Hydro Solar
Innovative Energy

GEOTHERMAL LIQUID TO WATER DC INVERTER HEAT PUMPS

Multi-Applications Heat Pumps

DC inverter Liquid to Water Heat Pumps for Space Heating, Space Cooling, Domestic Hot Water Pre-Heating, Heat recovery, Hot Tub and Swimming Pools water heating and cooling.

GEO 040, 60, 80
V1LM SERIES

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Contents

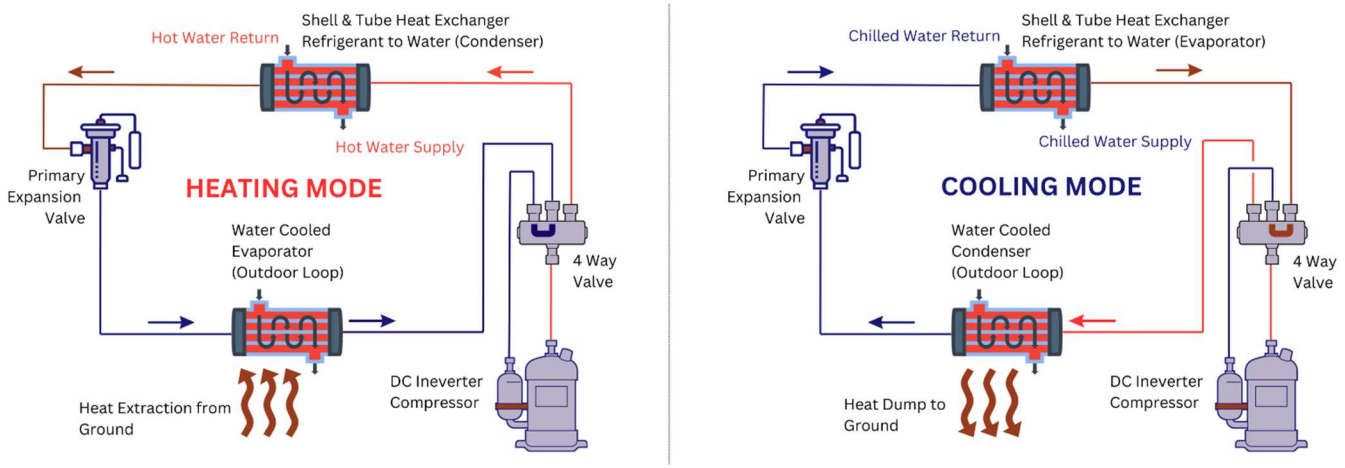
Introduction

What Is Geothermal Liquid-to-Water Heat Pump?

Liquid to Water Heat Pump is a device that draws heat from one place (called heat source) and reject the drawn heat to another place (called heat sink). Unlike conventional air to air heat pump, where generated thermal energy is used to cool/heat air, Liquid to Water Heat Pumps draw energy from the ground (geothermal heat exchanger) and use generated thermal energy to cool/heat water or water/glycol fluid mixture. Our Liquid to water heat pumps are equipped with DC inverter Compressor, which allows them to modulate and match their energy outputs with heating/cooling demand.

What Is a DC Inverter Compressor?

DC inverter compressors are variable speed compressors powered by direct current inverters. Speed is modulated via an external variable-frequency drive - to control the speed of the compressor. The refrigerant flow rate is changed by the change in the speed of compressor. The turndown ratio depends on the system configuration and manufacturer. It modulates from 15 or 25% up to 100% at full capacity. This means that heat pump operating with a DC inverter compressor can matches its capacity to the demand by simply modulating its compressor speed. Unlike conventional one or two stages compressors, Heat Pumps equipped with a DC inverter compressor do not cycle ON and OFF more frequently, they run most of the time at lower speeds.



Depending on operating mode, the 4 Way Valve reverses refrigerant flow cycle, and instead of extracting energy from the ground (Heating Mode), it switches to dumping energy to the ground (cooling mode). Heat Sink and Heat Source can be altered. In Cooling mode, heat sink could be a swimming pool or a hot tube (please refer to the applications section for more information).

