



Geothermal Heat Pump Systems



Models
HTV/HTH/HTD
024 - 070
60 Hz R-410A

Due to ongoing product improvements, design, specifications, performance data and material subject to change without notice.

SUBMITTAL DATA

Unit Designation _____
Job Name _____
Architect _____
Engineer _____
Contractor _____

PERFORMANCE DATA

Cooling Capacity _____ BTUH
EER _____
Heating Capacity _____ BTUH
COP _____
Ambient Air _____ °F
Entering Water Temp (Cooling) _____ °F
Entering Air Temp (Cooling) _____ °F
Entering Water Temp (Heating) _____ °F
Entering Air Temp (Heating) _____ °F
Airflow _____ CFM
Fan Speed or Motor RPM/Turns _____
Operating Weight _____ lb.

ELECTRICAL DATA

Power Supply _____ Volts Phase _____ Hz
Minimum Circuit Ampacity _____
Maximum Overcurrent Protection _____

HEAT CONTROLLER, INC.

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THE QUALITY LEADER IN CONDITIONING AIR

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Two Stage Geothermal Heat Pump Systems

Features of the Two Stage HT Series

The HT Series Geothermal Heat Pumps are some of the most efficient and innovative geothermal units on the market today. Packed with features, they offer the best value to the homeowner who is interested in quiet comfort and low operating costs as a result of extraordinary efficiencies.

Technically, the HT Series are state-of-the-art with digital electronic controls, multi-stage scroll compressors, computer controlled fan motors, zero ozone depleting refrigerant, and much more.

Design Features

- Five capacities to meet all application requirements—two, three, four and six ton models.
- Efficient operation from 20°F to 120°F entering water temperatures. Flow rates may be as low as 1.6 gpm/ton.
- Top supply air discharge accommodates upflow applications.
- Select left or right hand return air positions for all models; cabinets include a deluxe filter rack/duct collar.
- Variable speed ECM blower motor adjusts to multiple duct system applications and provides soft start for added comfort and quiet operation.
- Narrow cabinet design can be easily moved through doorways.
- Internally trapped condensate piping (on all vertical units) allows easy, compact installation.
- Internal electric heat unit (optional) is designed for easy field installation.
- Electric box is positioned for easy field wiring from two sides.
- Loop pump power block is built with circuit breaker.
- Coaxial low temperature protection can be selected in the field for well or closed loop installations.
- Air coil low temp. protection utilizes high accuracy thermistors.
- Coaxial heat exchanger, refrigerant suction lines, hot water generator coil, and all water pipes are fully insulated to reduce condensation in low temperature conditions.
- Isolation mounted compressors and low RPM blowers are used to reduce noise; compressor compartment and interior cabinet are insulated with 1/2" coated glass fiber insulation.
- Double isolated compressor delivers extra quiet operation.
- Safety features include: high pressure and loss of charge protection for the compressor; condensate overflow protection; low temperature protection sensors to safeguard the coaxial heat exchanger and air coil; hot water high-limit hot water generator pump shutdown; fault lockout that enables emergency heat and prevents compressor operation until thermostat or circuit breaker has been reset.

Operating Efficiencies

- AHRI/ASHRAE/ISO 13256-1 ratings for heating COPs and cooling EERs are industry leaders.
- Hot water generator (HWG) with internal pump generates hot water at dramatic savings while improving system performance.
- Efficient scroll compressors provide quiet, reliable operation.
- Oversized coaxial tube water-to-refrigerant heat exchanger delivers high efficiency and extra heating capacity; convoluted water tube functions efficiently at low flow rates and provides resistance to freeze damage.
- Oversized rifled copper tube/lanced aluminum fin air-to-refrigerant heat exchanger offers high efficiencies at low air velocity.
- Large, low RPM blower is both quiet and efficient, and provides high static capability.

Service Advantages

- Three removable access panels for the compressor compartment and one or two (depends on model) for the air handler compartment offer quick access to all internal components even with ductwork in place, making the unit service-friendly.
- Built with bi-directional thermal expansion valve.
- Brass, swivel water connections make it easy to connect loop and hot water piping.
- Insulated divider and separate air handling/compressor access panels allow service testing without air bypass.
- Design allows in-place service in tight installation spaces.
- CXM control features LED status light with memory feature for easy diagnostics.
- Control box and fan motors have quick-attach wiring connections for fast removal/reconnection.
- Biflow liquid line filter drier is factory-installed.
- 75 VA control transformer comes with circuit breaker.
- Internal drop-out blower assembly makes servicing simple.
- Refrigerant circuit includes high and low pressure service ports.
- E-coated refrigerant-to-air coil helps protect the coil from corrosion and extends life expectancy.

Factory Quality

- All units are built using our state-of-the-art manufacturing system that is designed to assure quality of the highest standards. This system:
 - Verifies that the correct components are being assembled;
 - Automatically performs special leak tests on all joints;
 - Conducts pressure tests;
 - Performs a highly detailed run test;
 - Automatically prevents a "failed" unit from being packaged for shipment;
 - Creates a computer database of run tests for future service analysis and diagnostics;
 - Includes painting heavy gauge steel cabinets with durable epoxy for a long-lasting finish;
 - Performs all refrigerant brazing in a nitrogen-rich environment;
 - Evacuates units to a deep vacuum of less than 50 microns prior to refrigerant charging
 - Halogen leak tests all joints to ensure a leak rate of less than 1/4 ounce per year.

Options & Accessories

- Optional internal auxiliary electric heat.
- Electronic auto-changeover thermostats with indicator LEDs.
- Closed loop flow controller and hose kits.

See *Geo Accessories brochure* for complete list of accessories.

Two Stage Geothermal Heat Pump Systems

What's New

R-410A Refrigerant

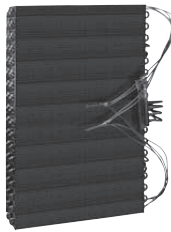
R-410A is a non-chlorine-based refrigerant with zero ozone depletion and low global warming potential

R-410 characteristics are:

- Near azeotropic mixture of 50% R-32 and 50% R-125.
- Virtually no glide.
- 50-60% higher operating pressures than R-22.
- Although a binary blend the two components have the same leak rate. As a result refrigerant can be added, if necessary, without recovering the charge.

Electro deposition-Coated Air Coil

All HT series models feature an e-coated air-coil. This Electro-deposition process will provide years of protection against corrosion from airborne chemicals resulting from modern building material out gassing and most environmental chemicals found in the air: Modern building materials such as counter-tops, floor coverings, paints and other materials can "outgas" chemicals into the home's air. Some of these chemicals are suspected of contributing to corrosion in the air coils found in both traditional and geothermal heating and cooling equipment. Corrosion often results in refrigerant leaks and eventual failure of the air coil costing hundreds of dollars



Copeland Scroll Compressor

Achieve a greater level of comfort. The Copeland Scroll UltraTech™ provides superior comfort to fixed-capacity compressors by incorporating a revolutionary two-step design. With a unique 67% part-load capacity step, systems with UltraTech™ maintain precise



temperature levels and lower relative humidity. This eliminates uneven peaks and valleys and allows for steady cooling comfort. Homeowners now have a better, more efficient way to power their heating and cooling system, raising their level of comfort, while lowering energy bills. So when your customers need a new heating and cooling system, make sure it has the best technology inside – the Copeland Scroll UltraTech™ compressor.

Save with superior efficiency. Over 40% of summer utility bills can come from the air conditioner compressor operation. A system with the Copeland Scroll UltraTech™ compressor delivers higher efficiency than any other single compressor system. In fact, systems with UltraTech™ provide up to 60% greater energy efficiency as compared to 13-SEER systems – which can save homeowners hundreds of dollars a year in energy costs.

Take it easy with quieter control. Copeland Scroll UltraTech™ is remarkably quiet at both full- and part-load capacity. It is up to four times quieter than a reciprocating compressor. Homeowners can enjoy its superior efficiency and comfort without having to hear the operation.

Learn the beauty of the design. With Copeland Scroll UltraTech™, two internal bypass ports enable the system to run at 67% part-load capacity for better efficiency and humidity

67% Capacity



100% Capacity

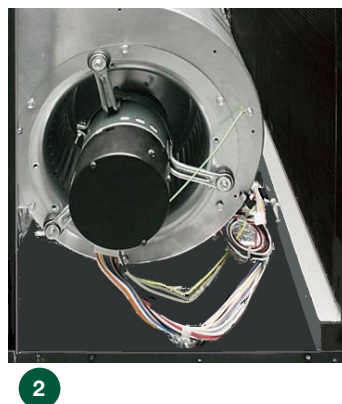


control. Based on demand, the modulation ring is activated, sealing the bypass ports and instantly shifting capacity to 100%. Take advantage of "shift on the fly" stage changing (no stopping and starting required like other two-stage compressors).

While Copeland Scroll Ultra Tech™ builds on established scroll technology, it is still a scroll at heart, which means it operates with fewer moving parts and result in unsurpassed reliability and virtually silent operation.

Two Stage Geothermal Heat Pump Systems

- 1 Copeland UltraTech Two-Stage Scroll Compressor
- 2 Latest Technology-Electronically commutated, Programmable, Variable Speed Blower Motor
- 3 Electro deposition coated air coil
- 4 Fully Insulated Blower Section, with Fully Insulated Compressor Section
- 5 Integrated Filter Rack with Return Air Duct Connection
- 6 Sloped Stainless Steel Drain Pan with Condensate Overflow Sensor
- 7 Unit Performance Sentinel: Automatic Alert System Lets Homeowner Know If The System Is Not Running At Peak Performance*
- 8 Double Spring or Grommet Compressor Isolation For Ultra Quiet Operation
- 9 Five Easily Removable Service Access Panels



*When installed with a thermostat that has a fault LED

Selection Procedure

- Step 1 Determine the actual heating and cooling loads at the desired dry bulb and wet bulb conditions.
- Step 2 Obtain the following design parameters: Entering water temperature, water flow rate in GPM, air flow in CFM, water flow pressure drop and design wet and dry bulb temperatures. Air flow CFM should be between 300 and 450 CFM per ton. Unit water pressure drop should be kept as close as possible to each other to make water balancing easier. Go to the appropriate tables and find the proper indicated water flow and water temperature.
- Step 3 Select a unit based on total and sensible cooling conditions. Select a unit which is closest to, but no larger than, the actual cooling load.
- Step 4 Enter tables at the design water flow and water temperature. Read the total and sensible cooling capacities (Note: interpolation is permissible, extrapolation is not).
- Step 5 Read the heating capacity. If it exceeds the design criteria it is acceptable. It is quite normal for Water-Source Heat Pumps to be selected on cooling capacity only since the heating output is usually greater than the cooling capacity.
- Step 6 Determine the correction factors associated with the variable factors of dry bulb and wet bulb.

Corrected Total Cooling =
tabulated total cooling x wet bulb correction.
Corrected Sensible Cooling =
tabulated sensible cooling x wet/dry bulb correction.
- Step 7 Compare the corrected capacities to the load requirements. Normally if the capacities are within 10% of the loads, the equipment is acceptable. It is better to undersize than oversize, as undersizing improves humidity control, reduces sound levels and extends the life of the equipment.
- Step 8 When completed, calculate water temperature rise and assess the selection. If the units selected are not within 10% of the load calculations, then review what effect changing the GPM, water temperature and/or air flow and air temperature would have on the corrected capacities. If the desired capacity cannot be achieved, select the next larger or smaller unit and repeat the procedure. Remember, when in doubt, undersize slightly for best performance.

Example Equipment Selection For Cooling

Step 1 Load Determination:

Assume we have determined that the appropriate cooling load at the desired dry bulb 80°F and wet bulb 65°F conditions is as follows:

Total Cooling22,100 BTUH
 Sensible Cooling.....16,500 BTUH
 Entering Air Temp.....80°F Dry Bulb / 65°F Wet Bulb

Step 2 Design Conditions:

Similarly, we have also obtained the following design parameters:

Entering Water Temp.....90°F
 Water Flow (Based upon 10°F rise in temp.)6.0 GPM
 Air Flow.....730 CFM

Step 3, 4 & 5 HP Selection:

After making our preliminary selection (HTH024 - Full Load), we enter the tables at design water flow and water temperature and read Total Cooling, Sens. Cooling and Heat of Rej. capacities:

Total Cooling.....24,200 BTUH
 Sensible Cooling.....16,300 BTUH
 Heat of Rejection.....29,900 BTUH

Step 6 & 7 Entering Air and Airflow Corrections:

Next, we determine our correction factors.

	Table	Ent Air	Air Flow	Corrected
Corrected Total Cooling =	24,200	x 0.975	x 0.978	= 23,076
Corrected Sens Cooling =	16,300	x 1.096	x 0.926	= 16,543
Corrected Heat of Reject =	29,900	x 0.979	x 0.978	= 28,628

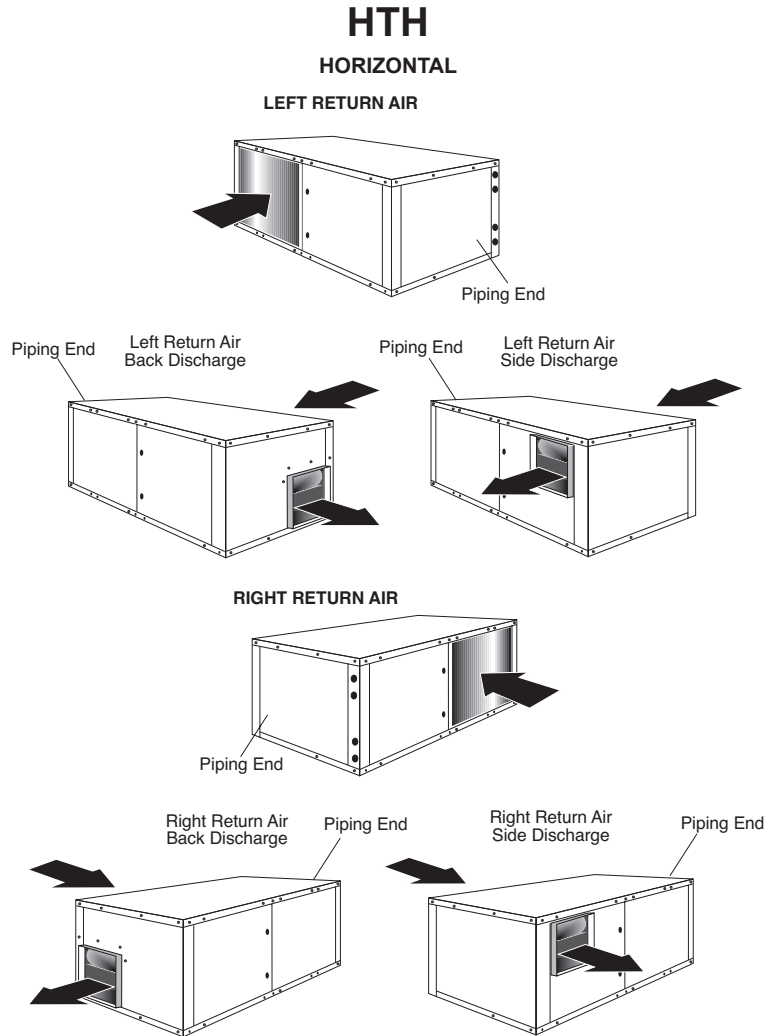
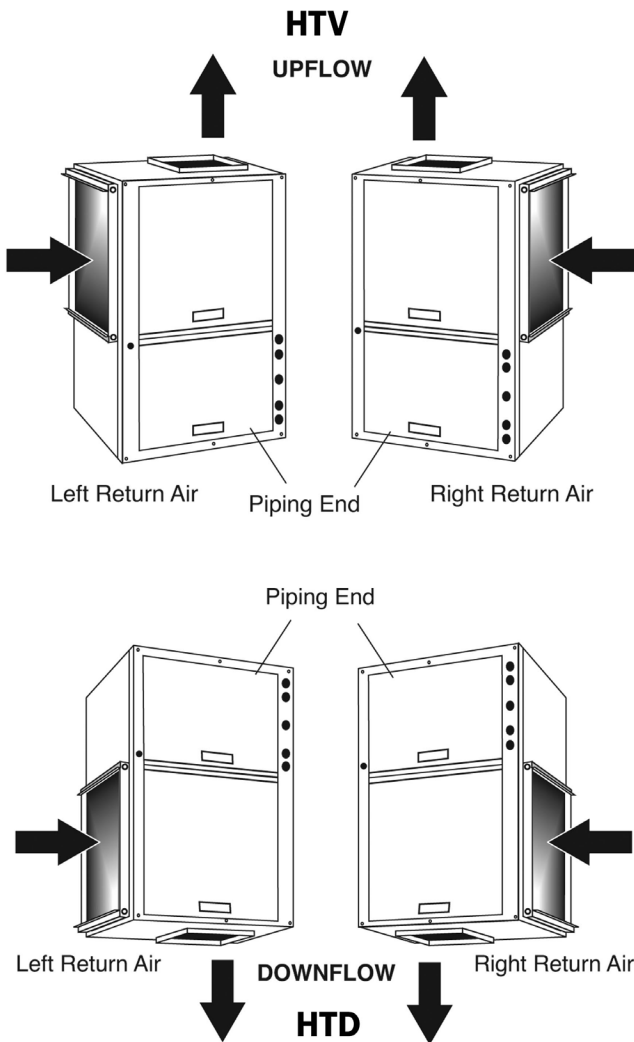
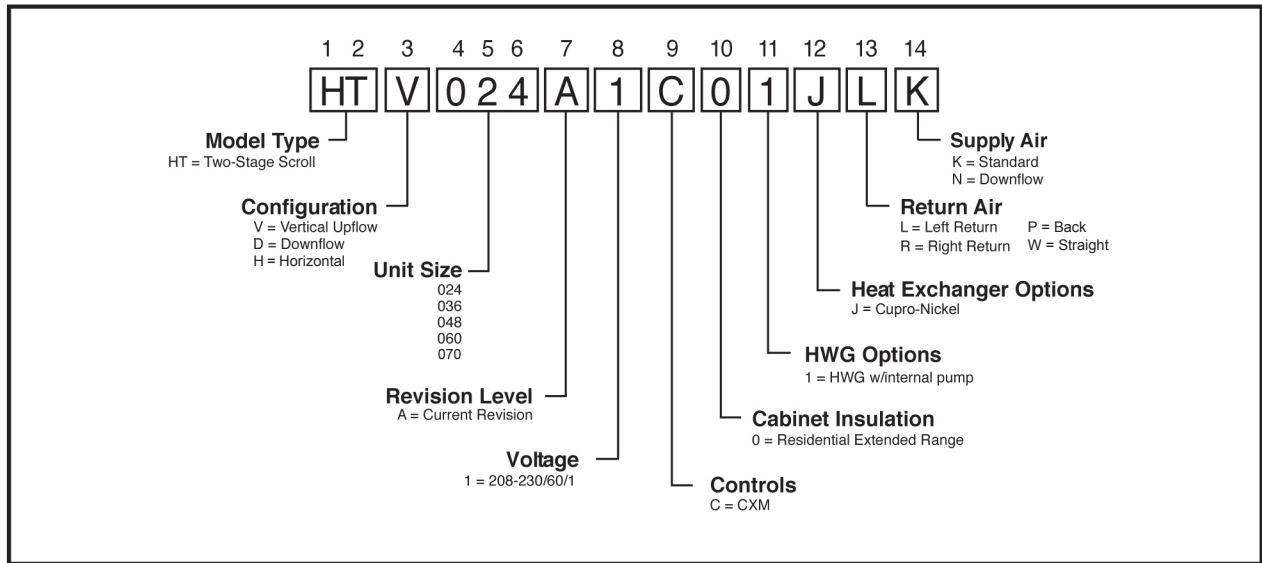
Step 8 Water Temperature Rise Calculation & Assessment:

