the LWT is below 35-38°F, there is potential for freezing conditions if the flow rate or water temperature is less than ideal conditions, and the flow rate must be increased.

Example 1:

EWT = 50°F.

Flow rate = 6 GPM.

Air Flow = 1650 CFM. HE = 36,600 Btuh.

$TD = 36,600 / (6 \times 485) = 12.6^\circ\text{F}$

$LWT = 50 - 12.6 = 37.4^\circ\text{F}$

Since the water flow is leaving at approximately 38°F, the flow rate is acceptable.

Example 2:

EWT = 40°F.

Flow rate = 6 GPM.

Air Flow = 1650 CFM. HE = 30,600 Btuh.

$TD = 30,600 / (6 \times 485) = 10.5^\circ\text{F}$

$LWT = 40 - 10.5 = 29.5^\circ\text{F}$

Water flow rate must be increased to avoid freezing.

PERFORMANCE DATA NOTES:

1. Capacity is based on 15% (by mass) methanol antifreeze solution as source water and pure water as load water (multiplier: 500).
2. Any condition outside performance table(s) requires correction factor(s).
3. Full-load performance data is accurate within $\pm 15\%$. Discharge pressure is up to ± 25 PSI; Suction pressure is up to ± 15 PSI, Subcooling is up to $\pm 5^\circ\text{F}$; Superheat is up to $\pm 6^\circ\text{F}$.
4. Unit performance test is run without hot water generation.
5. Capacity data does not include pump power and it does not reflect pump power correction for AHRI/ISO conditions.
6. Performance data is based upon the lower voltage of dual voltage rated units.
7. Interpolation of unit performance data is permissible; extrapolation is not.
8. Performance data is a result of lab testing and is not related to warranty.
9. Due to variations in installation, actual unit performance may vary from the tabulated data.
10. See Flow Rate Selection above for proper application.
11. Continuous research and development may result in a change to the current product design and specifications without notice.

ENGINEERING SPECIFICATIONS:

GLOSSARY OF TERMS:

CFM = Airflow, Cubic Feet/Minute	HR = Total Heat Of Rejection, Btu/hr
COP = Coefficient of Performance = BTU Output / BTU Input	KW = Total Power Unit Input, Kilowatts
DH = Desuperheater Capacity, Btu/hr	LAT = Leaving Air Temperature, Fahrenheit
EAT = Entering Air Temperature, Fahrenheit (Dry Bulb/Wet Bulb)	LC = Latent Cooling Capacity, Btu/hr
EER = Energy Efficiency Ratio = BTU output/Watts input	SC = Sensible Cooling Capacity, Btu/hr
EWT = Entering Source Water Temperature, Fahrenheit	LWT = Leaving Source Water Temperature, Fahrenheit
ELT = Entering Load Water Temperature, Fahrenheit	LLT = Leaving Load Water Temperature, Fahrenheit
GPM = Water Flow, Gallons Per Minute	TC = Total Cooling Capacity, Btu/hr
HC = Total Heating Capacity, Btu/hr	WPD = Water Pressure Drop, PSI & Feet of Water
HE = Total Heat Of Extraction, Btu/hr	

SENSIBLE COOLING CORRECTION FACTORS:

EAT (WB) °F	EAT (DB) °F				
	70	75	80	85	90
55	1.201	1.289			
60	0.943	1.067	1.192		
65	0.797	0.952	1.106	1.261	
67	0.624	0.812	1.000	1.188	1.343
70		0.697	0.820	0.944	1.067
75			0.637	0.817	0.983

COOLING CORRECTION FACTORS:

EAT (WB) °F	TC	HR	kW
55	0.8215	0.8293	0.8635
60	0.8955	0.9001	0.9205
65	0.9701	0.9715	0.9774
67	1.0000	1.0000	1.0000
70	1.0446	1.0425	1.0335
75	1.1179	1.1124	1.0878

HEATING & COOLING CALCULATIONS:

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

HEATING CORRECTION FACTORS:

EAT °F	HC	HE	kW
50	1.0465	1.1188	0.8024
55	1.0351	1.0918	0.8436
60	1.0253	1.0645	0.8928
65	1.0108	1.0300	0.9454
70	1.0000	1.0000	1.0000
75	0.9895	0.9701	1.0553
80	0.9742	0.9489	1.0518

ENGINEERING SPECIFICATIONS:

MODEL 048, 4 TON, FULL LOAD PERFORMANCE DATA:

EST °F	Source GPM	WPD		Heating										Cooling									
		PSI	FT	ELT °F	Load GPM	WPD		HC Mbtuh	HE Mbtuh	LLT °F	kW	COP W/W	DH Mbtuh	ELT °F	Load GPM	WPD		TC Mbtuh	HR Mbtuh	LLT °F	kW	EER	DH Mbtuh
						PSI	FT									PSI	FT						
25	12.0	4.2	9.7	85	12.0	3.6	8.4	41.1	29.8	91.9	3.32	3.63	5.4	Operation Not Recommended									
				95	3.4	7.9	40.2	27.4	101.7	3.74	3.15	5.3											
				110	3.4	7.9	38.9	23.7	116.5	4.45	2.56	5.1											
30	6.0	0.7	1.6	85	12.0	3.6	8.4	40.8	28.4	91.8	3.62	3.30	5.4										
				95	3.4	7.9	39.9	26.0	101.7	4.08	2.87	5.3											
				110	3.4	7.9	38.7	22.2	116.5	4.85	2.34	5.1											
	9.0	2.2	5.2	85	12.0	3.6	8.4	43.5	31.7	92.3	3.45	3.70	5.8										
				95	3.4	7.9	42.5	29.2	102.1	3.89	3.20	5.6											
				110	3.4	7.9	41.2	25.4	116.9	4.63	2.61	5.5											
12.0	4.0	9.2	85	12.0	3.6	8.4	44.2	32.8	92.4	3.34	3.88	5.8											
			95	3.4	7.9	43.2	30.3	102.2	3.77	3.36	5.6												
			110	3.4	7.9	41.9	26.6	117.0	4.48	2.74	5.5												
40	6.0	0.6	1.4	85	12.0	3.6	8.4	46.9	34.4	92.8	3.99	3.77	6.1		40								
				95	3.4	7.9	45.8	31.7	102.6	3.99	3.26	6.4	45										
				110	3.4	7.9	44.4	27.7	117.4	3.99	2.66	6.3	50										
	9.0	2.0	4.6	85	12.0	3.6	8.4	49.9	38.0	93.3	3.48	4.20	6.5		40								
				95	3.4	7.9	48.8	35.4	103.1	3.93	3.64	6.5	45										
				110	3.4	7.9	47.3	31.4	117.9	4.67	2.97	6.5	50										
	12.0	3.6	8.3	85	12.0	3.6	8.4	50.7	39.2	93.5	3.38	4.40	6.5		40								
				95	3.4	7.9	49.6	36.6	103.3	3.80	3.83	6.8	45										
				110	3.4	7.9	48.0	32.6	118.0	4.52	3.11	6.6	50										
50	6.0	0.6	1.3	85	12.0	3.6	8.4	53.1	40.5	93.9	3.69	4.22	7.1		40								
				95	3.4	7.9	51.9	37.7	103.7	4.16	3.66	6.9	45										
				110	3.4	7.9	50.3	33.4	118.4	4.95	2.98	6.7	50										
	9.0	1.8	4.2	85	12.0	3.6	8.4	56.6	44.6	94.4	3.52	4.71	7.5		40								
				95	3.4	7.9	55.3	41.8	104.2	3.97	4.08	7.2	45										
				110	3.4	7.9	53.6	37.5	118.9	4.72	3.33	7.1	50										
	12.0	3.2	7.5	85	12.0	3.6	8.4	57.4	45.8	94.6	3.41	4.93	7.5		40								
				95	3.4	7.9	56.1	43.0	104.4	3.85	4.27	7.4	45										
				110	3.4	7.9	54.4	38.8	119.1	4.57	3.49	7.1	50										
60	6.0	0.5	1.2	85	12.0	3.6	8.4	59.5	46.7	94.9	3.75	4.65	7.8	40									
				95	3.4	7.9	58.1	43.7	104.7	4.22	4.03	8.0	45										
				110	3.4	7.9	56.3	39.2	119.4	5.02	3.29	7.9	50										
	9.0	1.7	3.9	85	12.0	3.6	8.4	63.4	51.2	95.6	3.58	5.19	8.2	40									
				95	3.4	7.9	61.9	48.1	105.3	4.03	4.50	8.3	45										
				110	3.4	7.9	60.0	43.7	120.0	4.79	3.67	8.1	50										
	12.0	3.0	6.9	85	12.0	3.6	8.4	64.4	52.6	95.7	3.46	5.45	8.3	40									
				95	3.4	7.9	62.9	49.6	105.5	3.90	4.73	8.5	45										
				110	3.4	7.9	61.0	45.2	120.2	4.64	3.85	8.4	50										
70	6.0	0.5	1.2	85	12.0	3.6	8.4	66.3	53.3	96.1	3.82	5.09	8.8	40									
				95	3.4	7.9	64.8	50.1	105.8	4.30	4.42	8.4	45										
				110	3.4	7.9	62.8	45.3	120.5	5.12	3.59	8.3	50										
	9.0	1.6	3.8	85	12.0	3.6	8.4	70.7	58.3	96.8	3.64	5.69	9.2	40									
				95	3.4	7.9	69.1	55.1	106.5	4.11	4.93	9.0	45										
				110	3.4	7.9	66.9	50.2	121.2	4.88	4.02	8.7	50										
	12.0	2.9	6.8	85	12.0	3.6	8.4	71.8	59.8	97.0	3.53	5.96	9.4	40									
				95	3.4	7.9	70.1	56.5	106.7	3.98	5.16	9.1	45										
				110	3.4	7.9	68.0	51.9	121.3	4.73	4.21	8.9	50										
80	6.0	0.5	1.2	85	12.0	3.6	8.4	73.6	60.3	97.3	3.89	5.55	9.6	40									
				95	3.4	7.9	72.0	57.0	107.0	4.39	4.81	9.9	45										
				110	3.4	7.9	69.7	51.9	121.6	5.22	3.91	9.8	50										
	9.0	1.7	3.9	85	12.0	3.6	8.4	78.5	65.8	98.1	3.72	6.18	10.2	40									
				95	3.4	7.9	76.7	62.4	107.8	4.19	5.36	10.4	45										
				110	3.4	7.9	74.3	57.3	122.4	4.98	4.37	10.2	50										
	12.0	3.0	7.0	85	12.0	3.6	8.4	79.7	67.4	98.3	3.60	6.49	10.3	40									
				95	3.4	7.9	77.9	64.0	108.0	4.06	5.62	10.6	45										
				110	3.4	7.9	75.5	59.1	122.6	4.82	4.59	10.4	50										
90	6.0	0.6	1.3	85	12.0	3.6	8.4	81.1	67.5	98.5	3.98	5.97	10.9	40									
				95	3.4	7.9	79.3	64.0	108.2	4.48	5.19	10.6	45										
				110	3.4	7.9	76.8	58.6	122.8	5.33	4.22	10.3	50										
	9.0	1.8	4.1	85	12.0	3.6	8.4	86.5	73.6	99.4	3.79	6.69	11.6	40									
				95	3.4	7.9	84.5	69.9	109.1	4.28	5.79	11.3	45										
				110	3.4	7.9	81.9	64.5	123.7	5.09	4.72	11.0	50										
	12.0	3.2	7.4	85	12.0	3.6	8.4	87.8	75.3	99.6	3.67	7.01	11.7	40									
				95	3.4	7.9	85.8	71.7	109.3	4.14	6.07	11.5	45										
				110	3.4	7.9	83.1	66.3	123.9	4.93	4.94	11.1	50										
110	6.0	0.6	1.4	40	Operation Not Recommended																		
				45																			
				50																			
	9.0	1.9	4.4	40																			
				45																			
				50																			
12.0	3.4	7.9	40																				
			45																				
			50																				