Why are Liquid-to-Water Heat Pumps becoming so popular?

Canadian/US Building Codes are becoming more demanding in terms of energy efficiency for both residential and commercial buildings. Canadian Federal Government is aiming to gradually increase the energy efficiency standard for both existing and new constructions by requiring that every new home in Canada be Net Zero Ready by 2025 and completely Net Zero by 2030.

Despite the advancement in air source heat pump technology, they still need to be installed with a backup heat source in the northern portion of the US and in most Canadian cities. When properly designed and sized, Liquid to Water Geothermal Heat Pumps can provide the necessary space heating/cooling demand without the need of a backup heating source. Thermal energy is extracted or dumped from the deep ground where the temperature is near the undisturbed ground temperature.

Features

General Specifications

1- Ground Loop Heat Exchanger is made from Titanium.
2- Ground Loop is a coaxial Heat Exchanger.
3- Heat Pump can be used in Open and Closed Loop Geothermal without the need of Cupro-Nickel Coating.
4- Indoor Loop heat Exchanger is made from copper.
5- Indoor Loop is a shell and tube heat exchanger.
6- Heat Pump uses R32 refrigerant.
7- Power Supply: 220-240V/1PH/60Hz.
8- Heat Pump uses Panasonic DC Inverter Twin Rotary Compressors (One compressor per Heat Pump).
9- Control Protocol: Modbus.
10- Control Main Board, Inverter Boards, EEV and other by Carel.
11- Hot/Chilled Water supply temperatures can be reset with Outdoor Temperature (Outdoor Temperature Sensor is supplied with the Heat Pump, it requires field installation and wiring).
12- Controller can display units in both IP and SI format.

13- Satin galvanized steel cabinet with powder coat finish
14- Acoustically insulated cabinet.
15- All connections located on same side.
16- 4-way reversing valve.
17- Electronic Expansion Valve (EEV).
18- Refrigerant high- and low-pressure sensors.
19- Suction line temperature sensor.
20- Temperature sensors on all 4 water lines.
21- PWM signal for modulating Indoor Loop Circulation Pump Speed and Flow.
22- Separate wired temperature sensor to measure (T5) to measure Domestic Hot Water Pre-Heating tank temperature. When separate from space heating tank, HP allows the DHW Tank to be maintained at a separate temperature.

Optional Items

1. BMS interface card (Carel PCOS004850).
2. Hydronic Circulation pumps for indoor / ground loop.
3. Buffer Tanks
4. Backup Heaters

Ratings and Certifications

Testing and Certifications:

Heat Pumps are tested and certified as per UL 60335-1:2016, UL 60335-2-40: 2022 and CAN/CSA-C22.2 NO. 60335-1:16 (R2021), CSA C22.2 NO. 60335-2-40:22 at TUV Rheinland Laboratories.

Ratings List / Design Values

Model No.	Nominal Cooling Load (Btu/hr)	Power Supply	Electrical Power Input (KW)				
			Cooling Mode @ Ambient Dry Bulb: 40°C (104°F), Water inlet 12°C (53.6°F)	Heating Mode @ Ambient Dry Bulb: 21.1°C (70°F), Water inlet 50°C (122°F)	Cooling Load Max	Heating Load Max	Running Current (A) Max Load
GEO040V1LM	40 000	220-240VAC/1Ph/60Hz	4.0	4.9	4.0	5.0	23
GEO060V1LM	60 000	220-240VAC/1Ph/60Hz	4.9	5.5	5.0	6.0	28
GEO080V1LM	80 000	220-240VAC/1Ph/60Hz	6.3	8.3	6.5	8.5	39