Actual Temperature Rise.....9.5°F

When we compare the Corrected Total Cooling and Corrected Sensible Cooling figures with our load requirements stated in Step 1, we discover that our selection is within +/- 10% of our sensible load requirement. Furthermore, we see that our Corrected Total Cooling figure is within 1,000 Btuh of the actual indicated load.

Model Breakdown

Model Nomenclature – Two Stage Geothermal Heat Pump



Two Stage Geothermal Heat Pump Systems

HT Series Ratings

ARI/ASHRAE/ISO 13256-1

at EWT (Entering Water Temperature)

Model	Capacity Modulation	Ground Water—BTUH				Ground Loop—BTUH				Ship Wt. (lbs)
		Cooling Water 59°F		Heating Water 50°F		Cooling Full Load 77°F		Heating Full Load 32°F		
		BTUH	EER	BTUH	COP	Part Load 68°F BTUH	EER	Part Load 41°F BTUH	COP	
HTV/HTD/HTH024	Full	28,800	22.7	25,550	4.4	26,550	17.1	19,750	3.7	276
	Part	22,100	28.5	18,450	4.7	21,250	24.1	16,450	4.3	276
HTV/HTD/HTH036	Full	41,100	21.3	36,550	4.3	38,150	16.9	29,950	3.7	337
	Part	30,100	29.1	24,650	4.8	28,850	25.0	22,050	4.2	337
HTV/HTD/HTH048	Full	54,500	20.9	48,150	4.3	50,550	16.6	37,450	3.7	426
	Part	40,600	26.5	35,250	4.7	39,550	23.0	31,150	4.2	426
HTV/HTD/HTH060	Full	68,500	20.3	59,450	4.1	64,750	16.2	47,950	3.6	453
	Part	51,800	27.5	41,650	4.4	49,750	23.4	37,450	4.0	453
HTV/HTD/HTH070	Full	77,000	18.4	70,150	4.0	71,500	15.0	54,050	3.4	453
	Part	59,700	22.7	51,650	4.0	57,600	19.8	45,350	3.6	453

Cooling capacities based upon 80.6°F DB, 66.2°F WB entering air temperature.
 Heating capacities based upon 68°F DB, 59°F WB entering air temperature.

All ratings based on 208V operation.

Two Stage Geothermal Heat Pump Systems

PERFORMANCE DATA

HTV024, HTD024 & HTH024 Part Load

Performance capacities shown in thousands of Btuh.

560 CFM Rated Airflow																
EWT °F	GPM	WPD		COOLING - EAT 80°F DB / 67°F WB							HEATING - EAT 70°F					
		PSI	FT	TC	SC	Sens/Tot Ratio	KW	HR	EER	HWG	HC	KW	HE	LAT	COP	HWG
20	7.0	4.5	10.3	Operation Not Recommended							11.4	1.06	7.8	88.8	3.14	1.4
30	3.5	1.2	2.8	21.6	13.5	0.62	0.57	23.6	37.8	0.5	13.3	1.10	9.6	92.1	3.54	1.5
	5.8	2.8	6.5	21.9	13.5	0.62	0.56	23.8	38.7	0.4	13.9	1.11	10.2	93.0	3.69	1.6
	7.0	4.1	9.4	21.9	13.5	0.62	0.56	23.8	39.3	0.4	14.1	1.11	10.3	93.3	3.74	1.6
40	3.5	1.1	2.5	22.4	14.5	0.65	0.64	24.6	34.8	0.7	15.7	1.17	11.8	96.0	3.95	1.6
	5.8	2.6	5.9	22.6	14.6	0.65	0.60	24.6	37.4	0.7	16.4	1.17	12.4	97.1	4.11	1.7
	7.0	3.6	8.4	22.6	14.6	0.64	0.60	24.7	37.8	0.6	16.6	1.17	12.6	97.4	4.16	1.8
50	3.5	1.0	2.3	22.2	14.9	0.67	0.73	24.7	30.3	1.1	17.9	1.19	13.9	99.7	4.41	1.7
	5.8	2.4	5.5	22.4	14.9	0.67	0.68	24.7	33.0	1.0	18.7	1.19	14.6	100.9	4.58	1.8
	7.0	3.4	7.9	22.5	14.9	0.67	0.67	24.7	33.7	0.9	18.9	1.20	14.8	101.2	4.63	1.9
60	3.5	1.0	2.2	21.4	14.8	0.69	0.84	24.2	25.6	2.1	20.0	1.23	15.8	103.1	4.77	1.9
	5.8	2.2	5.1	21.9	15.0	0.68	0.78	24.5	28.2	1.9	20.8	1.23	16.6	104.4	4.94	2.0
	7.0	3.2	7.4	22.0	15.0	0.68	0.76	24.6	29.0	1.7	21.0	1.24	16.8	104.8	4.99	2.1
70	3.5	0.9	2.1	20.2	14.3	0.71	0.96	23.5	21.1	1.9	22.0	1.24	17.7	106.3	5.18	2.1
	5.8	2.1	4.8	20.9	14.6	0.70	0.89	23.9	23.5	1.7	22.8	1.25	18.5	107.7	5.35	2.2
	7.0	3.0	7.0	21.1	14.7	0.70	0.87	24.0	24.2	1.5	23.1	1.25	18.8	108.1	5.39	2.2
80	3.5	0.8	1.9	18.9	13.7	0.73	1.09	22.6	17.3	2.4	23.9	1.26	19.6	109.5	5.55	2.2
	5.8	2.0	4.5	19.6	14.0	0.72	1.02	23.1	19.2	2.3	24.8	1.27	20.5	111.0	5.71	2.3
	7.0	2.8	6.5	19.8	14.1	0.71	1.00	23.2	19.8	2.1	25.1	1.27	20.7	111.4	5.76	2.4
90	3.5	0.8	1.8	17.6	13.2	0.75	1.24	21.8	14.3	3.3	25.8	1.28	21.4	112.6	5.88	2.4
	5.8	1.9	4.3	18.1	13.4	0.74	1.17	22.1	15.6	3.0	26.8	1.30	22.3	114.3	6.05	2.5
	7.0	2.7	6.2	18.4	13.5	0.73	1.14	22.3	16.1	2.8	27.1	1.30	22.6	114.8	6.10	2.5
100	3.5	0.8	1.8	16.2	12.5	0.78	1.40	20.9	11.6	3.8	Operation Not Recommended					
	5.8	1.8	4.1	16.7	12.7	0.76	1.33	21.2	12.6	3.7						
	7.0	2.6	6.0	16.9	12.8	0.76	1.31	21.3	12.9	3.6						
110	3.5	0.7	1.7	15.1	12.3	0.81	1.57	20.5	9.6	4.9						
	5.8	1.7	4.0	15.4	12.2	0.79	1.51	20.6	10.2	4.7						
	7.0	2.5	5.7	15.6	12.3	0.79	1.49	20.6	10.5	4.5						
120	3.5	0.7	1.6	14.2	12.2	0.86	1.82	20.4	7.8	6.2						
	5.8	1.7	3.9	14.5	12.1	0.84	1.71	20.3	8.4	5.9						
	7.0	2.4	5.5	14.6	12.1	0.83	1.69	20.3	8.6	5.7						

†ARI/ASHRAE/ISO 13256-1 (WLHP applications) certified conditions are 86°F EWT, 80.6°F DB / 66.2°F WB
 EAT in cooling and 68°F DB / 59°F WB EAT in heating.
 Interpolation is permissible, extrapolation is not.
 All entering air conditions are 80°F DB and 67°F WB in cooling and 70°F DB in heating
 All performance data is based upon the lower voltage of dual voltage rated units
 See performance correction tables for operating conditions other than those listed above.
 Operation below 60°F EWT requires optional insulated water circuit.
 Operation below 40°F EWT is based upon 15% antifreeze solution.

Legend

- CFM = airflow, cubic feet/minute
- EWT = entering water temperature, °F
- GPM = water flow in US gallons/minute
- EAT = entering air temperature, Fahrenheit (dry bulb/wet bulb)
- HC = air heating capacity, Mbtuh
- TC = total cooling capacity, Mbtuh
- SC = sensible cooling capacity, Mbtuh
- KW = total power unit input, KiloWatts
- HR = total heat of rejection, Mbtuh
- HE = total heat of extraction, Mbtuh
- HWC = Hot Water Generator (desuperheater) capacity, Mbtuh
- WPD = Water coil pressure drop (psi & ft hd)
- EER = Energy Efficiency Ratio = BTU output/Watt input
- COP = Coefficient of Performance = BTU output/BTU input
- LWT = leaving water temperature, °F
- LAT = leaving air temperature, °F
- LC = latent cooling capacity, Mbtuh
- S/T = sensible to total cooling ratio

Note:

For operation in the shaded area when water is used in lieu of an anti-freeze solution, the LWT (Leaving Water Temperature) must be calculated. Flow must be maintained to a level such that the LWT is maintained above 40°F when the JW3 jumper is not clipped. This is due to the potential of the refrigerant temperature being as low as 32°F with 40°F LWT, which may lead to a nuisance cutout due to the activation of the Low Temperature Protection. JW3 should never be clipped for systems without antifreeze.

Calculate LWT as follows:

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

Two Stage Geothermal Heat Pump Systems

PERFORMANCE DATA

IHTV024, HTD024 & HTH024 Full Load

Performance capacities shown in thousands of Btuh.

800 CFM Rated Airflow

EWT °F	GPM	WPD		COOLING - EAT 80°F DB / 67°F WB							HEATING - EAT 70°F					
		PSI	FT	TC	SC	Sens/Tot Ratio	KW	HR	EER	HWG	HC	KW	HE	LAT	COP	HWG
20	8.0	5.6	10.3	Operation Not Recommended							15.0	1.47	10.0	87.4	3.00	1.6
30	4.0	1.5	2.8	30.6	19.6	0.64	1.02	34.1	30.1	0.6	17.8	1.53	12.6	90.6	3.41	1.9
	6.0	3.1	6.5	30.8	19.6	0.64	0.97	34.1	31.8	0.6	18.6	1.54	13.3	91.5	3.53	2.0
	8.0	5.1	9.4	31.0	19.7	0.63	0.95	34.2	32.8	0.5	19.1	1.55	13.8	92.1	3.60	2.1
40	4.0	1.3	2.5	30.4	20.0	0.66	1.11	34.2	27.3	1.0	21.2	1.61	15.8	94.6	3.88	2.2
	6.0	2.8	5.9	30.7	20.1	0.65	1.06	34.3	29.0	0.9	22.2	1.63	16.6	95.7	3.99	2.3
	8.0	4.5	8.4	30.8	20.1	0.65	1.03	34.3	29.9	0.9	22.7	1.64	17.1	96.3	4.05	2.4
50	4.0	1.3	2.3	29.6	20.1	0.68	1.23	33.8	24.2	1.6	24.4	1.69	18.6	98.2	4.24	2.5
	6.0	2.6	5.5	30.1	20.2	0.67	1.16	34.1	25.9	1.5	25.4	1.71	19.5	99.4	4.35	2.6
	8.0	4.3	7.9	30.3	20.2	0.67	1.13	34.2	26.8	1.3	25.9	1.73	20.0	100.0	4.40	2.7
60	4.0	1.2	2.2	28.4	19.7	0.69	1.35	33.0	21.0	2.2	27.2	1.76	21.2	101.5	4.53	2.8
	6.0	2.5	5.1	29.1	19.9	0.68	1.28	33.5	22.8	2.0	28.3	1.80	22.2	102.7	4.62	2.9
	8.0	4.0	7.4	29.4	20.0	0.68	1.24	33.7	23.6	1.8	28.8	1.81	22.7	103.4	4.66	3.0
70	4.0	1.1	2.1	27.0	19.0	0.71	1.50	32.1	18.0	3.0	29.9	1.84	23.6	104.6	4.75	3.1
	6.0	2.3	4.8	27.8	19.4	0.70	1.42	32.6	19.6	2.7	31.0	1.88	24.6	105.8	4.83	3.3
	8.0	3.8	7.0	28.2	19.6	0.69	1.38	32.9	20.5	2.4	31.5	1.89	25.0	106.5	4.87	3.4
80	4.0	1.0	1.9	25.4	18.3	0.72	1.66	31.0	15.3	3.6	32.3	1.92	25.8	107.4	4.93	3.4
	6.0	2.2	4.5	26.2	18.7	0.71	1.57	31.6	16.7	3.3	33.5	1.96	26.8	108.7	5.01	3.6
	8.0	3.5	6.5	26.7	18.9	0.71	1.53	31.9	17.5	3.0	34.0	1.98	27.3	109.4	5.04	3.7
90	4.0	1.0	1.8	23.7	17.5	0.74	1.84	30.0	12.9	4.5	34.7	2.00	27.9	110.2	5.09	3.7
	6.0	2.1	4.3	24.5	17.9	0.73	1.75	30.5	14.1	4.2	35.9	2.04	28.9	111.5	5.16	3.9
	8.0	3.4	6.2	25.0	18.1	0.72	1.70	30.8	14.7	3.9	36.5	2.06	29.4	112.2	5.19	4.0
100	4.0	1.0	1.8	22.0	16.7	0.76	2.05	29.0	10.7	5.0	Operation Not Recommended					
	6.0	2.0	4.1	22.8	17.1	0.75	1.95	29.5	11.7	4.8						
	8.0	3.2	6.0	23.3	17.3	0.74	1.89	29.7	12.3	4.6						
110	4.0	0.9	1.7	20.5	16.0	0.78	2.29	28.3	8.9	6.0						
	6.0	1.9	4.0	21.2	16.3	0.77	2.17	28.6	9.8	5.8						
	8.0	3.1	5.7	21.6	16.5	0.76	2.11	28.8	10.2	5.5						
120	4.0	0.9	1.6	19.1	15.5	0.81	2.55	27.8	7.5	7.1						
	6.0	1.8	3.9	19.7	15.7	0.80	2.43	28.0	8.1	6.8						
	8.0	3.0	5.5	20.0	15.8	0.79	2.36	28.1	8.5	6.5						

†ARI/ASHRAE/ISO 13256-1 (WLHP applications) certified conditions are 86°F EWT, 80.6°F DB / 66.2°F WB
 EAT in cooling and 68°F DB / 59°F WB EAT in heating.
 Interpolation is permissible, extrapolation is not.
 All entering air conditions are 80°F DB and 67°F WB in cooling and 70°F DB in heating
 All performance data is based upon the lower voltage of dual voltage rated units
 See performance correction tables for operating conditions other than those listed above.
 Operation below 60°F EWT requires optional insulated water circuit.
 Operation below 40°F EWT is based upon 15% antifreeze solution.