ENGINEERING SPECIFICATIONS:

MODEL 060, 5 TON PART LOAD PERFORMANCE DATA:

EST °F	Source GPM	WPD		ELT °F	Load GPM	Heating								ELT °F	Load GPM	Cooling																									
		PSI	FT			PSI	FT	HC Mbtuh	HE Mbtuh	LLT °F	kW	COP W/W	DH Mbtuh			TC Mbtuh	HR Mbtuh	LLT °F	kW	EER	DH Mbtuh																				
																						Operation Not Recommended																			
25	12.0	5.4	12.5	85	12.0	3.2	7.5	36.4	25.4	91.1	3.22	3.31	4.8																												
				95		3.0	7.0	35.3	22.7	100.9	3.68	2.81	4.7																												
				110		2.2	5.1	34.2	18.8	115.7	4.50	2.23	4.5																												
	30	6.0	1.6	3.6	85	12.0	3.2	7.5	35.7	23.9	91.0	3.46	3.02	4.7																											
					95		3.0	7.0	34.6	21.1	100.8	3.96	2.56	4.6																											
					110		2.2	5.1	33.5	17.0	115.6	4.84	2.03	4.4																											

ENGINEERING SPECIFICATIONS:

MODEL 092, 8 TON, FULL LOAD COOLING PERFORMANCE DATA:

Source Water				Load Water					Cooling										
EST °F	Flow GPM	WPD		LST °F	ELT °F	Flow GPM	WPD		LLT °F	TC MBtuh	HR MBtuh	kW	EER Btuh/W	Discharge PSIG	Suction PSIG	Subcooling °F	Superheat °F		
		PSID	FT				PSID	FT											
40	12.0	1.3	2.9	57.7	40	24.0	4.0	9.3	32.5	89.6	103.3	4.02	22.3	182.3	81.4	13.2	3.5		
				59.0	45		3.9	9.1	36.9	96.6	110.5	4.05	23.8	182.3	87.8	13.1	3.3		
				60.3	50		3.9	8.9	41.3	104.0	117.9	4.09	25.4	182.3	94.6	13.0	3.0		
	18.0	2.6	6.0	52.8	40		4.0	9.3	31.8	98.5	111.6	3.86	25.5	171.6	87.5	10.1	3.0		
				53.7	45		3.9	9.1	36.2	106.2	119.5	3.89	27.3	171.6	94.4	10.0	3.1		
				54.6	50		3.9	8.9	40.5	114.2	127.6	3.92	29.1	171.6	101.7	9.9	3.2		
	24.0	4.4	10.1	49.7	40		4.0	9.3	31.6	100.2	112.9	3.72	27.0	166.1	88.0	8.6	4.7		
				50.4	45		3.9	9.1	36.0	108.1	120.9	3.75	28.8	166.1	95.0	8.5	5.0		
				51.1	50		3.9	8.9	40.3	116.2	129.2	3.78	30.7	166.1	102.3	8.4	5.3		
	50	12.0	1.2	2.8	67.2		40	24.0	4.0	9.3	33.1	83.1	100.2	5.01	16.6	231.6	78.9	23.5	5.8
					68.4		45		3.9	9.1	37.5	89.6	106.8	5.05	17.7	231.6	85.2	23.4	5.7
					69.6		50		3.8	8.9	42.0	96.4	113.8	5.09	18.9	231.6	91.8	23.2	5.6
18.0		2.5	5.8	62.3	40	4.0	9.3		32.4	91.3	107.7	4.81	19.0	218.1	84.8	19.8	5.4		
				63.2	45	3.9	9.1		36.8	98.5	115.0	4.85	20.3	218.1	91.5	19.8	5.6		
				64.0	50	3.9	8.9		41.2	105.9	122.6	4.89	21.7	218.1	98.6	19.6	5.8		
24.0		4.2	9.6	59.3	40	4.0	9.3		32.3	92.9	108.8	4.63	20.1	211.0	85.4	18.1	7.2		
				60.0	45	3.9	9.1		36.6	100.2	116.2	4.68	21.4	211.0	92.1	18.0	7.6		
				60.6	50	3.9	8.9		41.0	107.8	123.9	4.71	22.9	211.0	99.2	17.9	8.1		
60		12.0	1.2	2.7	77.2	40	24.0		4.0	9.3	33.2	81.0	99.9	5.52	14.7	261.0	80.2	22.2	5.5
					78.3	45			3.9	9.1	37.7	87.4	106.4	5.57	15.7	261.0	86.5	22.0	5.4
					79.4	50			3.8	8.9	42.2	94.0	113.1	5.61	16.7	261.0	93.2	21.9	5.3
	18.0	2.4	5.6	72.3	40	4.0		9.3	32.6	89.0	107.1	5.30	16.8	245.7	86.1	18.3	5.1		
				73.1	45	3.9		9.1	37.0	96.0	114.2	5.34	18.0	245.7	92.9	18.2	5.4		
				73.9	50	3.9		8.9	41.4	103.3	121.6	5.39	19.2	245.7	100.2	18.1	5.6		
	24.0	4.0	9.3	69.3	40	4.0		9.3	32.5	90.6	108.0	5.11	17.7	237.8	86.7	16.5	6.9		
				69.9	45	3.9		9.1	36.9	97.7	115.3	5.15	19.0	237.8	93.5	16.4	7.4		
				70.5	50	3.9		8.9	41.2	105.1	122.8	5.20	20.2	237.8	100.8	16.2	7.9		
	70	12.0	1.2	2.7	87.0	40		24.0	4.0	9.3	33.5	78.4	99.2	6.08	12.9	292.3	81.0	21.3	5.5
					88.1	45			3.9	9.1	38.0	84.6	105.5	6.13	13.8	292.3	87.4	21.2	5.4
					89.2	50			3.8	8.9	42.4	91.0	112.0	6.18	14.7	292.3	94.1	21.0	5.4
18.0		2.4	5.4	82.2	40	4.0	9.3		32.8	86.2	106.1	5.83	14.8	275.2	87.0	17.4	5.1		
				82.9	45	3.9	9.1		37.3	92.9	113.0	5.89	15.8	275.2	93.9	17.3	5.5		
				83.8	50	3.9	8.9		41.7	99.9	120.2	5.93	16.9	275.2	101.1	17.1	5.8		
24.0		3.9	9.0	79.2	40	4.0	9.3		32.7	87.7	106.9	5.63	15.6	266.4	87.6	15.5	6.9		
				79.8	45	3.9	9.1		37.1	94.6	113.9	5.68	16.7	266.4	94.5	15.4	7.5		
				80.4	50	3.9	8.9		41.5	101.7	121.2	5.72	17.8	266.4	101.8	15.2	8.1		
80		12.0	1.1	2.6	96.8	40	24.0		4.0	9.2	33.8	74.6	98.0	6.86	10.9	332.6	81.3	22.7	5.8
					97.9	45			3.9	9.1	38.3	80.5	104.1	6.92	11.6	332.6	87.7	22.6	5.8
					99.0	50			3.8	8.9	42.8	86.6	110.4	6.98	12.4	332.6	94.5	22.4	5.9
	18.0	2.3	5.3	92.0	40	4.0		9.3	33.2	82.0	104.5	6.59	12.5	313.1	87.3	18.8	5.5		
				92.7	45	3.9		9.1	37.6	88.4	111.1	6.65	13.3	313.1	94.2	18.7	5.9		
				93.5	50	3.9		8.9	42.1	95.1	118.0	6.70	14.2	313.1	101.5	18.5	6.3		
	24.0	3.8	8.9	89.0	40	4.0		9.3	33.0	83.5	105.1	6.35	13.1	303.0	87.9	17.0	7.4		
				89.6	45	3.9		9.1	37.5	90.0	111.8	6.41	14.0	303.0	94.8	16.9	8.0		
				90.2	50	3.9		8.9	41.9	96.8	118.8	6.46	15.0	303.0	102.2	16.6	8.7		
	90	12.0	1.1	2.6	106.8	40		24.0	4.0	9.2	34.1	70.8	97.6	7.85	9.0	372.5	82.6	22.2	5.5
					107.8	45			3.9	9.1	38.6	76.4	103.4	7.92	9.7	375.8	89.1	22.6	5.5
					108.8	50			3.8	8.9	43.2	82.1	109.4	7.98	10.3	379.3	96.0	23.0	5.6
18.0		2.3	5.3	101.9	40	4.0	9.3		33.5	77.8	103.5	7.53	10.3	350.7	88.7	18.5	5.2		
				102.6	45	3.9	9.1		38.0	83.9	109.8	7.60	11.0	353.8	95.7	19.0	5.7		
				103.3	50	3.9	8.9		42.5	90.3	116.4	7.66	11.8	357.1	103.1	19.4	6.1		
24.0		3.8	8.8	98.9	40	4.0	9.3		33.4	79.2	104.0	7.26	10.9	339.4	89.3	16.8	7.1		
				99.5	45	3.9	9.1		37.9	85.4	110.4	7.33	11.7	342.4	96.3	17.2	7.8		
				100.1	50	3.9	8.9		42.3	91.9	117.1	7.39	12.4	345.6	103.8	17.7	8.5		
110		12.0	1.2	2.7	126.8	40	24.0		4.0	9.2	34.7	63.4	97.6	10.04	6.3	475.4	87.0	20.4	3.8
					127.7	45			3.9	9.1	39.3	68.3	102.9	10.13	6.7	479.6	93.8	20.9	3.9
					128.6	50			3.8	8.9	43.9	73.5	108.3	10.21	7.2	484.1	101.1	21.3	4.1
	18.0	2.4	5.4	121.7	40	4.0		9.3	34.2	69.6	102.5	9.64	7.2	447.6	93.4	16.4	3.6		
				122.4	45	3.9		9.1	38.7	75.1	108.3	9.72	7.7	451.5	100.8	16.9	4.1		
				123.1	50	3.8		8.9	43.3	80.8	114.2	9.80	8.2	455.7	108.6	17.2	4.6		
	24.0	3.9	9.0	118.8	40	4.0		9.3	34.1	70.9	102.6	9.30	7.6	433.2	94.0	14.8	5.5		
				119.3	45	3.9		9.1	38.6	76.4	108.4	9.38	8.2	437.0	101.5	15.2	6.3		
				119.8	50	3.8		8.9	43.2	82.2	114.4	9.45	8.7	441.1	109.3	15.6	7.1		