Model No.	Water Flow (US GPM) – Min-Max	Water Pressure Drop @ Max Flow (feet of water)		Liquid Pipe Connection Indoor/Ground Loop	Refrigerant Type	Sound Level	Refrigerant Charge (KG)	Design Refrigerant Pressure (PSI)		MOP (A)	MCA (A)	Maximum Outlet Water Temperature (°C) / (°F)
		Indoor Loop	Ground Loop			dB(A)		Low	High			
GEO040V1LM	9-11	6.59-7.46	7.45-8.72	Ø1"/1" - FNPT	R32	48	1.45	305	609	51.75	28.75	55°C / 131°F
GEO060V1LM	11-17	5.25-11.75	8.88-13.29	Ø1"/1" - FNPT	R32	48	1.70	305	609	63.00	35.00	55°C / 131°F
GEO080V1LM	14-22	9.22-13.77	12.90-17.12	Ø1¼"/1½"- FNPT	R32	52	2.40	305	609	109.68	48.75	55°C / 131°F

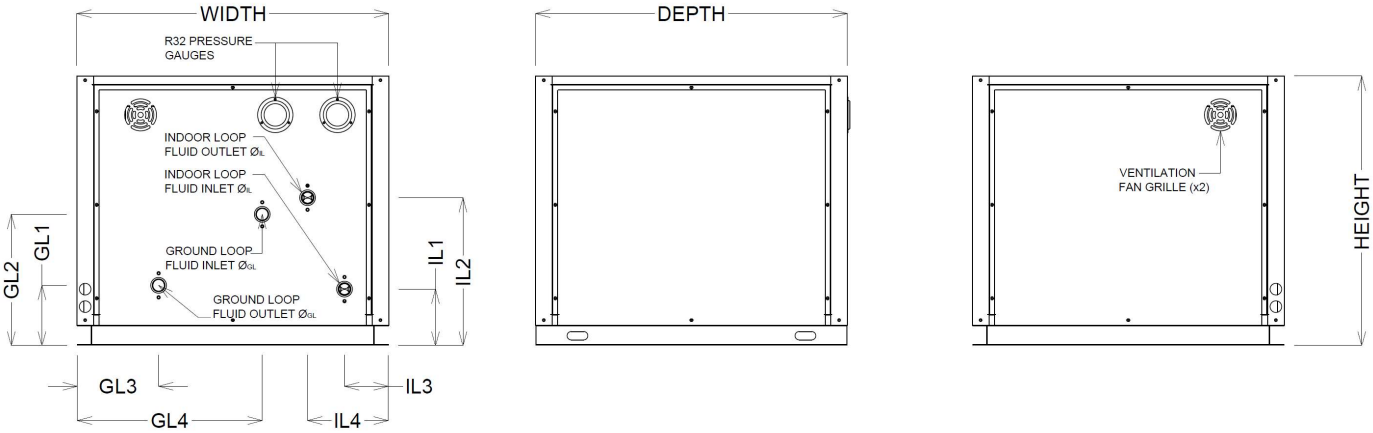
Remarks:

- The model GEO040V1LM equipped with Panasonic Compressor: 9VD330XAB21.
- The model GEO060V1LM equipped with Panasonic Compressor: 9KD420ZAA21.
- The model GEO080V1LM equipped with Panasonic Compressor: 9VD550XAA21.

Note:

1. The refrigeration circuit of the above Heat Pumps uses R32 refrigerant which has Global Warming Potential (GWP) index of 675 which is one third of R410a GWP index of 2090. Installation of equipment with R32 refrigerant shall comply to CSA-B52 (Canada) and ASHRAE-34 and ASHRAE-15 (USA).
2. Ratings List values were measured when compressor was at 100% of speed and incoming and leaving fluid temperatures (Ground Loop Side) were the highest for cooling mode and lowest for heating mode.