Legend

- CFM = airflow, cubic feet/minute
- EWT = entering water temperature, °F
- GPM = water flow in US gallons/minute
- EAT = entering air temperature, Fahrenheit (dry bulb/wet bulb)
- HC = air heating capacity, Mbtuh
- TC = total cooling capacity, Mbtuh
- SC = sensible cooling capacity, Mbtuh
- KW = total power unit input, KiloWatts
- HR = total heat of rejection, Mbtuh
- HE = total heat of extraction, Mbtuh
- HWC = Hot Water Generator (desuperheater) capacity, Mbtuh
- WPD = Water coil pressure drop (psi & ft hd)
- EER = Energy Efficiency Ratio = BTU output/Watt input
- COP = Coefficient of Performance = BTU output/BTU input
- LWT = leaving water temperature, °F
- LAT = leaving air temperature, °F
- LC = latent cooling capacity, Mbtuh
- S/T = sensible to total cooling ratio

Note:

For operation in the shaded area when water is used in lieu of an anti-freeze solution, the LWT (Leaving Water Temperature) must be calculated. Flow must be maintained to a level such that the LWT is maintained above 40°F when the JW3 jumper is not clipped. This is due to the potential of the refrigerant temperature being as low as 32°F with 40°F LWT, which may lead to a nuisance cutout due to the activation of the Low Temperature Protection. JW3 should never be clipped for systems without antifreeze.

Calculate LWT as follows:

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

Two Stage Geothermal Heat Pump Systems

PERFORMANCE DATA

HTV036, HTD036 & HTH036 Part Load

Performance capacities shown in thousands of Btuh.

800 CFM Rated Airflow

EWT °F	GPM	WPD		COOLING - EAT 80°F DB / 67°F WB							HEATING - EAT 70°F					
		PSI	FT	TC	SC	Sens/Tot Ratio	KW	HR	EER	HWG	HC	KW	HE	LAT	COP	HWG
20	8.0	4.7	10.9	Operation Not Recommended							17.3	1.46	12.3	90.0	3.48	1.9
30	4.0	1.2	2.8	29.8	18.9	0.63	0.79	32.5	37.7	0.5	19.1	1.51	14.0	92.1	3.71	2.1
	6.0	2.6	6.1	30.1	18.9	0.63	0.75	32.7	40.3	0.5	19.8	1.51	14.6	92.9	3.84	2.1
	8.0	4.5	10.4	30.3	19.0	0.63	0.73	32.8	41.6	0.4	20.1	1.51	15.0	93.3	3.91	2.2
40	4.0	1.1	2.5	30.6	20.4	0.67	0.90	33.6	34.0	0.8	21.8	1.56	16.5	95.2	4.08	2.2
	6.0	2.6	5.9	30.8	20.4	0.66	0.84	33.7	36.9	0.7	22.6	1.57	17.3	96.2	4.22	2.3
	8.0	4.4	10.2	31.0	20.5	0.66	0.81	33.7	38.3	0.7	23.1	1.58	17.7	96.7	4.29	2.4
50	4.0	1.0	2.2	30.3	21.1	0.70	1.03	33.8	29.4	1.2	24.6	1.64	19.0	98.5	4.40	2.4
	6.0	2.5	5.7	30.7	21.2	0.69	0.95	33.9	32.2	1.1	25.6	1.64	20.0	99.6	4.57	2.5
	8.0	4.2	9.7	30.9	21.2	0.69	0.92	34.0	33.7	1.0	26.2	1.65	20.5	100.3	4.64	2.6
60	4.0	0.9	2.0	29.2	21.2	0.72	1.19	33.3	24.6	2.5	27.5	1.66	21.9	101.9	4.87	2.6
	6.0	2.4	5.5	29.9	21.3	0.71	1.09	33.7	27.3	2.2	28.7	1.66	23.0	103.2	5.06	2.7
	8.0	4.1	9.5	30.2	21.4	0.71	1.05	33.8	28.7	2.0	29.4	1.67	23.7	104.0	5.16	2.8
70	4.0	0.8	1.8	27.7	20.6	0.74	1.36	32.3	20.4	2.2	30.5	1.68	24.8	105.3	5.34	2.9
	6.0	2.3	5.3	28.6	20.9	0.73	1.26	32.9	22.7	2.0	32.0	1.68	26.2	107.0	5.56	3.0
	8.0	4.0	9.2	29.0	21.1	0.73	1.21	33.1	24.0	1.8	32.7	1.69	27.0	107.9	5.68	3.1
80	4.0	0.7	1.7	26.0	19.8	0.76	1.56	31.3	16.7	2.8	33.7	1.70	27.9	109.0	5.82	3.1
	6.0	2.3	5.2	26.9	20.2	0.75	1.45	31.9	18.6	2.6	35.3	1.71	29.5	110.9	6.06	3.2
	8.0	3.9	9.0	27.4	20.4	0.75	1.39	32.2	19.7	2.4	36.2	1.71	30.4	111.9	6.20	3.3
90	4.0	0.6	1.5	24.2	19.0	0.79	1.78	30.3	13.6	3.8	36.9	1.72	31.0	112.7	6.30	3.3
	6.0	2.1	4.9	25.1	19.4	0.77	1.66	30.8	15.1	3.6	38.8	1.73	32.9	114.9	6.57	3.4
	8.0	3.7	8.5	25.6	19.6	0.77	1.60	31.1	16.0	3.3	39.9	1.74	33.9	116.1	6.73	3.6
100	4.0	0.6	1.4	22.7	18.5	0.81	2.02	29.6	11.2	4.5	Operation Not Recommended					
	6.0	2.1	4.8	23.4	18.7	0.80	1.89	29.9	12.4	4.3						
	8.0	3.6	8.3	23.8	18.9	0.79	1.83	30.1	13.0	4.2						
110	4.0	0.6	1.3	21.5	18.3	0.85	2.30	29.3	9.4	5.8						
	6.0	2.0	4.6	22.0	18.3	0.83	2.16	29.4	10.2	5.6						
	8.0	3.4	7.9	22.3	18.4	0.82	2.09	29.5	10.7	5.4						
120	4.0	0.5	1.2	20.7	18.0	0.87	2.57	29.4	8.1	7.3						
	6.0	1.9	4.5	21.1	18.3	0.87	2.44	29.5	8.6	7.0						
	8.0	3.3	7.7	21.3	18.4	0.86	2.40	29.5	8.9	6.8						

†ARI/ASHRAE/ISO 13256-1 (WLHP applications) certified conditions are 86°F EWT, 80.6°F DB / 66.2°F WB

EAT in cooling and 68°F DB / 59°F WB EAT in heating.

Interpolation is permissible, extrapolation is not.

All entering air conditions are 80°F DB and 67°F WB in cooling and 70°F DB in heating

All performance data is based upon the lower voltage of dual voltage rated units

See performance correction tables for operating conditions other than those listed above.

Operation below 60°F EWT requires optional insulated water circuit.

Operation below 40°F EWT is based upon 15% antifreeze solution.

Legend

- CFM = airflow, cubic feet/minute
- EWT = entering water temperature, °F
- GPM = water flow in US gallons/minute
- EAT = entering air temperature, Fahrenheit (dry bulb/wet bulb)
- HC = air heating capacity, Mbtuh
- TC = total cooling capacity, Mbtuh
- SC = sensible cooling capacity, Mbtuh
- KW = total power unit input, KiloWatts
- HR = total heat of rejection, Mbtuh
- HE = total heat of extraction, Mbtuh
- HWC = Hot Water Generator (desuperheater) capacity, Mbtuh
- WPD = Water coil pressure drop (psi & ft hd)
- EER = Energy Efficiency Ratio = BTU output/Watt input
- COP = Coefficient of Performance = BTU output/BTU input
- LWT = leaving water temperature, °F
- LAT = leaving air temperature, °F
- LC = latent cooling capacity, Mbtuh
- S/T = sensible to total cooling ratio

Note:

For operation in the shaded area when water is used in lieu of an anti-freeze solution, the LWT (Leaving Water Temperature) must be calculated. Flow must be maintained to a level such that the LWT is maintained above 40°F when the JW3 jumper is not clipped. This is due to the potential of the refrigerant temperature being as low as 32°F with 40°F LWT, which may lead to a nuisance cutout due to the activation of the Low Temperature Protection. JW3 should never be clipped for systems without antifreeze.

Calculate LWT as follows:

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

Two Stage Geothermal Heat Pump Systems

PERFORMANCE DATA

HTV036, HTD036 & HTH036 Full Load

Performance capacities shown in thousands of Btuh.

1200 CFM Rated Airflow

EWT °F	GPM	WPD		COOLING - EAT 80°F DB / 67°F WB							HEATING - EAT 70°F					
		PSI	FT	TC	SC	Sens/Tot Ratio	KW	HR	EER	HWG	HC	KW	HE	LAT	COP	HWG
20	9.0	5.9	13.7	Operation Not Recommended							26.1	2.30	18.2	90.1	3.32	2.3
30	4.5	1.7	3.9	43.9	30.7	0.70	1.61	49.4	27.2	0.6	28.3	2.34	20.3	91.9	3.54	2.7
	6.8	3.3	7.6	44.1	30.7	0.70	1.51	49.3	29.3	0.6	29.6	2.37	21.5	92.9	3.66	2.8
	9.0	5.7	13.1	44.3	30.7	0.69	1.45	49.2	30.4	0.6	30.3	2.38	22.2	93.4	3.73	2.9
40	4.5	1.5	3.5	43.2	30.7	0.71	1.77	49.2	24.4	1.1	32.3	2.43	24.0	94.9	3.90	3.1
	6.8	3.2	7.3	43.8	30.8	0.70	1.66	49.4	26.4	1.1	33.8	2.46	25.4	96.1	4.03	3.3
	9.0	5.4	12.5	44.0	30.9	0.70	1.60	49.4	27.5	1.0	34.7	2.48	26.2	96.8	4.10	3.4
50	4.5	1.3	3.1	41.9	30.3	0.72	1.93	48.5	21.7	1.8	36.3	2.52	27.7	98.0	4.22	3.6
	6.8	3.1	7.1	42.9	30.6	0.71	1.81	49.0	23.7	1.7	38.1	2.56	29.4	99.4	4.36	3.7
	9.0	5.2	12.0	43.3	30.7	0.71	1.75	49.2	24.7	1.5	39.2	2.59	30.3	100.2	4.43	3.9
60	4.5	1.2	2.8	40.4	29.6	0.73	2.11	47.6	19.1	2.6	40.4	2.62	31.5	101.2	4.52	4.1
	6.8	2.9	6.8	41.5	30.1	0.72	1.98	48.3	20.9	2.3	42.6	2.68	33.4	102.8	4.65	4.2
	9.0	5.0	11.6	42.0	30.3	0.72	1.92	48.6	21.9	2.0	43.8	2.71	34.5	103.8	4.73	4.4
70	4.5	1.1	2.5	38.5	28.7	0.75	2.32	46.4	16.6	3.4	44.7	2.74	35.3	104.5	4.78	4.6
	6.8	2.9	6.6	39.8	29.3	0.74	2.17	47.2	18.3	3.1	47.2	2.81	37.6	106.4	4.91	4.7
	9.0	4.8	11.0	40.4	29.6	0.73	2.10	47.6	19.2	2.7	48.5	2.86	38.8	107.4	4.98	4.9
80	4.5	1.0	2.3	36.5	27.7	0.76	2.55	45.2	14.3	4.1	49.0	2.87	39.2	107.8	5.01	5.0
	6.8	2.8	6.5	37.9	28.4	0.75	2.39	46.0	15.9	3.8	51.9	2.96	41.8	110.0	5.13	5.2
	9.0	4.5	10.4	38.6	28.7	0.75	2.31	46.5	16.7	3.5	53.5	3.01	43.2	111.3	5.20	5.4
90	4.5	0.9	2.1	34.5	26.7	0.78	2.81	44.1	12.2	5.3	53.6	3.02	43.3	111.3	5.20	5.4
	6.8	2.6	6.1	35.8	27.4	0.76	2.63	44.8	13.6	4.9	56.8	3.13	46.1	113.8	5.32	5.6
	9.0	4.4	10.2	36.5	27.7	0.76	2.55	45.2	14.3	4.5	58.6	3.19	47.7	115.2	5.38	5.9
100	4.5	0.8	1.9	32.4	25.7	0.79	3.12	43.0	10.4	5.8	Operation Not Recommended					
	6.8	2.6	6.0	33.7	26.3	0.78	2.92	43.7	11.5	5.6						
	9.0	4.2	9.7	34.4	26.7	0.78	2.82	44.0	12.2	5.4						
110	4.5	0.8	1.8	30.4	24.7	0.81	3.49	42.3	8.7	7.0						
	6.8	2.5	5.8	31.6	25.3	0.80	3.25	42.7	9.7	6.7						
	9.0	4.0	9.2	32.3	25.6	0.79	3.14	43.0	10.3	6.5						
120	4.5	0.7	1.6	28.6	23.8	0.83	3.91	41.9	7.3	8.2						
	6.8	2.5	5.8	29.7	24.3	0.82	3.64	42.1	8.2	7.9						
	9.0	3.8	8.8	30.2	24.6	0.81	3.51	42.2	8.6	7.6						

†ARI/ASHRAE/ISO 13256-1 (WLHP applications) certified conditions are 86°F EWT, 80.6°F DB / 66.2°F WB

EAT in cooling and 68°F DB / 59°F WB EAT in heating.

Interpolation is permissible, extrapolation is not.

All entering air conditions are 80°F DB and 67°F WB in cooling and 70°F DB in heating

All performance data is based upon the lower voltage of dual voltage rated units

See performance correction tables for operating conditions other than those listed above.

Operation below 60°F EWT requires optional insulated water circuit.

Operation below 40°F EWT is based upon 15% antifreeze solution.

Legend

- CFM = airflow, cubic feet/minute
- EWT = entering water temperature, °F
- GPM = water flow in US gallons/minute
- EAT = entering air temperature, Fahrenheit (dry bulb/wet bulb)
- HC = air heating capacity, Mbtuh
- TC = total cooling capacity, Mbtuh
- SC = sensible cooling capacity, Mbtuh
- KW = total power unit input, KiloWatts
- HR = total heat of rejection, Mbtuh
- HE = total heat of extraction, Mbtuh
- HWC = Hot Water Generator (desuperheater) capacity, Mbtuh
- WPD = Water coil pressure drop (psi & ft hd)
- EER = Energy Efficiency Ratio = BTU output/Watt input
- COP = Coefficient of Performance = BTU output/BTU input
- LWT = leaving water temperature, °F
- LAT = leaving air temperature, °F
- LC = latent cooling capacity, Mbtuh
- S/T = sensible to total cooling ratio

Note:

For operation in the shaded area when water is used in lieu of an anti-freeze solution, the LWT (Leaving Water Temperature) must be calculated. Flow must be maintained to a level such that the LWT is maintained above 40°F when the JW3 jumper is not clipped. This is due to the potential of the refrigerant temperature being as low as 32°F with 40°F LWT, which may lead to a nuisance cutout due to the activation of the Low Temperature Protection. JW3 should never be clipped for systems without antifreeze.

Calculate LWT as follows:

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

Two Stage Geothermal Heat Pump Systems

PERFORMANCE DATA

HTV048 HTD048 & HTH048 Part Load

Performance capacities shown in thousands of Btuh.