ENGINEERING SPECIFICATIONS:

MODEL 120, 10 TON, FULL LOAD COOLING PERFORMANCE DATA:

Source Water				Load Water						Cooling									
EST °F	Flow GPM	WPD		LST °F	ELT °F	Flow GPM	WPD		LLT °F	TC MBtuh	HR MBtuh	kW	EER Btuh/W	Discharge PSIG	Suction PSIG	Subcooling °F	Superheat °F		
		PSID	FT				PSID	FT											
40	15.0	2.0	4.5	54.7	40	30.0	6.1	14.1	33.9	91.5	106.7	4.44	20.6	181.9	66.5	19.1	15.5		
				55.7	45		6.0	13.8	38.4	99.0	114.3	4.47	22.2	181.9	72.3	19.0	15.4		
				56.8	50		5.9	13.5	42.9	106.8	122.1	4.50	23.7	181.9	78.2	18.8	15.5		
	22.5	4.0	9.3	50.2	40		6.1	14.1	33.5	96.9	111.2	4.20	23.1	172.4	71.0	16.3	15.1		
				50.9	45		6.0	13.8	38.0	104.9	119.3	4.23	24.8	172.4	77.2	16.1	15.3		
				51.7	50		5.9	13.6	42.5	113.0	127.6	4.26	26.5	172.4	83.5	15.9	15.7		
	30.0	6.7	15.5	47.9	40		6.1	14.1	33.3	100.6	114.6	4.11	24.5	167.4	73.3	14.7	15.4		
				48.4	45		6.0	13.8	37.7	108.8	122.9	4.13	26.3	167.4	79.6	14.6	15.8		
				49.0	50		5.9	13.6	42.2	117.3	131.5	4.17	28.2	167.4	86.2	14.4	16.4		
	50	15.0	1.9	4.4	64.7		40	30.0	6.1	14.1	34.0	90.1	107.3	5.05	17.8	213.1	73.3	19.4	10.6
					65.8		45		6.0	13.8	38.5	97.4	114.8	5.08	19.2	213.1	79.7	19.1	10.4
					66.8		50		5.9	13.5	43.0	105.0	122.5	5.12	20.5	213.1	86.2	18.9	10.5
22.5		3.9	8.9	60.2	40	6.1	14.1		33.6	95.3	111.6	4.78	20.0	201.9	78.2	16.2	10.2		
				61.0	45	6.0	13.8		38.1	103.1	119.5	4.80	21.5	201.9	85.1	16.0	10.3		
				61.7	50	5.9	13.5		42.6	111.2	127.7	4.84	23.0	201.9	92.0	15.8	10.6		
30.0		6.4	14.8	57.9	40	6.1	14.1		33.4	98.9	114.9	4.67	21.2	196.0	80.8	14.6	10.5		
				58.5	45	6.0	13.8		37.9	107.0	123.1	4.70	22.8	196.0	87.8	14.4	10.7		
				59.0	50	5.9	13.5		42.3	115.4	131.5	4.73	24.4	196.0	95.0	14.1	11.3		
60		15.0	1.8	4.2	74.8	40	30.0		6.1	14.1	34.1	88.0	107.7	5.76	15.3	247.7	75.8	19.9	9.1
					75.8	45			6.0	13.8	38.7	95.2	115.0	5.80	16.4	247.7	82.4	19.7	8.9
					76.8	50			5.9	13.5	43.2	102.6	122.5	5.84	17.6	247.7	89.2	19.4	8.9
	22.5	3.7	8.6	70.2	40	6.1		14.1	33.8	93.1	111.7	5.45	17.1	234.8	80.9	16.5	8.7		
				71.0	45	6.0		13.8	38.3	100.8	119.5	5.48	18.4	234.8	88.0	16.3	8.7		
				71.7	50	5.9		13.5	42.8	108.6	127.5	5.53	19.7	234.8	95.2	16.0	9.0		
	30.0	6.2	14.3	67.9	40	6.1		14.1	33.6	96.6	114.8	5.33	18.1	227.9	83.6	14.7	8.9		
				68.4	45	6.0		13.8	38.0	104.6	122.9	5.36	19.5	227.9	90.8	14.5	9.2		
				69.0	50	5.9		13.5	42.5	112.7	131.2	5.41	20.9	227.9	98.3	14.2	9.7		
	70	15.0	1.8	4.1	84.8	40		30.0	6.1	14.1	34.3	85.3	107.8	6.59	13.0	285.9	76.7	20.6	8.8
					85.8	45			6.0	13.8	38.8	92.3	115.0	6.63	13.9	285.9	83.3	20.3	8.6
					86.8	50			5.9	13.5	43.4	99.5	122.3	6.68	14.9	285.9	90.2	20.0	8.6