Dimensions & Weights



OPERATING DIMENSIONS AND WEIGHTS

MODEL	WIDTH	DEPTH	HEIGHT	WEIGHT
GEO040V1LM	750mm / 30"	750mm / 30"	650mm / 26"	105 Kg / 231 Lb
GEO060V1LM	750mm / 30"	750mm / 30"	710mm / 28"	113 Kg / 249 Lb
GEO080V1LM	750mm / 30"	750mm / 30"	830mm / 33"	142 Kg / 313 Lb

SHIPPING DIMENSIONS AND WEIGHTS

MODEL	WIDTH	DEPTH	HEIGHT	WEIGHT
GEO040V1LM	780mm / 31"	780mm / 31"	780mm / 31"	113 Kg / 249 Lb
GEO060V1LM	780mm / 31"	780mm / 31"	840mm / 33"	122 Kg / 269 Lb
GEO080V1LM	780mm / 31"	780mm / 31"	960mm / 38"	150 Kg / 330 Lb

PIPING CONNECTIONS DIAMETERS

MODEL	IL1 / IL3	IL2 / IL4	GL1 / GL3	GL2 / GL4
GEO040V1LM	Ø1" FNPT	Ø1" FNPT	Ø1" FNPT	Ø1" FNPT
GEO060V1LM	Ø1" FNPT	Ø1" FNPT	Ø1" FNPT	Ø1" FNPT
GEO080V1LM	Ø1¼" FNPT	Ø1¼" FNPT	Ø1½" FNPT	Ø1½" FNPT

PIPING CONNECTIONS DISTANCES

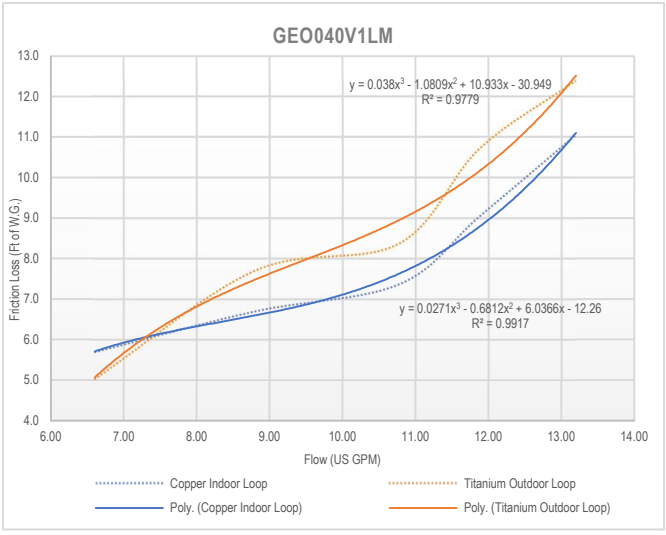
MODEL	IL1	IL2	IL3	IL4
GEO040V1LM	136.3 mm	358.1 mm	104.8 mm	194.5 mm
GEO060V1LM	137.2 mm	445.2 mm	104.8 mm	194.5 mm
GEO080V1LM	138.2 mm	533.2 mm	95 mm	185.0 mm