1050 CFM Rated Airflow																
EWT °F	WPD			COOLING - EAT 80°F DB / 67°F WB							HEATING - EAT 70°F					
	GPM	PSI	FT	TC	SC	Sens/Tot Ratio	KW	HR	EER	HWG	HC	KW	HE	LAT	COP	HWG
20	11.0	4.0	9.3	Operation Not Recommended							22.7	2.14	15.4	90.0	3.12	2.2
30	5.5	1.1	2.5	37.9	23.6	0.62	1.19	42.0	31.9	0.6	25.1	2.17	17.7	92.2	3.39	2.5
	8.3	2.2	5.2	38.1	23.7	0.62	1.12	42.0	34.0	0.5	26.0	2.18	18.6	93.0	3.49	2.6
	11.0	3.9	8.9	38.4	23.6	0.62	1.09	42.1	35.2	0.5	26.5	2.19	19.1	93.4	3.55	2.6
40	5.5	1.0	2.3	40.1	25.8	0.64	1.35	44.8	29.7	1.0	29.0	2.21	21.5	95.6	3.84	2.7
	8.3	2.1	5.0	40.5	25.8	0.64	1.27	44.8	31.9	0.9	30.3	2.23	22.7	96.7	3.99	2.8
	11.0	3.7	8.6	40.6	25.8	0.64	1.24	44.8	32.7	0.9	31.0	2.23	23.3	97.3	4.06	2.9
50	5.5	0.9	2.1	40.1	26.4	0.66	1.48	45.2	27.2	1.6	33.4	2.25	25.7	99.4	4.34	2.8
	8.3	2.1	4.9	40.5	26.4	0.65	1.40	45.2	28.9	1.5	34.9	2.27	27.2	100.8	4.52	2.9
	11.0	3.6	8.3	40.6	26.4	0.65	1.39	45.3	29.2	1.3	35.8	2.27	28.0	101.6	4.62	3.0
60	5.5	0.9	2.0	39.3	26.7	0.68	1.71	45.2	23.0	3.5	37.9	2.29	30.1	103.4	4.85	3.1
	8.3	2.0	4.7	40.0	26.8	0.67	1.60	45.5	25.0	3.2	39.8	2.31	31.9	105.1	5.06	3.3
	11.0	3.5	8.1	40.3	26.8	0.67	1.55	45.5	26.0	2.8	40.8	2.31	32.9	106.0	5.17	3.4
70	5.5	0.8	1.8	37.6	26.1	0.70	1.92	44.1	19.6	3.1	42.5	2.33	34.6	107.5	5.35	3.5
	8.3	2.0	4.6	38.6	26.5	0.69	1.80	44.8	21.5	2.8	44.7	2.35	36.6	109.4	5.57	3.6
	11.0	3.2	7.5	39.1	26.6	0.68	1.74	45.0	22.4	2.5	45.8	2.36	37.8	110.4	5.69	3.7
80	5.5	0.7	1.7	35.3	25.3	0.71	2.15	42.7	16.4	4.0	47.1	2.37	39.0	111.5	5.81	3.7
	8.3	1.9	4.5	36.6	25.7	0.70	2.02	43.5	18.1	3.7	49.4	2.40	41.2	113.5	6.02	3.8
	11.0	3.2	7.3	37.2	26.0	0.70	1.96	43.9	19.0	3.4	50.6	2.42	42.3	114.6	6.13	4.0
90	5.5	0.7	1.6	32.8	24.3	0.74	2.41	41.1	13.6	5.5	51.4	2.43	43.1	115.3	6.20	4.0
	8.3	1.8	4.2	34.1	24.8	0.73	2.27	41.9	15.0	5.1	53.7	2.47	45.3	117.4	6.38	4.1
	11.0	3.1	7.2	34.8	25.0	0.72	2.20	42.3	15.8	4.7	54.9	2.49	46.4	118.4	6.47	4.3
100	5.5	0.6	1.5	30.3	23.3	0.77	2.70	39.6	11.2	6.5	Operation Not Recommended					
	8.3	1.8	4.1	31.6	23.8	0.75	2.55	40.3	12.4	6.2						
	11.0	2.9	6.8	32.2	24.0	0.75	2.48	40.7	13.0	6.0						
110	5.5	0.6	1.5	28.0	22.6	0.81	3.03	38.4	9.3	8.3						
	8.3	1.7	4.0	29.1	22.9	0.79	2.87	38.9	10.2	8.0						
	11.0	2.9	6.6	29.7	23.1	0.78	2.79	39.2	10.7	7.7						
120	5.5	0.6	1.4	26.2	22.3	0.85	3.41	37.8	7.7	10.6						
	8.3	1.6	3.8	27.0	22.4	0.83	3.22	38.0	8.4	10.2						
	11.0	2.7	6.3	27.4	22.4	0.82	3.14	38.1	8.8	9.8						

†ARI/ASHRAE/ISO 13256-1 (WLHP applications) certified conditions are 86°F EWT, 80.6°F DB / 66.2°F WB

EAT in cooling and 68°F DB / 59°F WB EAT in heating.

Interpolation is permissible, extrapolation is not.

All entering air conditions are 80°F DB and 67°F WB in cooling and 70°F DB in heating

All performance data is based upon the lower voltage of dual voltage rated units

See performance correction tables for operating conditions other than those listed above.

Operation below 60°F EWT requires optional insulated water circuit.

Operation below 40°F EWT is based upon 15% antifreeze solution.

Legend

- CFM = airflow, cubic feet/minute
- EWT = entering water temperature, °F
- GPM = water flow in US gallons/minute
- EAT = entering air temperature, Fahrenheit (dry bulb/wet bulb)
- HC = air heating capacity, Mbtuh
- TC = total cooling capacity, Mbtuh
- SC = sensible cooling capacity, Mbtuh
- KW = total power unit input, KiloWatts
- HR = total heat of rejection, Mbtuh
- HE = total heat of extraction, Mbtuh
- HWC = Hot Water Generator (desuperheater) capacity, Mbtuh
- WPD = Water coil pressure drop (psi & ft hd)
- EER = Energy Efficiency Ratio = BTU output/Watt input
- COP = Coefficient of Performance = BTU output/BTU input
- LWT = leaving water temperature, °F
- LAT = leaving air temperature, °F
- LC = latent cooling capacity, Mbtuh
- S/T = sensible to total cooling ratio

Note:

For operation in the shaded area when water is used in lieu of an anti-freeze solution, the LWT (Leaving Water Temperature) must be calculated. Flow must be maintained to a level such that the LWT is maintained above 40°F when the JW3 jumper is not clipped. This is due to the potential of the refrigerant temperature being as low as 32°F with 40°F LWT, which may lead to a nuisance cutout due to the activation of the Low Temperature Protection. JW3 should never be clipped for systems without antifreeze.

Calculate LWT as follows:

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

Two Stage Geothermal Heat Pump Systems

PERFORMANCE DATA

HTV048, HTD048 & HTH048 Full Load

Performance capacities shown in thousands of Btuh.

1600 CFM Rated Airflow																
EWT °F	GPM	WPD		COOLING - EAT 80°F DB / 67°F WB							HEATING - EAT 70°F					
		PSI	FT	TC	SC	Sens/Tot Ratio	KW	HR	EER	HWG	HC	KW	HE	LAT	COP	HWG
20	12.0	4.8	11.0	Operation Not Recommended							32.1	3.09	21.6	88.6	3.04	2.7
30	6.0	1.3	2.9	57.6	37.1	0.64	2.24	65.3	25.7	0.8	35.3	3.12	24.6	90.4	3.31	3.3
	9.0	2.6	6.1	58.1	37.2	0.64	2.12	65.3	27.5	0.7	36.9	3.16	26.1	91.3	3.41	3.4
	12.0	4.5	10.5	58.4	37.2	0.64	2.05	65.4	28.5	0.7	37.7	3.19	26.9	91.8	3.47	3.5
40	6.0	1.2	2.7	57.3	38.1	0.67	2.44	65.7	23.5	1.6	40.6	3.17	29.8	93.5	3.76	3.8
	9.0	2.6	5.9	57.9	38.2	0.66	2.31	65.8	25.1	1.4	42.6	3.21	31.7	94.7	3.89	3.9
	12.0	4.4	10.1	58.2	38.2	0.66	2.24	65.8	26.0	1.3	43.8	3.23	32.7	95.3	3.97	4.1
50	6.0	1.1	2.5	56.0	38.5	0.69	2.64	65.0	21.2	2.6	46.3	3.16	35.5	96.8	4.29	4.4
	9.0	2.5	5.7	57.1	38.6	0.68	2.50	65.7	22.9	2.3	48.7	3.22	37.7	98.2	4.43	4.5
	12.0	4.2	9.6	57.5	38.7	0.67	2.43	65.8	23.7	2.1	50.1	3.26	39.0	99.0	4.51	4.7
60	6.0	1.0	2.3	53.9	37.8	0.70	2.85	63.6	18.9	3.7	52.1	3.31	40.8	100.2	4.62	4.9
	9.0	2.4	5.5	55.5	38.3	0.69	2.70	64.7	20.5	3.3	55.1	3.38	43.5	101.9	4.77	5.1
	12.0	4.0	9.2	56.1	38.5	0.69	2.63	65.1	21.4	2.9	56.7	3.42	45.0	102.8	4.85	5.3
70	6.0	1.0	2.2	51.3	36.7	0.72	3.09	61.8	16.6	5.0	58.1	3.46	46.3	103.6	4.92	5.5
	9.0	2.3	5.4	53.2	37.5	0.70	2.92	63.1	18.2	4.5	61.5	3.55	49.4	105.6	5.08	5.8
	12.0	3.8	8.8	54.0	37.8	0.70	2.84	63.7	19.0	3.9	63.4	3.61	51.1	106.7	5.16	6.0
80	6.0	0.9	2.1	48.4	35.4	0.73	3.35	59.8	14.4	6.0	64.3	3.63	51.9	107.2	5.19	6.1
	9.0	2.3	5.2	50.4	36.3	0.72	3.17	61.2	15.9	5.5	68.1	3.74	55.3	109.4	5.33	6.3
	12.0	3.6	8.3	51.4	36.7	0.72	3.08	61.9	16.7	5.1	70.2	3.81	57.2	110.6	5.41	6.5
90	6.0	0.9	2.0	45.2	34.1	0.76	3.66	57.7	12.4	7.7	Operation Not Recommended					
	9.0	2.2	5.0	47.3	35.0	0.74	3.45	59.0	13.7	7.1						
	12.0	3.5	8.1	48.3	35.4	0.73	3.36	59.7	14.4	6.6						
100	6.0	0.8	1.9	42.0	32.9	0.78	4.01	55.6	10.5	8.5						
	9.0	2.1	4.8	44.0	33.7	0.77	3.78	56.9	11.6	8.2						
	12.0	3.3	7.7	45.0	34.1	0.76	3.67	57.6	12.3	7.9						
110	6.0	0.8	1.8	38.8	31.9	0.82	4.42	53.9	8.8	10.2						
	9.0	2.0	4.7	40.7	32.5	0.80	4.16	54.9	9.8	9.9						
	12.0	3.2	7.3	41.7	32.8	0.79	4.04	55.5	10.3	9.5						
120	6.0	0.7	1.7	35.9	31.2	0.87	4.90	52.6	7.3	12.1						
	9.0	1.9	4.5	37.6	31.6	0.84	4.61	53.3	8.1	11.7						
	12.0	3.0	7.0	38.5	31.8	0.83	4.47	53.7	8.6	11.2						

†ARI/ASHRAE/ISO 13256-1 (WLHP applications) certified conditions are 86°F EWT, 80.6°F DB / 66.2°F WB

EAT in cooling and 68°F DB / 59°F WB EAT in heating.

Interpolation is permissible, extrapolation is not.

All entering air conditions are 80°F DB and 67°F WB in cooling and 70°F DB in heating

All performance data is based upon the lower voltage of dual voltage rated units

See performance correction tables for operating conditions other than those listed above.

Operation below 60°F EWT requires optional insulated water circuit.

Operation below 40°F EWT is based upon 15% antifreeze solution.

Legend

- CFM = airflow, cubic feet/minute
- EWT = entering water temperature, °F
- GPM = water flow in US gallons/minute
- EAT = entering air temperature, Fahrenheit (dry bulb/wet bulb)
- HC = air heating capacity, Mbtuh
- TC = total cooling capacity, Mbtuh
- SC = sensible cooling capacity, Mbtuh
- KW = total power unit input, KiloWatts
- HR = total heat of rejection, Mbtuh
- HE = total heat of extraction, Mbtuh
- HWC = Hot Water Generator (desuperheater) capacity, Mbtuh
- WPD = Water coil pressure drop (psi & ft hd)
- EER = Energy Efficiency Ratio = BTU output/Watt input
- COP = Coefficient of Performance = BTU output/BTU input
- LWT = leaving water temperature, °F
- LAT = leaving air temperature, °F
- LC = latent cooling capacity, Mbtuh
- S/T = sensible to total cooling ratio

Note:

For operation in the shaded area when water is used in lieu of an anti-freeze solution, the LWT (Leaving Water Temperature) must be calculated. Flow must be maintained to a level such that the LWT is maintained above 40°F when the JW3 jumper is not clipped. This is due to the potential of the refrigerant temperature being as low as 32°F with 40°F LWT, which may lead to a nuisance cutout due to the activation of the Low Temperature Protection. JW3 should never be clipped for systems without antifreeze.

Calculate LWT as follows:

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

Two Stage Geothermal Heat Pump Systems

PERFORMANCE DATA

HTV060, HTD060 & HTH060 Part Load

Performance capacities shown in thousands of Btuh.

1350 CFM Rated Airflow

EWT °F	GPM	WPD		COOLING - EAT 80°F DB / 67°F WB							HEATING - EAT 70°F					
		PSI	FT	TC	SC	Sens/Tot Ratio	KW	HR	EER	HWG	HC	KW	HE	LAT	COP	HWG
20	14.0	4.1	9.4	Operation Not Recommended							28.4	2.44	20.0	89.5	3.40	2.4
30	7.0	0.5	1.1	49.1	34.5	0.70	1.56	54.4	31.4	0.6	31.3	2.54	22.7	91.5	3.61	2.6
	10.5	1.9	4.4	50.1	34.9	0.70	1.52	55.2	32.9	0.6	32.3	2.55	23.6	92.2	3.71	2.7
	14.0	3.9	9.0	51.6	35.7	0.69	1.51	56.7	34.3	0.5	32.8	2.55	24.1	92.5	3.77	2.8
40	7.0	0.4	0.9	51.9	37.1	0.71	1.71	57.8	30.4	1.1	35.7	2.66	26.7	94.5	3.94	2.9
	10.5	1.9	4.3	52.3	37.2	0.71	1.63	57.9	32.2	1.0	37.0	2.68	27.9	95.4	4.05	3.0
	14.0	3.7	8.6	52.7	37.2	0.71	1.59	58.1	33.1	0.9	37.7	2.69	28.5	95.8	4.10	3.1
50	7.0	0.3	0.7	52.0	37.9	0.73	1.91	58.5	27.3	1.7	40.4	2.82	30.8	97.7	4.19	3.0
	10.5	1.8	4.1	52.6	37.9	0.72	1.79	58.7	29.4	1.6	41.9	2.83	32.3	98.8	4.34	3.2
	14.0	3.5	8.2	52.8	37.9	0.72	1.74	58.7	30.4	1.4	42.8	2.84	33.1	99.3	4.42	3.3
60	7.0	0.3	0.6	50.2	37.1	0.74	2.15	57.5	23.3	3.8	45.2	2.86	35.5	101.0	4.64	3.4
	10.5	1.7	4.0	51.3	37.6	0.73	2.01	58.2	25.6	3.4	47.0	2.87	37.2	102.2	4.80	3.5
	14.0	3.4	7.8	51.8	37.8	0.73	1.94	58.4	26.7	3.0	47.9	2.88	38.1	102.9	4.88	3.6
70	7.0	0.2	0.5	47.5	35.8	0.75	2.44	55.9	19.5	3.4	50.0	2.90	40.2	104.3	5.06	3.7
	10.5	1.7	3.9	49.1	36.6	0.75	2.28	56.8	21.5	3.0	52.1	2.92	42.1	105.7	5.23	3.9
	14.0	3.2	7.5	49.8	36.9	0.74	2.20	57.3	22.6	2.7	53.1	2.93	43.1	106.4	5.32	4.0
80	7.0	0.2	0.4	44.5	34.3	0.77	2.78	53.9	16.0	4.3	54.8	2.95	44.8	107.6	5.45	4.0
	10.5	1.6	3.8	46.1	35.1	0.76	2.59	55.0	17.8	4.0	57.0	2.98	46.8	109.1	5.61	4.1
	14.0	3.1	7.2	46.9	35.5	0.76	2.51	55.5	18.7	3.7	58.1	3.00	47.9	109.9	5.68	4.3
90	7.0	0.1	0.3	41.2	32.8	0.79	3.16	52.0	13.0	5.9	59.5	3.02	49.2	110.8	5.77	4.3
	10.5	1.6	3.6	42.9	33.5	0.78	2.96	53.0	14.5	5.5	61.7	3.06	51.3	112.3	5.91	4.4
	14.0	2.9	6.8	43.7	33.9	0.78	2.86	53.5	15.3	5.0	62.9	3.09	52.4	113.1	5.97	4.6
100	7.0	0.1	0.2	38.1	31.5	0.82	3.59	50.4	10.6	7.0	Operation Not Recommended					
	10.5	1.5	3.5	39.6	32.0	0.81	3.38	51.1	11.7	6.7						
	14.0	2.8	6.5	40.4	32.4	0.80	3.27	51.6	12.4	6.5						
110	7.0	0.1	0.2	35.5	30.7	0.86	4.08	49.4	8.7	9.0						
	10.5	1.4	3.3	36.7	31.0	0.84	3.84	49.8	9.5	8.7						
	14.0	2.7	6.2	37.3	31.2	0.83	3.73	50.0	10.0	8.3						
120	7.0	0.0	0.1	33.7	30.3	0.90	4.63	49.5	7.3	11.4						
	10.5	1.4	3.2	34.4	30.4	0.88	4.36	49.3	7.9	11.0						
	14.0	2.6	6.0	34.9	30.6	0.88	4.24	49.3	8.2	10.5						

†ARI/ASHRAE/ISO 13256-1 (WLHP applications) certified conditions are 86°F EWT, 80.6°F DB / 66.2°F WB EAT in cooling and 68°F DB / 59°F WB EAT in heating.

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Interpolation is permissible, extrapolation is not.

All entering air conditions are 80°F DB and 67°F WB in cooling and 70°F DB in heating

All performance data is based upon the lower voltage of dual voltage rated units

See performance correction tables for operating conditions other than those listed above.

Operation below 60°F EWT requires optional insulated water circuit.

Operation below 40°F EWT is based upon 15% antifreeze solution.