22.5		3.6	8.4	80.2	40	6.1	14.1		34.0	90.3	111.6	6.23	14.5	271.0	81.8	17.0	8.3		
				80.9	45	6.0	13.8		38.5	97.7	119.1	6.27	15.6	271.0	88.9	16.7	8.4		
				81.6	50	5.9	13.5		43.0	105.4	126.9	6.32	16.7	271.0	96.2	16.4	8.7		
30.0		6.0	13.9	77.9	40	6.1	14.1		33.8	93.7	114.5	6.10	15.4	263.0	84.5	15.1	8.6		
				78.4	45	6.0	13.8		38.2	101.4	122.4	6.13	16.5	263.0	91.8	14.8	8.9		
				79.0	50	5.9	13.5		42.7	109.3	130.4	6.18	17.7	263.0	99.4	14.5	9.5		
80		15.0	1.8	4.0	94.8	40	30.0		6.1	14.1	34.5	82.1	107.8	7.52	10.9	327.6	77.5	20.8	8.5
					95.8	45			6.0	13.8	39.1	88.8	114.7	7.57	11.7	327.6	84.2	20.5	8.3
					96.7	50			5.9	13.5	43.6	95.8	121.8	7.63	12.6	327.6	91.1	20.2	8.4
	22.5	3.6	8.2	90.2	40	6.1		14.1	34.2	86.9	111.2	7.12	12.2	310.4	82.7	17.3	8.1		
				90.9	45	6.0		13.8	38.7	94.1	118.5	7.16	13.1	310.4	89.9	17.0	8.2		
				91.5	50	5.9		13.5	43.2	101.4	126.0	7.21	14.1	310.4	97.2	16.6	8.5		
	30.0	5.9	13.6	87.8	40	6.1		14.1	34.0	90.2	114.0	6.96	13.0	301.3	85.3	15.4	8.4		
				88.4	45	6.0		13.8	38.5	97.6	121.5	7.00	13.9	301.3	92.8	15.1	8.7		
				88.9	50	5.9		13.5	43.0	105.2	129.3	7.06	14.9	301.3	100.4	14.8	9.2		
	90	15.0	1.7	4.0	104.8	40		30.0	6.1	14.1	34.8	78.3	107.6	8.57	9.1	365.5	78.9	19.0	7.8
					105.7	45			6.0	13.8	39.4	84.7	114.1	8.62	9.8	365.5	85.8	19.2	7.7
					106.6	50			5.9	13.5	43.9	91.3	121.0	8.68	10.5	371.8	92.8	19.4	7.7
22.5		3.6	8.2	100.1	40	6.1	14.1		34.5	82.9	110.6	8.10	10.2	346.4	84.2	15.6	7.4		
				100.8	45	6.0	13.8		39.0	89.7	117.5	8.15	11.0	349.2	91.6	15.8	7.5		
				101.4	50	5.9	13.5		43.6	96.7	124.7	8.21	11.8	352.4	99.1	16.1	7.9		
30.0		5.9	13.6	97.8	40	6.1	14.1		34.3	86.0	113.1	7.93	10.9	336.2	86.9	13.8	7.7		
				98.3	45	6.0	13.8		38.8	93.1	120.3	7.97	11.7	339.0	94.5	14.0	8.0		
				98.8	50	5.9	13.5		43.3	100.3	127.7	8.03	12.5	342.1	102.3	14.3	8.6		
110		15.0	1.8	4.1	124.6	40	30.0		6.1	14.1	35.4	69.0	106.5	10.99	6.3	464.4	82.1	16.4	7.1
					125.4	45			6.0	13.8	40.0	74.6	112.3	11.05	6.8	468.2	89.3	16.6	7.1
					126.3	50			5.9	13.5	44.6	80.4	118.4	11.13	7.2	472.5	96.6	16.8	7.2
	22.5	3.6	8.4	119.9	40	6.1		14.1	35.1	73.0	108.5	10.39	7.0	440.1	87.7	12.9	6.8		
				120.5	45	6.0		13.8	39.7	79.0	114.7	10.45	7.6	443.7	95.3	13.0	7.0		
				121.1	50	5.9		13.5	44.3	85.2	121.1	10.53	8.1	447.7	103.1	13.2	7.5		
	30.0	6.0	13.8	117.6	40	6.1		14.1	34.9	75.8	110.5	10.16	7.5	427.2	90.5	11.1	7.1		
				118.0	45	6.0		13.8	39.5	82.0	116.9	10.22	8.0	430.7	98.4	11.3	7.6		
				118.5	50	5.9		13.5	44.1	88.4	123.5	10.30	8.6	434.6	106.5	11.4	8.3		

ENGINEERING SPECIFICATIONS:

MODEL 144, 12 TON, PART LOAD PERFORMANCE DATA:

EST	GPM	PSI	FT	Heating							Cooling						
				ELT	HC	HE	KW	LLT	COP	DH	ELT	TC	HR	KW	LLT	EER	DH
30	10.0	2.2	5.0	85	58.8	42.2	5.13	96.7	3.36	7.3	Operation Not Recommended						
				95	57.1	39.7	5.40	106.4	3.10	7.5							
				110	55.3	37.4	5.66	121.0	2.86	7.8							
	14.0	4.0	9.3	85	60.5	44.0	5.18	93.7	3.42	7.5							
				95	58.9	41.3	5.46	103.4	3.16	7.8							
				110	57.3	38.9	5.73	118.2	2.93	8.0							
	18.0	6.5	15.0	85	61.3	44.8	5.18	91.8	3.47	7.6							
				95	59.7	42.3	5.45	101.6	3.21	7.9							
				110	58.1	39.7	5.73	116.5	2.97	8.2							
50	10.0	2.0	4.7	85	76.0	58.9	5.37	100.2	4.15	9.5	40	61.9	72.8	3.57	27.6	17.3	5.2
				95	73.7	55.4	5.66	109.7	3.82	9.7	45	67.2	77.5	3.65	31.6	18.4	5.3
				110	71.2	52.2	5.93	124.2	3.52	10.0	50	72.6	82.1	3.73	35.5	19.5	5.5
	14.0	3.7	8.6	85	79.2	61.7	5.48	96.3	4.24	9.9	40	62.5	73.1	3.41	31.1	18.3	5.0
				95	76.6	58.2	5.77	106.0	3.89	10.1	45	67.9	77.7	3.48	35.3	19.5	5.1
				110	74.2	54.6	6.06	120.6	3.58	10.4	50	73.3	82.4	3.55	39.5	20.6	5.2
	18.0	6.0	14.0	85	80.8	63.3	5.50	94.0	4.31	10.1	40	63.1	73.5	3.31	33.0	19.1	4.7
				95	78.2	59.7	5.79	103.7	3.96	10.3	45	68.6	78.2	3.38	37.4	20.3	4.8
				110	75.6	56.1	6.09	118.4	3.64	10.6	50	74.1	82.8	3.45	41.8	21.5	5.0
70	10.0	2.0	4.7	85	92.5	74.3	5.71	103.5	4.75	11.5	40	58.0	70.9	4.29	28.4	13.5	7.5
				95	89.2	70.1	6.01	112.8	4.35	11.8	45	63.0	75.4	4.39	32.4	14.3	7.7
				110	85.9	65.8	6.30	127.2	4.00	12.1	50	68.1	80.0	4.47	36.4	15.3	8.0
	14.0	3.6	8.3	85	97.1	78.3	5.88	98.9	4.84	12.1	40	58.9	71.2	4.09	31.6	14.4	7.2
				95	93.7	73.8	6.19	108.4	4.44	12.4	45	64.0	75.8	4.17	35.8	15.3	7.5
				110	90.2	69.4	6.51	122.9	4.06	12.7	50	69.1	80.4	4.25	40.1	16.2	7.6
	18.0	5.8	13.3	85	99.7	80.7	5.95	96.1	4.92	12.4	40	59.4	71.6	3.96	33.4	15.0	6.9
				95	96.1	76.1	6.26	105.7	4.50	12.7	45	64.7	76.2	4.04	37.8	16.0	7.1
				110	92.5	71.5	6.57	120.3	4.13	13.0	50	69.8	80.6	4.13	42.2	16.9	7.4
90	10.0	1.9	4.3	85	106.6	87.6	5.67	106.3	5.52	13.3	40	52.8	68.2	5.31	29.4	9.9	9.9
				95	102.7	82.5	6.41	115.5	4.70	13.6	45	57.4	72.6	5.41	33.5	10.6	10.2
				110	98.8	77.6	6.59	129.7	4.39	13.9	50	62.0	77.0	5.50	37.6	11.3	10.4
	14.0	3.3	7.7	85	112.7	92.9	6.22	101.1	5.31	14.0	40	53.8	68.6	4.99	32.3	10.8	9.5
				95	108.6	87.6	6.55	110.5	4.86	14.4	45	58.5	73.0	5.12	36.6	11.4	9.8
				110	104.3	82.4	6.88	124.9	4.45	14.6	50	63.3	77.3	5.19	41.0	12.2	10.0
	18.0	5.3	12.3	85	116.5	96.1	6.32	97.9	5.40	14.5	40	54.5	68.7	4.87	33.9	11.2	9.1
				95	112.0	90.7	6.64	107.4	4.94	14.8	45	59.2	73.1	4.96	38.4	11.9	9.4
				110	107.6	85.3	6.98	122.0	4.52	15.1	50	63.9	77.5	5.07	42.9	12.6	9.7
110	10.0	1.8	4.2	Operation Not Recommended							40	46.0	64.9	6.61	30.8	7.0	12.2
											45	50.0	69.1	6.70	35.0	7.5	12.6
	50	54.1	73.2								6.87	39.2	7.9	13.0			
	40	47.2	65.2								6.19	33.3	7.6	11.8			
	45	51.4	69.3								6.33	37.6	8.1	12.2			
	50	55.5	73.5								6.50	42.1	8.5	12.4			
14.0	3.3	7.7	Operation Not Recommended							40	47.7	65.2	6.06	34.7	7.9	11.3	
										45	51.9	69.3	6.14	39.2	8.5	11.7	
18.0	5.3	12.1	Operation Not Recommended							50	56.0	73.5	6.25	43.8	9.0	12.1	
Operation Not Recommended										45	51.9	69.3	6.14	39.2	8.5	11.7	

ENGINEERING SPECIFICATIONS:

MODEL 144, 12 TON, FULL LOAD PERFORMANCE DATA:

EST	GPM	PSI	FT	Heating							Cooling						
				ELT	HC	HE	KW	LLT	COP	DH	ELT	TC	HR	KW	LLT	EER	DH
30	17.8	2.3	5.4	85	117.5	84.3	10.26	98.2	3.36	14.6	Operation Not Recommended						
				95	114.2	79.4	10.81	107.8	3.10	15.1							
				110	110.6	74.8	11.33	122.4	2.86	15.5							
	24.9	4.4	10.1	85	121.1	87.9	10.37	94.7	3.42	15.1							
				95	117.7	82.7	10.92	104.5	3.16	15.6							
				110	114.5	77.8	11.47	119.2	2.93	16.1							
	32.0	7.0	16.2	85	122.6	89.6	10.36	92.7	3.47	15.3							
				95	119.4	84.7	10.91	102.5	3.21	15.8							
				110	116.2	79.4	11.45	117.3	2.97	16.3							
50	17.8	2.2	5.0	85	152.0	117.8	10.75	102.1	4.15	18.9	40	123.7	145.7	7.14	26.1	17.3	10.4
				95	147.5	110.9	11.32	111.6	3.82	19.5	45	134.4	155.1	7.30	29.9	18.4	10.7
				110	142.5	104.3	11.87	126.0	3.52	20.0	50	145.1	164.3	7.45	33.7	19.5	10.9
	24.9	4.1	9.4	85	158.5	123.4	10.95	97.7	4.24	19.7	40	125.0	146.2	6.82	29.9	18.3	9.9
				95	153.2	116.5	11.54	107.3	3.89	20.3	45	135.7	155.4	6.97	34.1	19.5	10.2
				110	148.3	109.3	12.13	121.9	3.58	20.8	50	146.7	164.8	7.11	38.2	20.6	10.4
	32.0	6.6	15.1	85	161.7	126.6	11.01	95.1	4.31	20.1	40	126.3	146.9	6.62	32.1	19.1	9.4
				95	156.5	119.4	11.59	104.8	3.96	20.7	45	137.2	156.4	6.76	36.4	20.3	9.7
				110	151.2	112.2	12.17	119.4	3.64	21.2	50	148.2	165.6	6.90	40.7	21.5	9.9
70	17.8	2.2	5.0	85	185.0	148.6	11.42	105.8	4.75	23.0	40	116.1	141.8	8.59	27.0	13.5	15.0
				95	178.4	140.1	12.01	115.1	4.35	23.6	45	126.0	150.8	8.79	30.8	14.3	15.5
				110	171.8	131.6	12.60	129.3	4.00	24.1	50	136.2	159.9	8.93	34.7	15.3	16.0
	24.9	3.9	9.0	85	194.2	156.5	11.76	100.6	4.84	24.2	40	117.9	142.3	8.17	30.5	14.4	14.5
				95	187.3	147.6	12.37	110.1	4.44	24.8	45	128.1	151.5	8.35	34.7	15.3	15.0
				110	180.5	138.7	13.02	124.5	4.06	25.3	50	138.3	160.7	8.51	38.9	16.2	15.2
	32.0	6.2	14.4	85	199.5	161.4	11.89	97.5	4.92	24.8	40	118.9	143.1	7.92	32.6	15.0	13.7
				95	192.3	152.2	12.51	107.0	4.50	25.4	45	129.3	152.3	8.08	36.9	16.0	14.2
				110	185.1	143.1	13.14	121.6	4.13	26.0	50	139.5	161.2	8.25	41.3	16.9	14.7
90	17.8	2.0	4.7	85	213.3	175.2	11.33	109.0	5.52	26.6	40	105.6	136.5	10.62	28.1	9.9	19.8
				95	205.4	165.0	12.82	118.1	4.70	27.2	45	114.8	145.1	10.82	32.1	10.6	20.3
				110	197.5	155.2	13.19	132.2	4.39	27.7	50	124.0	154.1	11.00	36.1	11.3	20.8
	24.9	3.6	8.3	85	225.4	185.7	12.44	103.1	5.31	28.1	40	107.6	137.2	9.99	31.3	10.8	19.1
				95	217.2	175.2	13.10	112.5	4.86	28.7	45	117.1	145.9	10.23	35.6	11.4	19.6
				110	208.7	164.7	13.75	126.8	4.45	29.3	50	126.5	154.6	10.38	39.8	12.2	20.1
	32.0	5.8	13.3	85	233.0	192.3	12.64	99.6	5.40	29.0	40	108.9	137.5	9.73	33.2	11.2	18.3
				95	224.1	181.4	13.29	109.0	4.94	29.6	45	118.4	146.2	9.91	37.6	11.9	18.8
				110	215.2	170.6	13.95	123.5	4.52	30.2	50	127.8	155.1	10.14	42.0	12.6	19.3
110	17.8	2.0	4.5	Operation Not Recommended							40	92.1	129.8	13.22	29.6	7.0	24.4
											45	100.0	138.3	13.40	33.8	7.5	25.2
											50	108.2	146.4	13.73	37.8	7.9	25.9
	24.9	3.6	8.3								40	94.4	130.4	12.38	32.4	7.6	23.6
											45	102.8	138.5	12.65	36.7	8.1	24.4
											50	111.0	146.9	13.00	41.1	8.5	24.9
	32.0	5.7	13.2								40	95.4	130.4	12.11	34.0	7.9	22.6
											45	103.8	138.5	12.28	38.5	8.5	23.4
											50	112.0	146.9	12.51	43.0	9.0	24.1

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