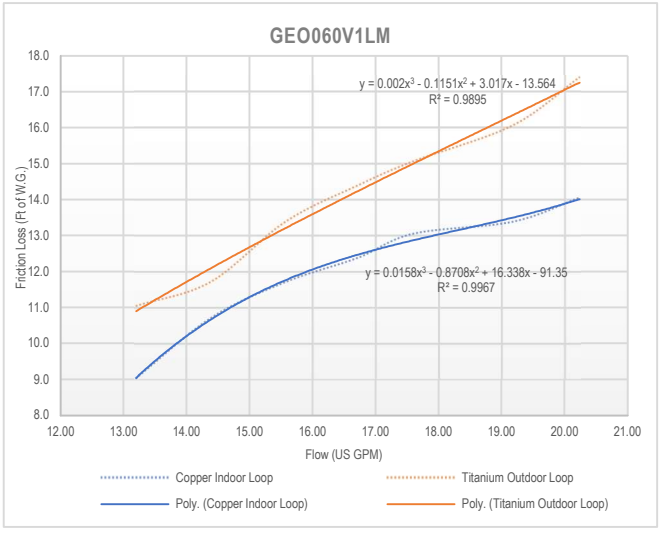
PIPING CONNECTIONS DISTANCES

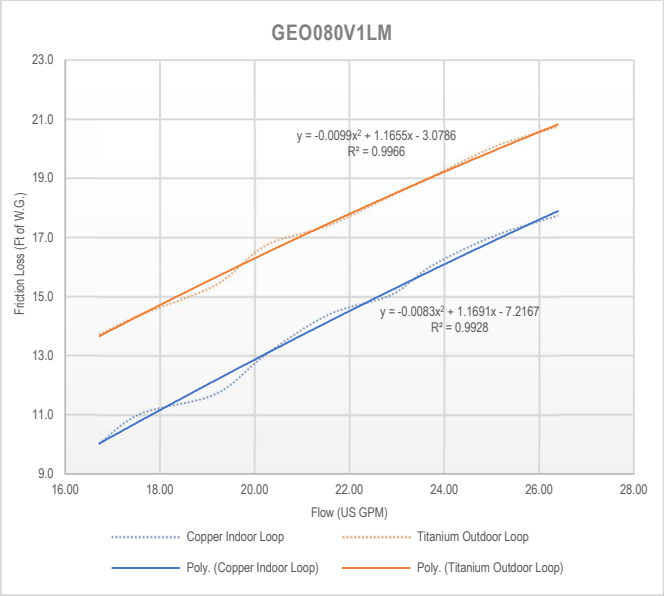
MODEL	GL1	GL2	GL3	GL4
GEO040V1LM	146.2 mm	317.2 mm	196 mm	446 mm
GEO060V1LM	146.2 mm	356.2 mm	200.8 mm	451 mm
GEO080V1LM	138.2 mm	363.2 mm	175.5 mm	425.5 mm

Friction Losses through Indoor / Ground Loop heat Exchangers

Heat transfer fluid on both sides of heat exchanger is pump with modulating speed pumps and friction loss increases and decreases with the flow.

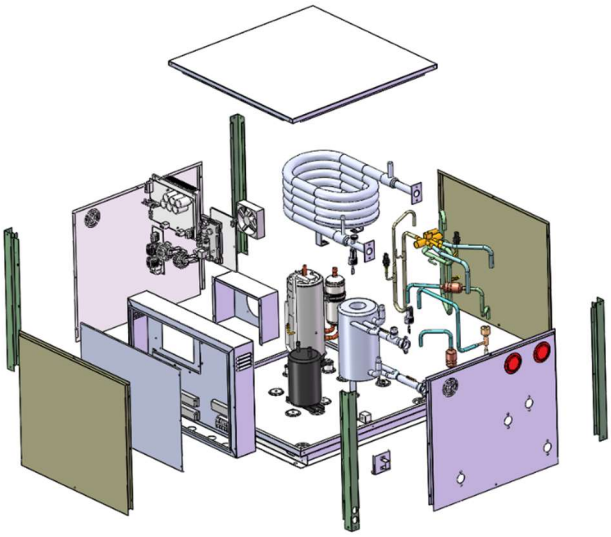




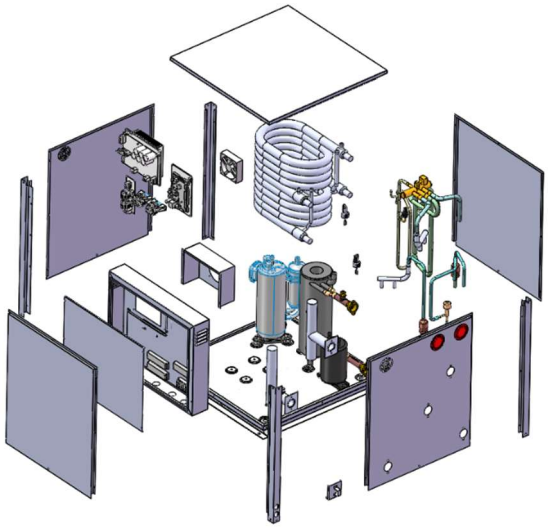


Exploded Pictures

GEO040V1LM & GEO060V1LM



GEO080V1LM



Heating / Cooling Performances:

GEO040V1LM

HEATING PERFORMANCE

Outdoor Loop										Electrical		Indoor Loop									
Entering Liquid Temperature		Flow (USGPM)		Leaving Liquid Temperature (@ Max Flow)		Delta T		Heat Absorbed		Power Input	Coefficient of Performance	Entering Liquid Temperature		Flow (USGPM)		Leaving Liquid Temperature (@ Max Flow)		Delta T		Heating Capacity	
(° F)	(°C)	Min	Max	(° F)	(°C)	(° F)	(°C)	Btu/Hr	KW	KW	COP	(° F)	(°C)	Min	Max	(° F)	(°C)	(° F)	(°C)	Btu/Hr	KW
23	-5.00	8.8	10.56	17.0	-8.3	6.0	3.3	18,799	5.51	3.79	2.5	104	40	4.84	7.04	113.0	45.0	9.0	5.0	31,730	9.3
25	-3.89	8.8	10.56	18.4	-7.5	6.6	3.6	21,938	6.43	3.77	2.7	104	40	5.28	7.48	113.3	45.1	9.3	5.1	34,800	10.2
30	-1.11	8.8	10.56	23.0	-5.0	7.0	3.9	24,804	7.27	3.63	3.0	104	40	5.72	8.37	112.9	44.9	8.9	4.9	37,189	10.9
32	0.00	8.8	10.56	24.4	-4.3	7.7	4.3	29,000	8.5	3.4	3.5	104	40	6.16	8.81	113.2	45.1	9.2	5.1	40,600	11.9
35	1.67	8.8	10.56	27.0	-2.8	8.0	4.4	30,877	9.05	3.35	3.7	104	40	6.16	9.25	113.1	45.1	9.1	5.1	42,306	12.4
40	4.44	8.8	10.56	31.6	-0.2	8.4	4.7	33,060	9.69	3.33	3.9	104	40	6.60	9.69	113.1	45.1	9.1	5.1	44,422	13.02
45	7.22	8.8	10.56	36.2	2.3	8.8	4.9	35,483	10.4	3.25	4.2	104	40	7.04	10.13	113.2	45.1	9.2	5.1	46,571	13.65
50	10.00	8.8	10.56	41.0	5.0	9.0	5.0	36,984	10.84	3.18	4.4	104	40	7.48	10.57	113.0	45.0	9.0	5.0	47,833	14.02
55	12.78	8.8	10.56	45.8	7.7	9.2	5.1	38,553	11.3	3.05	4.7	104	40	7.93	10.57	113.2	45.1	9.2	5.1	48,959	14.35
60	15.56	8.8	10.56	50.5	10.3	9.5	5.3	40,396	11.84	2.94	5.0	104	40	7.93	10.57	113.5	45.3	9.5	5.3	50,426	14.78