Legend

- CFM = airflow, cubic feet/minute
- EWT = entering water temperature, °F
- GPM = water flow in US gallons/minute
- EAT = entering air temperature, Fahrenheit (dry bulb/wet bulb)
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- TC = total cooling capacity, Mbtuh
- SC = sensible cooling capacity, Mbtuh
- KW = total power unit input, KiloWatts
- HR = total heat of rejection, Mbtuh
- HE = total heat of extraction, Mbtuh
- HWC = Hot Water Generator (desuperheater) capacity, Mbtuh
- WPD = Water coil pressure drop (psi & ft hd)
- EER = Energy Efficiency Ratio = BTU output/Watt input
- COP = Coefficient of Performance = BTU output/BTU input
- LWT = leaving water temperature, °F
- LAT = leaving air temperature, °F
- LC = latent cooling capacity, Mbtuh
- S/T = sensible to total cooling ratio

Note:

For operation in the shaded area when water is used in lieu of an anti-freeze solution, the LWT (Leaving Water Temperature) must be calculated. Flow must be maintained to a level such that the LWT is maintained above 40°F when the JW3 jumper is not clipped. This is due to the potential of the refrigerant temperature being as low as 32°F with 40°F LWT, which may lead to a nuisance cutout due to the activation of the Low Temperature Protection. JW3 should never be clipped for systems without antifreeze.

Calculate LWT as follows:

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

Two Stage Geothermal Heat Pump Systems

PERFORMANCE DATA

HTV060, HTD060 & HTH060 Full Load

Performance capacities shown in thousands of Btuh.

2000 CFM Rated Airflow

EWT °F	GPM	WPD		COOLING - EAT 80°F DB / 67°F WB							HEATING - EAT 70°F					
		PSI	FT	TC	SC	Sens/Tot Ratio	KW	HR	EER	HWG	HC	KW	HE	LAT	COP	HWG
20	15.0	5.0	11.6	Operation Not Recommended							41.6	3.73	28.9	89.3	3.27	2.9
30	7.5	0.6	1.5	68.0	49.7	0.73	2.99	78.2	22.7	0.8	45.3	3.83	32.2	91.0	3.47	3.6
	11.3	2.3	5.3	69.0	50.3	0.73	2.86	78.7	24.2	0.8	47.1	3.88	33.9	91.8	3.56	3.7
	15.0	4.8	11.0	70.4	51.3	0.73	2.80	79.9	25.2	0.7	48.1	3.90	34.8	92.3	3.61	3.8
40	7.5	0.5	1.2	69.8	51.5	0.74	3.23	80.8	21.6	1.7	51.4	3.99	37.8	93.8	3.78	4.1
	11.3	2.2	5.0	70.7	51.8	0.73	3.07	81.2	23.0	1.5	53.6	4.05	39.8	94.8	3.88	4.3
	15.0	4.5	10.4	71.0	51.9	0.73	2.99	81.2	23.7	1.4	54.8	4.08	40.9	95.4	3.94	4.4
50	7.5	0.4	1.0	70.0	52.3	0.75	3.51	82.0	19.9	2.8	57.6	4.15	43.4	96.7	4.06	4.7
	11.3	2.1	4.8	70.7	52.4	0.74	3.31	82.0	21.3	2.5	60.2	4.22	45.8	97.9	4.18	4.9
	15.0	4.3	9.9	71.1	52.4	0.74	3.22	82.1	22.1	2.2	61.6	4.26	47.1	98.5	4.24	5.1
60	7.5	0.3	0.8	68.0	51.8	0.76	3.83	81.1	17.7	3.9	64.0	4.33	49.2	99.6	4.33	5.4
	11.3	2.1	4.7	69.5	52.2	0.75	3.60	81.8	19.3	3.5	67.0	4.41	52.0	101.0	4.45	5.6
	15.0	4.1	9.4	70.1	52.4	0.75	3.49	82.0	20.0	3.1	68.7	4.46	53.5	101.8	4.52	5.8
70	7.5	0.3	0.7	65.2	50.8	0.78	4.21	79.5	15.5	5.4	70.5	4.51	55.1	102.7	4.58	6.0
	11.3	2.0	4.5	67.2	51.5	0.77	3.94	80.7	17.1	4.8	74.1	4.61	58.4	104.3	4.71	6.3
	15.0	3.9	8.9	68.1	51.8	0.76	3.81	81.1	17.9	4.2	76.1	4.67	60.1	105.2	4.78	6.5
80	7.5	0.2	0.5	61.8	49.4	0.80	4.64	77.7	13.3	6.4	77.3	4.71	61.3	105.8	4.82	6.6
	11.3	1.9	4.4	64.2	50.4	0.78	4.34	79.0	14.8	5.9	81.5	4.83	65.0	107.7	4.95	6.9
	15.0	3.6	8.4	65.3	50.8	0.78	4.19	79.6	15.6	5.5	83.8	4.90	67.1	108.8	5.02	7.1
90	7.5	0.2	0.4	58.1	47.8	0.82	5.14	75.6	11.3	8.3	84.4	4.92	67.7	109.1	5.04	7.2
	11.3	1.8	4.2	60.6	48.9	0.81	4.80	77.0	12.6	7.7	89.2	5.06	72.0	111.3	5.17	7.5
	15.0	3.5	8.0	61.9	49.4	0.80	4.63	77.7	13.4	7.0	91.9	5.14	74.4	112.5	5.24	7.8
100	7.5	0.1	0.3	54.1	46.1	0.85	5.72	73.7	9.5	9.1	Operation Not Recommended					
	11.3	1.8	4.1	56.7	47.2	0.83	5.34	74.9	10.6	8.8						
	15.0	3.3	7.6	58.0	47.8	0.82	5.15	75.6	11.3	8.5						
110	7.5	0.1	0.2	50.2	44.3	0.88	6.40	72.0	7.8	11.0						
	11.3	1.7	4.0	52.7	45.4	0.86	5.96	73.0	8.8	10.6						
	15.0	3.1	7.2	54.0	46.0	0.85	5.75	73.6	9.4	10.2						
120	7.5	0.0	0.1	46.4	42.7	0.92	7.18	70.9	6.5	13.1						
	11.3	1.7	3.9	48.7	43.7	0.90	6.68	71.5	7.3	12.6						
	15.0	2.9	6.8	49.9	44.2	0.89	6.45	71.9	7.7	12.1						

†ARI/ASHRAE/ISO 13256-1 (WLHP applications) certified conditions are 86°F EWT, 80.6°F DB / 66.2°F WB

EAT in cooling and 68°F DB / 59°F WB EAT in heating.

Interpolation is permissible, extrapolation is not.

All entering air conditions are 80°F DB and 67°F WB in cooling and 70°F DB in heating

All performance data is based upon the lower voltage of dual voltage rated units

See performance correction tables for operating conditions other than those listed above.

Operation below 60°F EWT requires optional insulated water circuit.

Operation below 40°F EWT is based upon 15% antifreeze solution.

Legend

- CFM = airflow, cubic feet/minute
- EWT = entering water temperature, °F
- GPM = water flow in US gallons/minute
- EAT = entering air temperature, Fahrenheit (dry bulb/wet bulb)
- HC = air heating capacity, Mbtuh
- TC = total cooling capacity, Mbtuh
- SC = sensible cooling capacity, Mbtuh
- KW = total power unit input, KiloWatts
- HR = total heat of rejection, Mbtuh
- HE = total heat of extraction, Mbtuh
- HWC = Hot Water Generator (desuperheater) capacity, Mbtuh
- WPD = Water coil pressure drop (psi & ft hd)
- EER = Energy Efficiency Ratio = BTU output/Watt input
- COP = Coefficient of Performance = BTU output/BTU input
- LWT = leaving water temperature, °F
- LAT = leaving air temperature, °F
- LC = latent cooling capacity, Mbtuh
- S/T = sensible to total cooling ratio

Note:

For operation in the shaded area when water is used in lieu of an anti-freeze solution, the LWT (Leaving Water Temperature) must be calculated. Flow must be maintained to a level such that the LWT is maintained above 40°F when the JW3 jumper is not clipped. This is due to the potential of the refrigerant temperature being as low as 32°F with 40°F LWT, which may lead to a nuisance cutout due to the activation of the Low Temperature Protection. JW3 should never be clipped for systems without antifreeze.

Calculate LWT as follows:

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

Two Stage Geothermal Heat Pump Systems

PERFORMANCE DATA

HTV070, HTD070 & HTH070 Part Load

Performance capacities shown in thousands of Btu/h.

1600 CFM Rated Airflow

EWT °F	GPM	WPD		COOLING - EAT 80°F DB / 67°F WB							HEATING - EAT 70°F					
		PSI	FT	TC	SC	Sens/Tot Ratio	KW	HR	EER	HWG	HC	KW	HE	LAT	COP	HWG
20	15.0	10.1	23.3	Operation Not Recommended							33.0	3.68	20.4	89.1	2.62	4.1
30	7.5	1.7	3.9	59.1	42.1	0.71	2.25	66.8	26.3	-	36.9	3.74	24.1	91.3	2.89	4.8
	11.25	3.9	9.0	60.0	42.5	0.71	2.15	67.3	27.9	-	38.3	3.77	25.4	92.1	2.98	4.8
	15.0	6.9	15.9	61.0	43.1	0.71	2.10	68.1	29.0	-	39.0	3.78	26.1	92.6	3.03	4.8
40	7.5	1.6	3.7	61.1	43.0	0.70	2.46	69.5	24.8	-	43.1	3.84	30.0	94.9	3.29	5.5
	11.25	3.6	8.3	61.8	43.5	0.70	2.33	69.8	26.6	-	45.0	3.87	31.8	96.0	3.41	5.5
	15.0	6.5	15.0	62.5	43.8	0.70	2.27	70.2	27.5	-	46.1	3.88	32.8	96.7	3.48	5.5
50	7.5	1.5	3.5	61.9	43.5	0.70	2.72	71.2	22.8	2.3	49.9	3.94	36.4	98.9	3.71	6.2
	11.25	3.4	7.9	62.6	43.9	0.70	2.55	71.3	24.5	2.1	52.3	3.97	38.8	100.3	3.86	6.1
	15.0	6.0	13.9	62.9	44.0	0.70	2.48	71.4	25.4	1.9	53.7	3.99	40.1	101.1	3.94	6.1
60	7.5	1.4	3.2	59.7	42.3	0.71	3.02	70.0	19.8	2.8	56.9	4.04	43.2	103.0	4.13	6.8
	11.25	3.1	7.2	61.2	43.1	0.70	2.83	70.8	21.6	2.5	59.9	4.09	46.0	104.7	4.30	8.3
	15.0	5.4	12.5	61.8	43.4	0.70	2.74	71.1	22.6	2.3	61.6	4.11	47.5	105.6	4.39	6.8
70	7.5	1.3	3.0	56.8	40.9	0.72	3.36	68.3	16.9	3.4	64.1	4.15	49.9	107.1	4.52	7.4
	11.25	3.0	6.9	58.6	41.8	0.71	3.15	69.4	18.6	3.1	67.5	4.21	53.1	109.1	4.70	7.4
	15.0	5.4	12.5	59.5	42.2	0.71	3.05	69.9	19.5	2.9	69.3	4.24	54.9	110.1	4.79	7.4
80	7.5	1.3	3.0	53.3	39.4	0.74	3.76	66.2	14.2	4.2	71.1	4.27	56.5	111.1	4.88	8.0
	11.25	2.8	6.5	55.4	40.3	0.73	3.52	67.4	15.7	3.8	74.7	4.34	59.9	113.2	5.05	8.0
	15.0	5.0	11.6	56.4	40.7	0.72	3.41	68.0	16.6	3.5	76.6	4.38	61.7	114.4	5.13	8.0
90	7.5	1.3	3.0	49.7	37.9	0.76	4.21	64.1	11.8	5.1	77.7	4.40	62.7	115.0	5.18	8.6
	11.25	2.8	6.5	51.8	38.7	0.75	3.95	65.3	13.1	4.7	81.3	4.48	66.0	117.1	5.32	8.6
	15.0	5.0	11.6	52.8	39.1	0.74	3.82	65.9	13.8	4.3	83.1	4.52	67.7	118.1	5.39	8.5
100	7.5	1.2	2.8	46.1	36.6	0.79	4.73	62.2	9.8	6.1	Operation Not Recommended					
	11.25	2.7	6.2	48.1	37.2	0.77	4.44	63.2	10.8	5.7						
	15.0	4.8	11.1	49.1	37.6	0.77	4.29	63.7	11.4	5.2						
110	7.5	1.1	2.5	42.9	35.7	0.83	5.31	61.0	8.1	7.4						
	11.25	2.5	5.8	44.5	36.1	0.81	4.99	61.6	8.9	6.8						
	15.0	4.5	10.4	45.5	36.3	0.80	4.83	61.9	9.4	6.2						
120	7.5	1.1	2.5	40.2	35.5	0.88	5.97	60.6	6.7	8.7						
	11.25	2.4	5.5	41.5	35.5	0.85	5.61	60.7	7.4	8.1						
	15.0	4.3	9.9	42.3	35.6	0.84	5.44	60.8	7.8	7.4						

†ARI/ASHRAE/ISO 13256-1 (WHP applications) certified conditions are 86°F EWT, 80.6°F DB / 66.2°F WB
 EAT in cooling and 68°F DB / 59°F WB EAT in heating.
 Interpolation is permissible, extrapolation is not.
 All entering air conditions are 80°F DB and 67°F WB in cooling and 70°F DB in heating
 All performance data is based upon the lower voltage of dual voltage rated units
 See performance correction tables for operating conditions other than those listed above.
 Operation below 60°F EWT requires optional insulated water circuit.
 Operation below 40°F EWT is based upon 15% antifreeze solution.

Legend

- CFM = airflow, cubic feet/minute
- EWT = entering water temperature, °F
- GPM = water flow in US gallons/minute
- EAT = entering air temperature, Fahrenheit (dry bulb/wet bulb)
- HC = air heating capacity, Mbtuh
- TC = total cooling capacity, Mbtuh
- SC = sensible cooling capacity, Mbtuh
- KW = total power unit input, KiloWatts
- HR = total heat of rejection, Mbtuh
- HE = total heat of extraction, Mbtuh
- HWC = Hot Water Generator (desuperheater) capacity, Mbtuh
- WPD = Water coil pressure drop (psi & ft hd)
- EER = Energy Efficiency Ratio = BTU output/Watt input
- COP = Coefficient of Performance = BTU output/BTU input
- LWT = leaving water temperature, °F
- LAT = leaving air temperature, °F
- LC = latent cooling capacity, Mbtuh
- S/T = sensible to total cooling ratio

Note:

For operation in the shaded area when water is used in lieu of an anti-freeze solution, the LWT (Leaving Water Temperature) must be calculated. Flow must be maintained to a level such that the LWT is maintained above 40°F when the JW3 jumper is not clipped. This is due to the potential of the refrigerant temperature being as low as 32°F with 40°F LWT, which may lead to a nuisance cutout due to the activation of the Low Temperature Protection. JW3 should never be clipped for systems without antifreeze.

Calculate LWT as follows:

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

Two Stage Geothermal Heat Pump Systems

PERFORMANCE DATA

HTV070, HTD070 & HTH070 Full Load

Performance capacities shown in thousands of Btuh.

2100 CFM Rated Airflow

EWT °F	GPM	WPD		COOLING - EAT 80°F DB / 67°F WB							HEATING - EAT 70°F					
		PSI	FT	TC	SC	Sens/Tot Ratio	KW	HR	EER	HWG	HC	KW	HE	LAT	COP	HWG
20	17.0	10.1	23.3	Operation Not Recommended							45.1	4.67	29.2	89.9	2.8	5.0
	8.5	2.2	5.1	74.9	49.2	0.66	3.36	86.4	22.3	-	49.5	4.74	33.3	91.8	3.1	5.9
	12.8	5.0	11.6	75.4	49.6	0.66	3.23	86.4	23.4	-	51.6	4.78	35.3	92.8	3.2	5.9
30	17.0	8.9	20.6	76.0	50.0	0.66	3.10	86.6	24.5	-	52.8	4.81	36.4	93.3	3.2	5.8
	8.5	2.1	4.9	79.2	51.4	0.65	3.57	91.4	22.2	-	57.4	4.90	40.6	95.3	3.4	6.7
	12.8	4.7	10.9	79.7	51.8	0.65	3.45	91.5	23.1	-	60.3	4.97	43.4	96.6	3.6	6.7
40	17.0	8.3	19.2	80.2	52.2	0.65	3.33	91.6	24.1	-	62.0	5.01	44.9	97.3	3.6	6.7
	8.5	1.9	4.4	80.1	51.7	0.64	4.08	94.1	19.6	3.7	66.2	5.11	48.7	99.2	3.8	7.5
	12.8	4.3	9.9	80.8	52.5	0.65	3.93	94.2	20.6	3.4	70.0	5.21	52.2	100.9	3.9	7.5
50	17.0	7.7	17.8	81.3	53.0	0.65	3.80	94.3	21.4	3.2	72.1	5.26	54.2	101.8	4.0	7.5
	8.5	1.7	3.9	78.0	50.8	0.65	4.65	93.9	16.8	4.5	75.4	5.35	57.2	103.3	4.1	8.3
	12.8	3.9	9.0	78.9	51.4	0.65	4.45	94.1	17.7	4.2	80.1	5.49	61.3	105.3	4.3	8.3
60	17.0	7.0	16.2	79.7	51.8	0.65	4.37	94.6	18.2	3.8	82.6	5.56	63.6	106.4	4.4	8.3
	8.5	1.7	3.9	72.5	50.3	0.69	5.02	89.6	14.4	5.5	84.9	5.63	65.6	107.4	4.4	9.1
	12.8	3.9	9.0	75.0	50.7	0.68	4.75	91.2	15.8	5.1	90.1	5.80	70.3	109.7	4.6	9.0
70	17.0	6.9	15.9	76.1	50.8	0.67	4.63	91.9	16.4	4.7	92.9	5.90	72.8	111.0	4.6	9.0
	8.5	1.6	3.7	68.1	49.8	0.73	5.47	86.8	12.4	6.8	94.1	5.94	73.8	111.5	4.6	9.8
	12.8	3.6	8.3	71.2	50.2	0.71	5.15	88.7	13.8	6.3	99.6	6.15	78.6	113.9	4.7	9.8
80	17.0	6.5	15.0	72.6	50.4	0.69	5.01	89.7	14.5	5.8	102.4	6.26	81.0	115.2	4.8	9.7
	8.5	1.6	3.7	63.4	48.8	0.77	6.01	83.9	10.5	8.3	102.7	6.27	81.3	115.3	4.8	10.5
	12.8	3.6	8.3	66.5	49.5	0.74	5.65	85.8	11.8	7.7	108.0	6.52	85.8	117.6	4.9	10.4
90	17.0	6.5	15.0	68.1	49.8	0.73	5.47	86.8	12.5	7.0	110.6	6.65	87.9	118.8	4.9	10.4
	8.5	1.5	3.5	58.8	47.3	0.80	6.61	81.4	8.9	10.1	Operation Not Recommended					
	12.8	3.4	7.9	61.7	48.3	0.78	6.21	82.9	9.9	9.3						
100	17.0	6.1	14.1	63.2	48.8	0.77	6.03	83.8	10.5	8.5						
	8.5	1.4	3.2	55.1	45.4	0.82	7.28	79.9	7.6	12.0						
	12.8	3.3	7.6	57.3	46.6	0.81	6.86	80.7	8.4	11.1						
110	17.0	5.8	13.4	58.6	47.2	0.81	6.65	81.3	8.8	10.2						
	8.5	1.4	3.2	52.9	43.3	0.82	8.01	80.2	6.6	14.3						
	12.8	3.1	7.2	54.0	44.6	0.83	7.55	79.8	7.2	13.2						
120	17.0	5.6	12.9	54.9	45.2	0.82	7.33	79.9	7.5	12.1						

†ARI/ASHRAE/ISO 13256-1 (WLHP applications) certified conditions are 86°F EWT, 80.6°F DB / 66.2°F WB

EAT in cooling and 68°F DB / 59°F WB EAT in heating.

Interpolation is permissible, extrapolation is not.

All entering air conditions are 80°F DB and 67°F WB in cooling and 70°F DB in heating

All performance data is based upon the lower voltage of dual voltage rated units

See performance correction tables for operating conditions other than those listed above.

Operation below 60°F EWT requires optional insulated water circuit.

Operation below 40°F EWT is based upon 15% antifreeze solution.

Legend

- CFM = airflow, cubic feet/minute
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- HE = total heat of extraction, Mbtuh
- HWC = Hot Water Generator (desuperheater) capacity, Mbtuh
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- COP = Coefficient of Performance = BTU output/BTU input
- LWT = leaving water temperature, °F
- LAT = leaving air temperature, °F
- LC = latent cooling capacity, Mbtuh
- S/T = sensible to total cooling ratio

Note:

For operation in the shaded area when water is used in lieu of an anti-freeze solution, the LWT (Leaving Water Temperature) must be calculated. Flow must be maintained to a level such that the LWT is maintained above 40°F when the JW3 jumper is not clipped. This is due to the potential of the refrigerant temperature being as low as 32°F with 40°F LWT, which may lead to a nuisance cutout due to the activation of the Low Temperature Protection. JW3 should never be clipped for systems without antifreeze.

Calculate LWT as follows:

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

Two Stage Geothermal Heat Pump Systems

Part Load Operation

Part Load Cooling Corrections 400 CFM per Ton													
Ent Air WB F	Total Clg Cap	Sens Clg Cap Multipliers- Entering DB F										Power	Heat of Rej
		60	65	70	75	80	80.6	85	90	95	100		
45	0.876	*	*	*	*	*	*	*	*	*	*	0.981	0.895
50	0.883	1.178	1.292	*	*	*	*	*	*	*	*	0.985	0.901
55	0.903	0.829	1.024	1.123	*	*	*	*	*	*	*	0.989	0.918
60	0.935		0.725	0.895	1.088	*	*	*	*	*	*	0.993	0.945
65	0.979			0.626	0.857	1.095	1.095	*	*	*	*	0.998	0.982
66.2	0.991			0.490	0.728	1.039	1.039	1.283	*	*	*	0.999	0.993
67	1.000			0.438	0.673	1.000	1.000	1.245	*	*	*	1.000	1.000
70	1.035				0.552	0.847	0.847	1.097	1.335	*	*	1.003	1.030
75	1.105					0.567	0.567	0.833	1.085	1.324	*	1.008	1.088

* Sensible capacity equals total capacity.

Part Load Heating Corrections			
Ent Air DB F	Htg Cap	Power	Heat of Ext
20	1.110	0.674	1.206
25	1.107	0.676	1.202
30	1.102	0.687	1.192
35	1.094	0.706	1.179
40	1.084	0.732	1.161
45	1.073	0.764	1.140
50	1.060	0.802	1.117
55	1.046	0.846	1.090
60	1.031	0.893	1.061
65	1.016	0.945	1.031
68	1.006	0.978	1.013
70	1.000	1.000	1.000
75	0.984	1.058	0.968
80	0.968	1.117	0.936

Airflow Part Load		Heating			Cooling					
CFM Per Ton of Clg	% of Nominal	Htg Cap	Power	Heat of Ext	Total Cap	Sens Cap	S/T	Power	Heat of Rej	
240	60.0	0.946	1.241	0.881	0.920	0.781	0.849	0.959	0.927	
275	68.8	0.960	1.163	0.915	0.942	0.832	0.883	0.964	0.946	
300	75.0	0.969	1.115	0.937	0.956	0.867	0.906	0.969	0.959	
325	81.3	0.978	1.076	0.956	0.969	0.901	0.929	0.975	0.970	
350	87.5	0.986	1.043	0.973	0.981	0.934	0.952	0.982	0.981	
375	93.8	0.993	1.018	0.988	0.991	0.967	0.976	0.990	0.991	
400	100.0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
425	106.3	1.006	0.990	1.010	1.007	1.033	1.025	1.011	1.008	
450	112.5	1.012	0.986	1.017	1.013	1.065	1.051	1.023	1.015	
475	118.8	1.017	0.983	1.024	1.018	1.098	1.079	1.036	1.021	
500	125.0	1.021	0.981	1.030	1.021	1.131	1.108	1.051	1.026	
520	130.0	1.024	0.979	1.034	1.023	1.159	1.133	1.063	1.030	

Full Load Operation

Full Load Cooling Corrections 400 CFM per Ton													
Ent Air WB F	Total Clg Cap	Sens Clg Cap Multipliers- Entering DB F										Power	Heat of Rej
		60	65	70	75	80	80.6	85	90	95	100		
45	0.832	*	*	*	*	*	*	*	*	*	*	0.946	0.853
50	0.850	1.066	1.246	*	*	*	*	*	*	*	*	0.953	0.870
55	0.880	0.737	0.958	1.119	*	*	*	*	*	*	*	0.964	0.896
60	0.922		0.686	0.892	1.102	*	*	*	*	*	*	0.977	0.932
65	0.975			0.641	0.868	1.093	1.120	*	*	*	*	0.993	0.979
66.2	0.990			0.547	0.763	1.038	1.065	1.261	*	*	*	0.997	0.991
67	1.000			0.505	0.717	1.000	1.027	1.223	*	*	*	1.000	1.000
70	1.040				0.603	0.857	0.884	1.080	1.302	*	*	1.011	1.035
75	1.117					0.610	0.637	0.834	1.062	1.296	*	1.033	1.101

* Sensible capacity equals total capacity.

Full Load Heating Corrections			
Ent Air DB F	Htg Cap	Power	Heat of Ext
20	1.098	0.701	1.197
25	1.084	0.714	1.177
30	1.072	0.731	1.157
35	1.061	0.753	1.138
40	1.052	0.779	1.120
45	1.043	0.808	1.102
50	1.035	0.841	1.084
55	1.027	0.877	1.065
60	1.019	0.915	1.045
65	1.010	0.957	1.023
68	1.004	0.982	1.010
70	1.000	1.000	1.000
75	0.989	1.045	0.974
80	0.976	1.093	0.946

Airflow Full Load		Heating			Cooling					
CFM Per Ton of Clg	% of Nominal	Htg Cap	Power	Heat of Ext	Total Cap	Sens Cap	S/T	Power	Heat of Rej	
240	60.0	0.946	1.153	0.896	0.925	0.788	0.852	0.913	0.922	
275	68.8	0.959	1.107	0.924	0.946	0.829	0.876	0.926	0.942	
300	75.0	0.969	1.078	0.942	0.960	0.861	0.897	0.937	0.955	
325	81.3	0.977	1.053	0.959	0.972	0.895	0.921	0.950	0.968	
350	87.5	0.985	1.032	0.974	0.983	0.930	0.946	0.982	0.979	
375	93.8	0.993	1.014	0.988	0.992	0.965	0.973	0.982	0.990	
400	100.0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
425	106.3	1.006	0.989	1.011	1.007	1.033	1.027	1.020	1.009	
450	112.5	1.012	0.982	1.019	1.012	1.064	1.052	1.042	1.018	
475	118.8	1.018	0.979	1.027	1.016	1.092	1.075	1.066	1.025	
500	125.0	1.022	0.977	1.033	1.018	1.116	1.096	1.091	1.032	
520	130.0	1.026	0.975	1.038	1.019	1.132	1.110	1.112	1.037	

Antifreeze & Water Pressure Drop Adder for Options - Correction Table

Antifreeze Correction Table

Antifreeze Type	Antifreeze %	Cooling			Heating		WPD Corr. Fct. EWT 30°F
		EWT 90°F			EWT 30°F		
		Total Cap	Sens Cap	Power	Htg Cap	Power	
Water	0	1.000	1.000	1.000	1.000	1.000	1.000
Propylene Glycol	5	0.995	0.995	1.003	0.989	0.997	1.070
	15	0.986	0.986	1.009	0.968	0.990	1.210
	25	0.978	0.978	1.014	0.947	0.983	1.360
Methanol	5	0.997	0.997	1.002	0.989	0.997	1.070
	15	0.990	0.990	1.007	0.968	0.990	1.160
	25	0.982	0.982	1.012	0.949	0.984	1.220
Ethanol	5	0.998	0.998	1.002	0.981	0.994	1.140
	15	0.994	0.994	1.005	0.944	0.983	1.300
	25	0.986	0.986	1.009	0.917	0.974	1.360
Ethylene Glycol	5	0.998	0.998	1.002	0.993	0.998	1.040
	15	0.994	0.994	1.004	0.980	0.994	1.120
	25	0.988	0.988	1.008	0.966	0.990	1.200

Two Stage Geothermal Heat Pump Systems

Blower Performance Data

Model	Max ESP (in. wg)	Fan Motor (hp)	Tap Setting	Airflow in CFM with wet coil and clean air filter									Residential Units Only	
				Cooling Mode			Dehumid Mode			Heating Mode			AUX CFM	Aux/ Emerg Mode
				Stg 1	Stg 2	Fan	Stg 1	Stg 2	Fan	Stg 1	Stg 2	Fan		
024	0.50	1/2	4	810	950	475	630	740	475	920	1060	475	4	1060
	0.50	1/2	3	725	850	425	560	660	425	825	950	425	3	950
	0.50	1/2	2	620	730	370	490	570	370	710	820	370	2	820
	0.50	1/2	1	520	610	300				600	690	300	1	690
036	0.50	1/2	4	1120	1400	700	870	1090	700	1120	1400	700	4	1400
	0.50	1/2	3	1000	1250	630	780	980	630	1000	1250	630	3	1350
	0.50	1/2	2	860	1080	540	670	840	540	860	1080	540	2	1350
	0.50	1/2	1	730	900	450				730	900	450	1	1350
048	0.75	1	4	1460	1730	870	1140	1350	870	1560	1850	870	4	1850
	0.75	1	3	1300	1550	780	1020	1210	780	1400	1650	780	3	1660
	0.75	1	2	1120	1330	670	870	1040	670	1200	1430	670	2	1430
	0.75	1	1	940	1120	560				1010	1200	560	1	1350
060	0.75	1	4	1670	2050	1020	1300	1600	1020	1860	2280	1020	4	2280
	0.75	1	3	1500	1825	920	1160	1430	920	1650	2050	920	3	2040
	0.75	1	2	1280	1580	790	1000	1230	790	1430	1750	790	2	1750
	0.75	1	1	1080	1320	660				1200	1470	660	1	1470
070	0.75	1	4	1620	2190	1050	1270	1650	1050	1690	2230	1050	4	2230
	0.75	1	3	1500	1950	980	1170	1520	980	1600	2100	980	3	2100
	0.75	1	2	1400	1830	910	1100	1420	910	1400	1850	910	2	1870
	0.75	1	1	1320	1700	850				1240	1620	850	1	1670

Factory shipped on Tap Setting 2
 During Auxiliary operation (residential units only) the CFM will run at the higher if the heating (delay jumper) or AUX settings
 Airflow is controlled within +/- 5% up to Max ESP shown with wet coil and standard 1" fiberglass filter
 Do not select Dehumidification mode if HP CFM is on setting 1
 All units ARI/ISO/ASHRAE 13256-1 rated HP (Cooling) Delay (Heating) CFM Setting 3

ECM Control Features

ECM Board Tap Settings

Cooling settings:

Tap Setting	DIP Switch	
	SW1	SW2
1	ON	ON
2	ON	OFF
3	OFF	ON
4	OFF	OFF

Heating settings:

Tap Setting	DIP Switch	
	SW3	SW4
1	ON	ON
2	ON	OFF
3	OFF	ON
4	OFF	OFF

Aux/Emerg Heat settings:

Tap Setting	DIP Switch	
	SW5	SW6
1	ON	ON
2	ON	OFF
3	OFF	ON
4	OFF	OFF

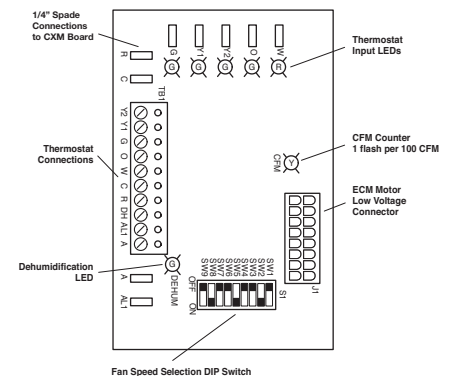
CFM Adjust settings:

Tap Setting	DIP Switch	
	SW7	SW8
TEST	ON	ON
-	ON	OFF
+	OFF	ON
NORM	OFF	OFF

Dehum Mode settings:

Tap Setting	DIP Switch
	SW9
NORM	ON
Dehumid	OFF

ECM Interface Layout



Two Stage Geothermal Heat Pump Systems

ECM Control Features

The ECM fan is controlled by an interface board that converts thermostat inputs and field selectable CFM settings to signals used by the ECM motor controller.

Fan speeds are selected with jumpers via a nine position DIP switch.

To take full advantage of the ECM motor features, a multi-stage thermostat such as 7800-201 should be used (2-stage heat/2-stage cool or 3-stage heat/2-stage cool).

Note: Power must be off to the unit for at least three seconds before the ECM motor will recognize a speed change. The motor will recognize a change in the CFM Adjust or dehumidification mode settings while the unit is powered.

There are four different airflow settings from lowest airflow rate (speed tap 1) to the highest airflow rate (speed tap 4). The charts below indicate settings for both versions of the ECM interface board, followed by detailed information for each setting.

Cooling settings: The cooling setting determines the cooling (normal) CFM for all units with ECM motor. Cooling (normal) setting is used when the unit is not in dehumidification mode.

Tap 1 is the lowest CFM setting, while tap 4 is the highest CFM setting. To avoid air coil freeze-up, tap 1 may not be used if the dehumidification mode is selected. Consult airflow specifications for the specific unit model to correlate speed tap setting to airflow in CFM.

Heating settings: The heating setting determines the heating.

Tap 1 is the lowest CFM setting, while tap 4 is the highest CFM setting. Consult airflow specifications for the specific unit model to correlate speed tap setting to airflow in CFM.

Auxiliary/Emergency Heat settings: The auxiliary/emergency heat setting determines the CFM when the unit is in auxiliary heat or emergency heat mode. This setting is used for residential units with internal electric heat. When auxiliary electric heat is energized (i.e. compressor and electric heat), the greater of the auxiliary/emergency or heating setting will be used. A "G" (fan) signal must be present from the thermostat for electric heat to operate. Consult airflow specifications for the specific unit model to correlate speed tap setting to airflow in CFM.

CFM Adjust settings: The CFM adjust setting allows four selections. The NORM setting is the factory default position. The + or – settings adjust the airflow by +/- 15%. The +/- settings are used to "fine tune" airflow adjustments. The TEST setting runs the ECM motor at 70% torque, which causes the motor to operate like a standard PSC motor, and disables the CFM counter.

Dehumidification Mode settings: The dehumidification mode setting provides field selection of humidity control. When operating in the normal mode, the cooling airflow settings are determined by the cooling tap setting above. When dehumidification is enabled there is a reduction in airflow in cooling to increase the moisture removal of the heat pump. Consult airflow specifications for the specific unit model to correlate speed tap setting to airflow in CFM. The dehumidification mode can be enabled in two ways.

1. **Constant Dehumidification Mode:** When the dehumidification mode is selected (via DIP switch or jumper setting), the ECM motor will operate with a multiplier applied to the cooling CFM settings (approx. 20-25% lower airflow). Any time the unit is running in the cooling mode, it will operate at the lower airflow to improve latent capacity. The "DEHUM" LED will be illuminated at all times. Heating airflow is not affected. NOTE: Do not select dehumidification mode if cooling setting is tap 1.
2. **Automatic (Humidistat-controlled) Dehumidification Mode:** When the dehumidification mode is selected (via DIP switch or jumper setting) AND a humidistat is connected to terminal DH, the cooling airflow will only be reduced when the humidistat senses that additional dehumidification is required. The DH terminal is reverse logic. Therefore, a humidistat (not dehumidistat) is required. The "DEHUM" LED will be illuminated only when the humidistat is calling for dehumidification mode. Heating airflow is not affected. NOTE: Do not select dehumidification mode if cooling setting is tap 1.

Two Stage Geothermal Heat Pump Systems

HT Physical Data

Model	HT 024	HT 036	HT 048	HT 060	HT 070
Compressor (1 Each)	Two-Stage Scroll				
Factory Charge R410a, oz	58	78	81	144	156
ECM Fan Motor & Blower Wheel					
Fan Motor Type & Speeds	ECM Variable Speed				
Fan Motor, hp	1/2	1/2	1	1	1
Blower Wheel Size (Dia x W), in	9 x 7	11 x 10	11 x 10	11 x 10	11 x 10
Water Connection Size					
Swivel	1"	1"	1"	1"	1"
HWG Water Connection Size					
Swivel	1"	1"	1"	1"	1"
Vertical-HTV & Downflow-HTD					
Air Coil Dimensions (H x W), in	28 x 20	28 x 25	32 x 25	36 x 25	36x25
Standard Filter - 2" Pleated HERV11, Quantity - in x in	1 - 24 x 28	1 - 28 x 30	1 - 30 x 32	1 - 30 x 36	1 - 30 x 36
Weight - Operating, lbs	266	327	416	443	443
Weight - Packaged, lbs	276	337	426	453	453
Horizontal-HTH					
Air Coil Dimensions (H x W), in	18 x 31	20 x 35	20 x 40	20 x 45	20 x 45
Standard Filter - 2" Pleated MERV11, Quantity - in x in	2 - 18 x 18	1 - 12 x 20 1 - 20 x 25	1 - 18 x 20 1 - 20 x 24	2 - 20 x 24	2 - 20 x 24
Weight - Operating, lbs	266	327	416	443	443
Weight - Packaged, lbs	276	337	426	453	453

All units have spring compressor mountings, TXV expansion devices, and 1/2" [12.7mm] & 3/4" [19.1mm] electrical knockouts.

HT Electrical Data

Model	Voltage Code	Voltage	Min/Max Voltage	Compressor			Fan Motor FLA	Total Unit FLA	MCA	Max/Fuse
				QTY	RLA	LRA				
024	1	208/230-60/1	197/254	1	10.3	52.0	3.9	18.6	21.2	30
036	1	208/230-60/1	197/254	1	16.7	82.0	3.9	25.0	29.2	45
048	1	208/230-60/1	197/254	1	21.2	96.0	6.9	32.5	37.8	50
060	1	208/230-60/1	197/254	1	25.6	118.0	6.9	36.9	43.3	60
070	1	208/230-60/1	197/254	1	27.2	150.0	6.9	38.5	45.3	70

Min/Max Voltage of 197/254

HACR circuit breaker in USA only

All fuses Class RK-5

Wire size based on 60°C copper conductor and Minimum Circuit Ampacity.

Wire length based on one way measurement with 2% voltage drop

Two Stage Geothermal Heat Pump Systems

Dimensions – Vertical Upflow

Vertical Upflow Model		Overall Cabinet		
		A Width	B Depth	C Height
024	in	22.4	25.6	48.5
	cm	56.8	65.1	123.2
036	in	25.4	30.6	50.5
	cm	64.5	77.8	128.3
048	in	25.4	30.6	54.5
	cm	64.5	77.8	138.4
060	in	25.4	30.6	58.5
	cm	64.5	77.8	148.6
070	in	25.4	30.6	58.5
	cm	64.5	77.8	148.6

Vertical Upflow Model		Water Connections						
		①	②	③	④	⑤		
		D In	E Out	F HWG IN	G HWG Out	H Condensate	Loop Water IPT	HWG IPT
024	in	2.1	10.0	13.9	16.9	7.8	1"	1"
	cm	5.2	25.4	35.2	42.9	19.8	Swivel	Swivel
036	in	3.4	10.8	15.6	18.9	7.8	1"	1"
	cm	8.6	27.5	39.7	47.9	19.8	Swivel	Swivel
048	in	3.4	10.8	15.6	18.9	7.8	1"	1"
	cm	8.6	27.5	39.7	47.9	19.8	Swivel	Swivel
060	in	3.4	10.8	15.6	18.9	7.8	1"	1"
	cm	8.6	27.5	39.7	47.9	19.8	Swivel	Swivel
070	in	3.4	10.8	15.6	18.9	7.8	1"	1"
	cm	8.6	27.5	39.7	47.9	19.7	Swivel	Swivel

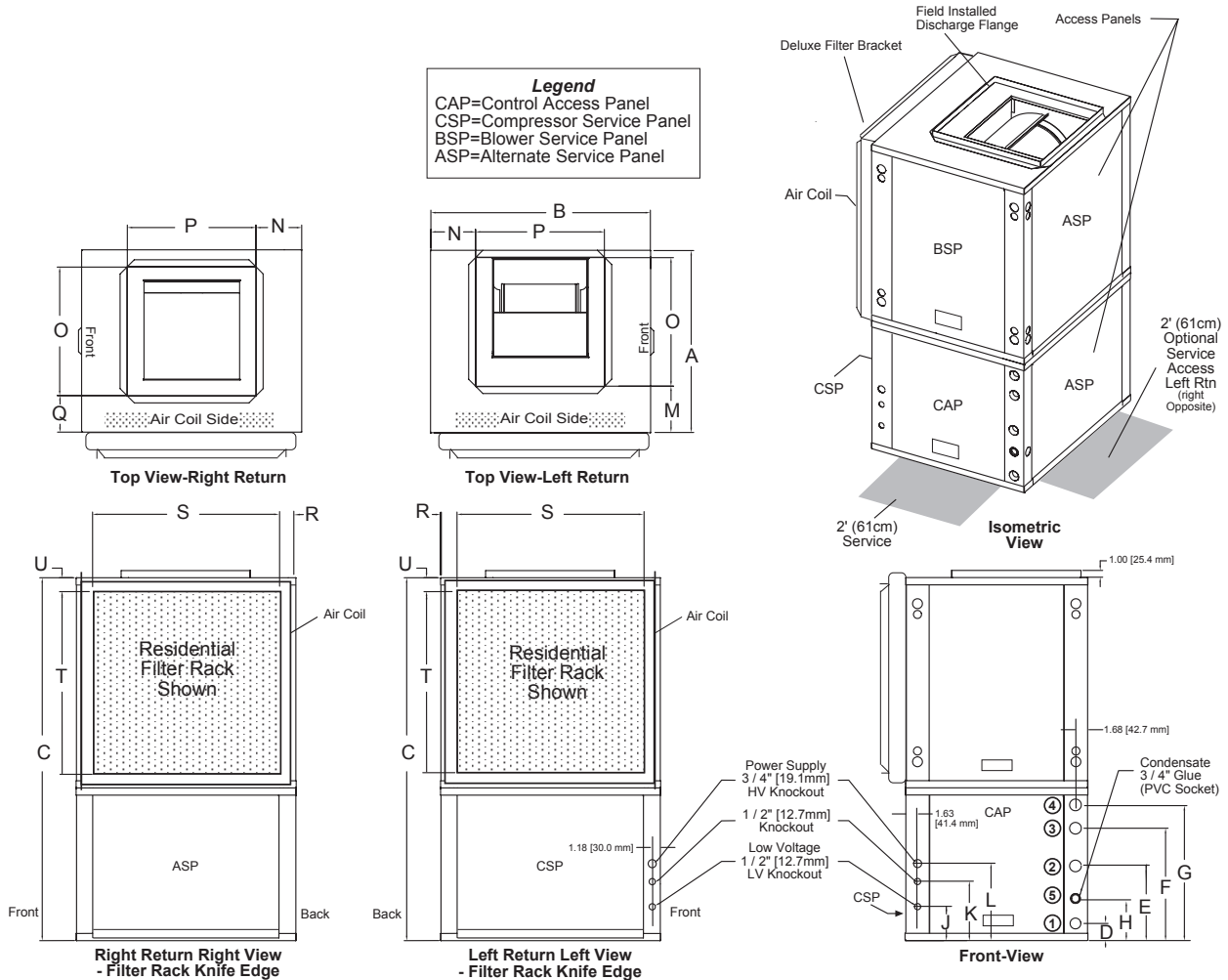
Vertical Upflow Model		Electrical Knockouts		
		J 1/2"	K 1/2"	L 3/4"
		Low Voltage	External Pump	Power Supply
024	in	3.6	6.1	8.6
	cm	9.2	15.6	21.9
036	in	3.6	6.1	8.6
	cm	9.2	15.6	21.9
048	in	3.6	6.1	8.6
	cm	9.2	15.6	21.9
060	in	3.6	6.1	8.6
	cm	9.2	15.6	21.9
070	in	3.6	6.1	8.6
	cm	9.2	15.6	21.9

Condensate is 3/4" PVC female glue socket and is switchable from front to side.
 Unit shipped with deluxe duct collar/filter rack extending from unit 2" (5.1 cm) and is suitable for duct connection.
 Discharge flange is field installed.

Two Stage Geothermal Heat Pump Systems

Dimensions – Vertical Upflow

Vertical Upflow Model		Discharge Connection Duct Flange Installed (+/- 0.10 in, +/- 2.5mm)					Return Connection Standard Deluxe Filter Rack (+/- 0.10 in, +/- 2.5mm)			
		M Left Return	N	O Supply Width	P Supply Depth	Q Right Return	R	S Return Depth	T Return Height	U
024	in cm	7.8 18.3	5.8 14.8	14.0 35.6	14.0 35.6	4.9 12.4	1.7 4.2	22.2 56.4	26.2 66.4	1.5 3.9
036	in cm	6.4 16.1	6.3 16.0	18.0 45.7	18.0 45.7	5.3 13.5	2.1 5.4	27.1 68.9	26.1 66.4	1.5 3.9
048	in cm	6.4 16.1	6.3 16.0	18.0 45.7	18.0 45.7	5.3 13.5	2.1 5.4	27.1 68.9	30.1 76.5	1.5 3.9
060	in cm	6.4 16.1	6.3 16.0	18.0 45.7	18.0 45.7	5.3 13.5	2.1 5.4	27.1 68.9	34.1 86.7	1.5 3.9
070	in cm	6.4 16.1	6.3 16.0	18.0 45.7	18.0 45.7	5.3 13.5	2.1 5.4	27.1 68.9	34.1 86.7	1.5 3.9



Two Stage Geothermal Heat Pump Systems

Dimensions – Vertical Downflow

Vertical Downflow Model		Overall Cabinet		
		A Width	B Depth	C Height
024	in cm	22.4 56.8	25.6 65.1	52.4 133.1
036	in cm	25.4 64.5	30.6 77.8	54.4 138.2
048	in cm	25.4 64.5	30.6 77.8	58.4 148.2
060	in cm	25.4 64.5	30.6 77.8	62.4 158.5
070	in cm	25.4 64.5	30.6 77.8	62.4 158.5

Vertical Downflow Model		Water Connections						
		①	②	③	④	⑤	Loop Water IPT	HWG IPT
		D In	E Out	F HWG IN	G HWG Out	H Condensate		
024	in cm	17.0 42.9	14.0 35.3	5.4 13.7	2.4 6.1	3.6 8.9	1" Swivel	1" Swivel
036	in cm	19.0 48.0	16.0 40.4	5.4 13.7	2.4 6.1	3.6 8.9	1" Swivel	1" Swivel
048	in cm	19.0 48.0	16.0 40.4	5.4 13.7	2.4 6.1	3.6 8.9	1" Swivel	1" Swivel
060	in cm	19.0 48.0	16.0 40.4	5.4 13.7	2.4 6.1	3.6 8.9	1" Swivel	1" Swivel
070	in cm	19.0 48.0	16.0 40.4	5.4 13.7	2.4 6.1	3.6 8.9	1" Swivel	1" Swivel

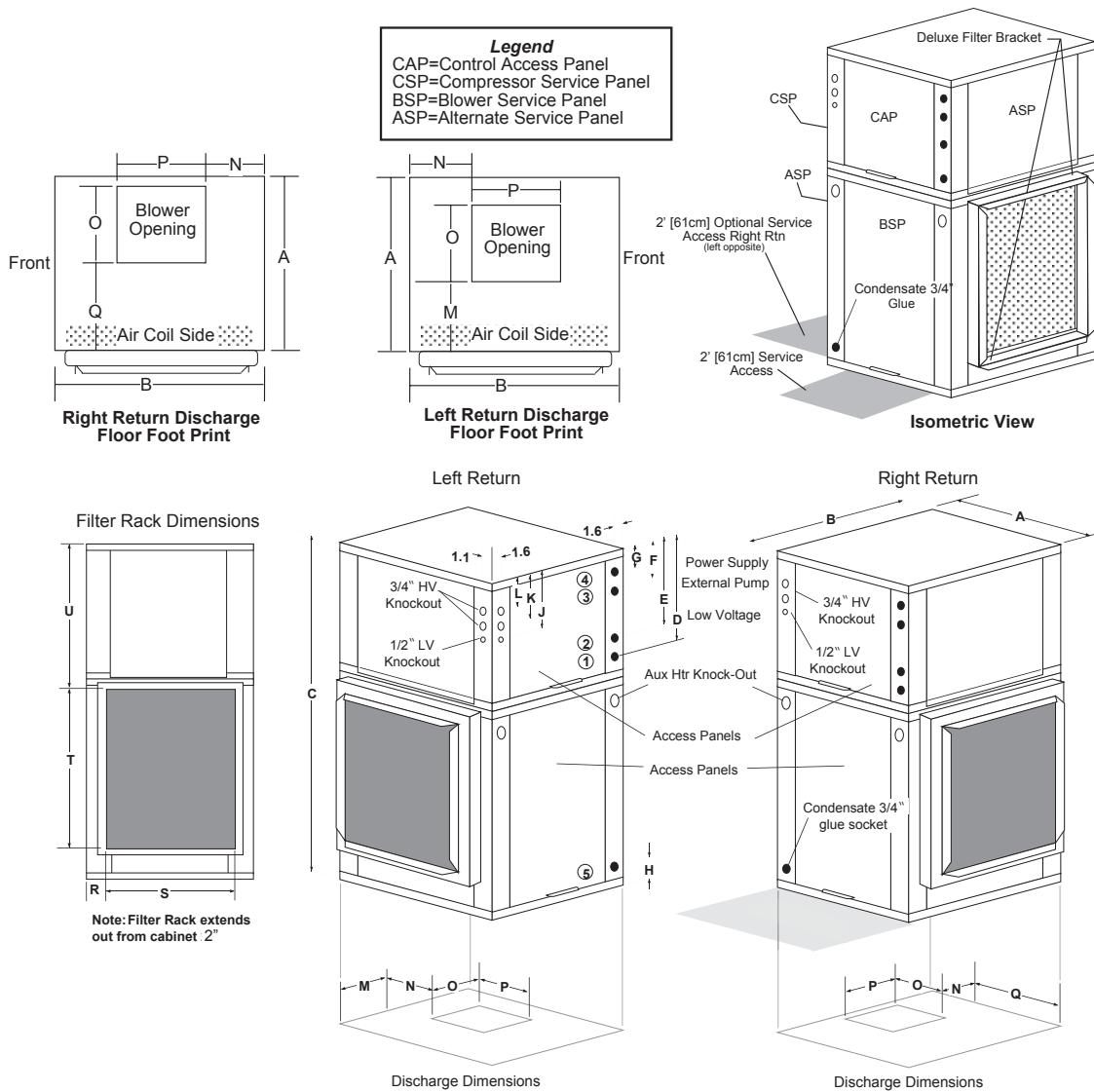
Vertical Downflow Model		Electrical Knockouts		
		J 1/2"	K 1/2"	L 3/4"
		Low Voltage	External Pump	Power Supply
024	in cm	13.7 33.0	9.7 24.1	7.2 17.8
036	in cm	13.7 33.0	9.7 24.1	7.2 17.8
048	in cm	13.7 33.0	9.7 24.1	7.2 17.8
060	in cm	13.7 33.0	9.7 24.1	7.2 17.8
070	in cm	13.7 33.0	9.7 24.1	7.2 17.8

Condensate is 3/4" PVC female glue socket and is switchable from front to side.
 Unit shipped with deluxe duct collar/filter rack extending from unit 2" (5.1 cm) and is suitable for duct connection.
 Downflow unit does not have discharge flange, and is rated for zero clearance installation.

Two Stage Geothermal Heat Pump Systems

Dimensions – Vertical Downflow

Vertical Downflow Model		Discharge Connection Duct Flange Installed (+/- 0.10 in, +/- 2.5mm)					Return Connection Standard Deluxe Filter Rack (+/- 0.10 in, +/- 2.5mm)			
		M Left Return	N	O Supply Width	P Supply Depth	Q Right Return	R	S Return Depth	T Return Height	U
024	in cm	6.1 15.4	8.2 20.8	10.4 26.4	9.4 23.5	10.9 27.9	1.8 4.6	22.3 56.6	26.2 66.5	21.1 53.6
036	in cm	7.4 18.3	8.6 22.1	13.6 34.4	13.3 33.7	10.5 27.5	1.5 3.8	27.8 70.6	26.2 66.5	23.1 58.4
048	in cm	7.4 18.3	8.6 22.1	13.6 34.4	13.3 33.7	10.5 27.5	1.5 3.8	27.8 70.6	30.2 76.7	23.1 58.4
060	in cm	7.4 18.3	8.6 22.1	13.6 34.4	13.3 33.7	10.5 27.5	1.5 3.8	27.8 70.6	26.2 66.5	23.1 58.4
070	in cm	7.4 18.3	8.6 22.1	13.6 34.4	13.3 33.7	10.5 27.5	1.5 3.8	27.8 70.6	34.2 86.9	23.1 58.4



Two Stage Geothermal Heat Pump Systems

Dimensions – Horizontal

Horizontal Model		Overall Cabinet		
		A Width	B Depth	C Height
024	in	22.4	62.2	19.3
	cm	56.8	158.0	48.9
036	in	25.4	71.2	21.3
	cm	64.5	180.8	54.0
048	in	25.4	76.2	21.3
	cm	64.5	193.5	54.0
060	in	25.4	81.2	21.3
	cm	64.5	206.2	54.0
070	in	25.4	81.2	21.3
	cm	64.5	206.2	54.0

Horizontal Model		Water Connections						
		①	②	③	④	⑤	Loop Water IPT	HWG IPT
		D In	E Out	F HWG IN	G HWG Out	H Condensate		
024	in	2.1	10.0	13.9	16.9	0.6	1" Swivel	1" Swivel
	cm	5.2	25.4	35.2	42.9	1.5		
036	in	3.4	10.8	15.6	18.9	0.6	1" Swivel	1" Swivel
	cm	8.6	27.5	39.7	47.9	1.5		
048	in	3.4	10.8	15.6	18.9	0.6	1" Swivel	1" Swivel
	cm	8.6	27.5	39.7	47.9	1.5		
060	in	3.4	10.8	15.6	18.9	0.6	1" Swivel	1" Swivel
	cm	8.6	27.5	39.7	47.9	1.5		
070	in	3.4	10.8	15.6	18.9	0.6	1" Swivel	1" Swivel
	cm	8.6	27.5	39.7	47.9	1.5		

Horizontal Model		Electrical Knockouts		
		J 1/2"	K 1/2"	L 3/4"
		Low Voltage	External Pump	Power Supply
024	in	3.6	6.1	8.6
	cm	9.2	15.6	21.9
036	in	3.4	6.1	8.6
	cm	9.2	15.6	21.9
048	in	3.6	6.1	8.6
	cm	9.2	15.6	21.9
060	in	3.6	6.1	8.6
	cm	9.2	15.6	21.9
070	in	3.6	6.1	8.6
	cm	9.2	15.6	21.9

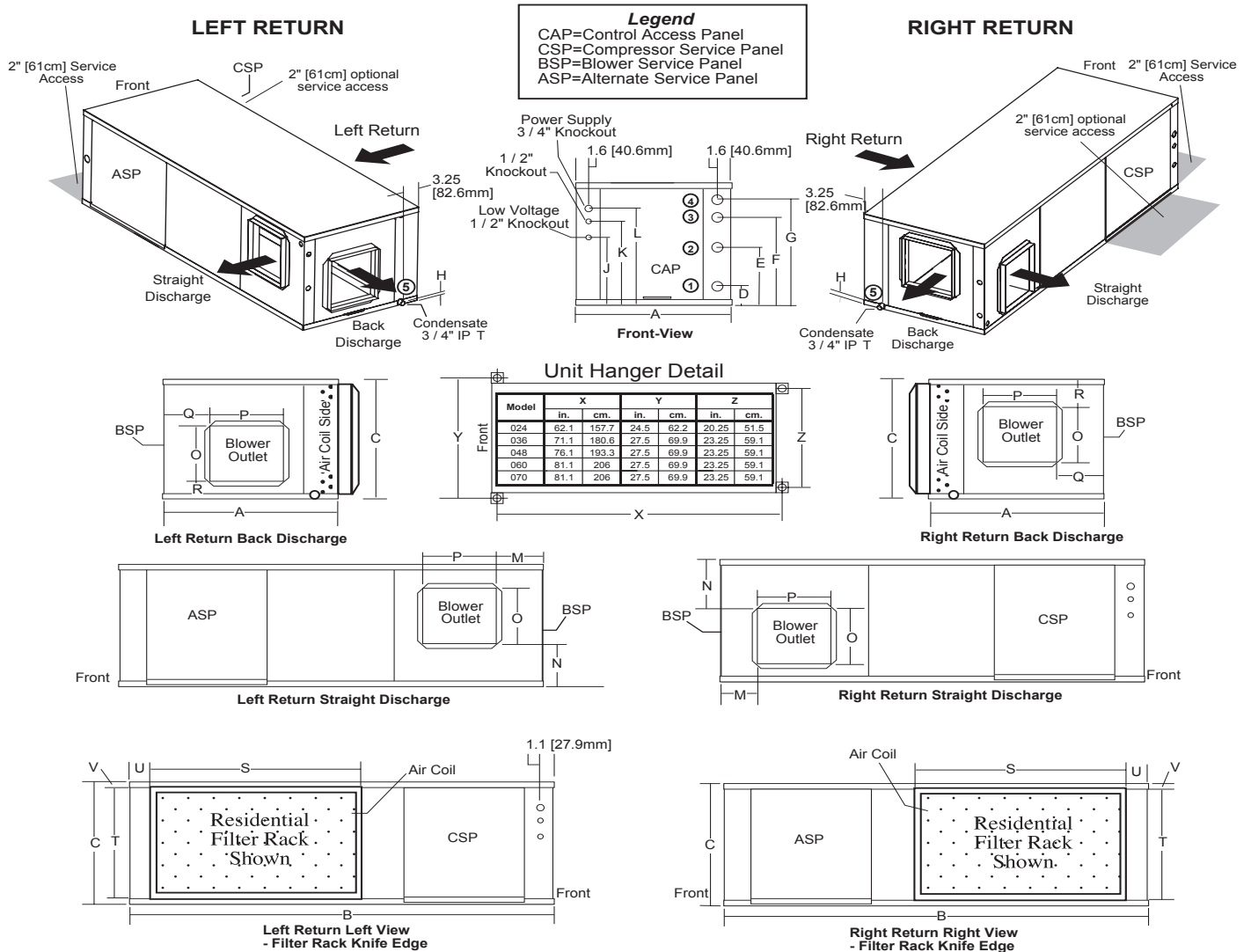
Condensate is 3/4" IPT.

Unit shipped with deluxe duct collar/filter rack extending from unit 3" [7.6cm] and is suitable for duct connection. Discharge flange and hanger brackets are factory installed.

Two Stage Geothermal Heat Pump Systems

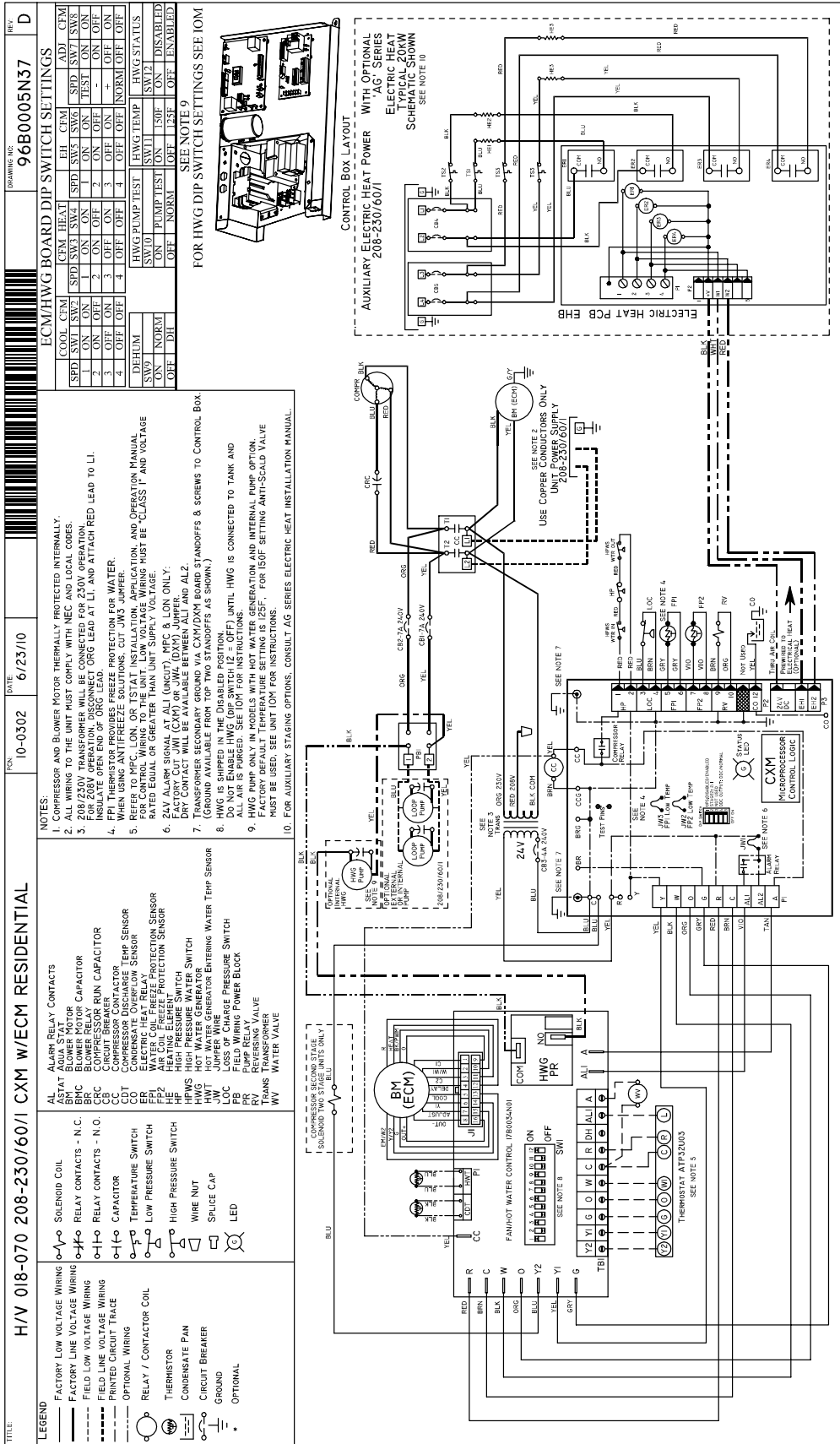
Dimensions – Horizontal

Horizontal Model		Discharge Connection Duct Flange Installed (+/- 0.10 in, +/- 2.5mm)						Return Connection Standard Deluxe Filter Rack (+/- 0.10 in, +/- 2.5mm)			
		M	N	O Supply Width	P Supply Depth	Q	R	S Return Depth	T Return Height	U	V
024	in cm	3.6 9.3	2.0 5.1	12.5 31.8	15.5 39.4	3.6 9.2	2.0 5.2	33.8 85.8	16.2 41.0	2.3 5.8	1.5 3.9
036	in cm	3.1 7.4	1.2 3.1	19.0 48.3	17.5 44.5	3.1 7.4	1.0 2.6	34.8 88.3	18.2 46.1	3.1 7.8	1.5 3.9
048	in cm	3.1 7.4	1.2 3.1	19.0 48.3	17.5 44.5	3.1 7.4	1.0 2.6	39.8 101.0	18.2 46.1	3.1 7.8	1.5 3.9
060	in cm	3.1 7.4	1.2 3.1	19.0 48.3	17.5 44.5	3.1 7.4	1.0 2.6	44.8 113.7	18.2 46.1	3.1 7.8	1.5 3.9
070	in cm	3.1 7.4	1.2 3.1	19.0 48.3	17.5 44.5	3.1 7.4	1.0 2.6	44.8 113.7	18.2 46.1	3.1 7.8	1.5 3.9



Typical Wiring Diagram

HTV/HTD/HTH Units with CXM Board and ECM Fan Motor (single phase)



Two Stage Geothermal Heat Pump Systems

Auxiliary Electric Heat

Auxiliary Heat Ratings

Auxiliary Electric Heat Model	HT					kW Rating		Btuh Rating		Minimum CFM Required
	024	036	048	060	070	230V	208V	230V	208V	
HGM5A						4.8	3.6	16300	12300	500
HGM8A						7.6	5.7	25900	19400	650
HGM10A						9.6	7.2	32700	24600	650
HGM12A						11.4	8.6	38900	29200	750
HGL10A						9.6	7.2	32700	24600	1300
HGL15A						14.4	10.8	49100	36900	1350
HGL20A						19.2	14.4	65500	49200	1350

Grey area denotes compatibility

Note: Vertical units rated for zero clearance for both unit and duct.

Auxiliary Heat Electrical Data

Auxiliary Electric Heat Model	Supply Circuit	Heater Amps		Minimum Circuit Amps		Maximum Fuse		Supply Wire	
		230V	208V	230V	208V	230V	208V	Min AWG	Max Ft
HGM5A	Single	20.0	17.3	25.0	21.6	25	25	10	70
HGM8A	Single	31.7	27.5	39.6	34.4	40	35	8	70
HGM10A	Single	40.0	34.7	50.0	43.4	50	45	6	90
HGM12A	Single	47.5	41.2	59.4	51.5	60	60	6	70
	Dual - L1/L2 Dual - L3/L4	31.7 15.8	27.5 13.7	39.6 19.8	34.4 17.1	40 20	35 20	8 12	70 50
HGL10A	Single	40.0	34.7	50.0	43.4	50	45	6	80
HGL15A	Single	60.0	52.0	75.0	65.0	80	70	6	50
	Dual - L1/L2 Dual - L3/L4	40.0 20.0	34.7 17.3	50.0 25.0	43.4 21.6	50 25	45 25	6 10	80 70
HGL20A	Single	80.0	69.3	100.0	86.6	100	90	2	100
	Dual - L1/L2 Dual - L3/L4	40.0 40.0	34.7 34.7	50.0 50.0	43.4 43.4	50 50	45 45	6 6	80 80

All heaters rated single phase 208-230V 60Hz

Wire length based on one way measurement with 2% voltage drop

Wire size based on 60°C (90°C) copper conductor

All models 12kW or larger feature internal circuit breakers All Fuses UL Class K general purpose

Accessories & Options

Hot Water Generator

An optional insulated heat reclaiming desuperheater coil of vented double-wall copper construction suitable for potable water shall be provided. The coil and hot water circulating pump shall be factory mounted inside the unit. A high limit and low compressor discharge line temperature switch shall be provided to disable the pump when these conditions occur.

Cupro-Nickel Heat Exchanger

An optional corrosion resistant CuNi coaxial heat exchanger shall be factory installed in lieu of standard copper construction.

Thermostat (field installed)

A multistage auto-changeover electronic digital thermostat shall be provided. The thermostat shall offer 3 heating and 2 cooling stages with precise temperature control. An OFF-HEAT-AUTO-COOL-EMERG system switch, OFF-AUTO fan switch, and indicating LED's shall be provided. The thermostat shall read out in °F or °C. An optional remote indoor sensor and outdoor sensor use shall be available on some models.

Auxiliary Heater (field installed)

An external, field-installed electric heater shall provide supplemental and/or emergency heating capability when used with the three stage heating thermostat. (Heater is externally mounted on horizontal and vertical units).

Design, specifications, performance data and materials subject to change without notice.

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