HEATING PERFORMANCE

Outdoor Loop										Electrical		Indoor Loop									
Entering Liquid Temperature		Flow (USGPM)		Leaving Liquid Temperature (@ Max Flow)		Delta T		Heat Absorbed		Power Input	Coefficient of Performance	Entering Liquid Temperature		Flow (USGPM)		Leaving Liquid Temperature (@ Max Flow)		Delta T		Heating Capacity	
(° F)	(°C)	Min	Max	(° F)	(°C)	(° F)	(°C)	Btu/Hr	KW	KW	COP	(° F)	(°C)	Min	Max	(° F)	(°C)	(° F)	(°C)	Btu/Hr	KW
23	-5.00	8.8	10.56	18.1	-7.7	4.9	2.7	10,679	3.13	4.47	1.7	122	50	3.52	5.72	131.0	55.0	9.0	5.0	25,930	7.6
25	-3.89	8.8	10.56	19.8	-6.8	5.2	2.9	13,101	3.84	4.26	1.9	122	50	3.96	6.16	130.9	55.0	8.9	5.0	27,636	8.1
30	-1.11	8.8	10.56	24.4	-4.2	5.6	3.1	15,490	4.54	4.16	2.1	122	50	4.40	6.60	130.9	55.0	8.9	5.0	29,683	8.7
32	0.00	8.8	10.56	25.9	-3.4	6.1	3.4	18,321	5.37	4.13	2.3	122	50	4.84	7.04	131.2	55.1	9.2	5.1	32,412	9.5
35	1.67	8.8	10.56	28.7	-1.8	6.3	3.5	19,515	5.72	4.08	2.4	122	50	5.28	7.48	130.9	54.9	8.9	4.9	33,436	9.8
40	4.44	8.8	10.56	33.4	0.8	6.6	3.7	22,143	6.49	3.81	2.7	122	50	5.72	7.93	130.8	54.9	8.8	4.9	35,142	10.3
45	7.22	8.8	10.56	38.1	3.4	6.9	3.8	23,951	7.02	3.68	2.9	122	50	5.72	7.93	131.2	55.1	9.2	5.1	36,506	10.7
50	10.00	8.8	10.56	42.8	6.0	7.2	4.0	26,441	7.75	3.45	3.2	122	50	6.16	8.37	131.1	55.1	9.1	5.1	38,212	11.2
55	12.78	8.8	10.56	47.6	8.7	7.4	4.1	27,806	8.15	3.35	3.4	122	50	6.60	8.81	130.9	54.9	8.9	4.9	39,236	11.5
60	15.56	8.8	10.56	52.5	11.4	7.5	4.2	28,830	8.45	3.25	3.6	122	50	6.60	8.81	131.0	55.0	9.0	5.0	39,918	11.7

COOLING PERFORMANCE

Outdoor Loop										Electrical		Indoor Loop									
Entering Liquid Temperature		Flow (USGPM)		Leaving Liquid Temperature (@ Max Flow)		Delta T		Heat Rejected		Power Input	Coefficient of Performance	Entering Liquid Temperature		Flow (USGPM)		Leaving Liquid Temperature (@ Max Flow)		Delta T		Cooling Capacity	
(° F)	(°C)	Min	Max	(° F)	(°C)	(° F)	(°C)	Btu/Hr	KW	KW	COP	(° F)	(°C)	Min	Max	(° F)	(°C)	(° F)	(°C)	Btu/Hr	KW
55	12.78	8.8	10.56	66.1	18.9	11.1	6.15	41,692	12.22	2.58	5.7	53.6	12	8.37	11.01	44.5	6.9	9.1	5.1	50,495	14.8
60	15.56	8.8	10.56	69.2	20.7	9.2	5.1	39,884	11.69	2.61	5.5	53.6	12	8.37	11.01	44.8	7.1	8.8	4.9	48,789	14.3
65	18.33	8.8	10.56	73.9	23.3	8.9	5.0	38,485	11.28	2.62	5.3	53.6	12	7.93	10.57	44.7	7.0	8.9	5.0	47,424	13.9
70	21.11	8.8	10.56	78.5	25.8	8.5	4.7	36,029	10.56	2.64	5.0	53.6	12	7.48	10.13	44.7	7.1	8.9	4.9	45,036	13.2
75	23.89	8.8	10.56	83.2	28.5	8.2	4.6	34,766	10.19	2.61	4.9	53.6	12	7.04	9.69	44.6	7.0	9.0	5.0	43,671	12.8
80	26.67	8.8	10.56	88.0	31.1	8.0	4.5	33,402	9.79	2.71	4.6	53.6	12	7.04	9.69	44.8	7.1	8.8	4.9	42,648	12.5
85	29.44	8.8	10.56	92.8	33.8	7.8	4.4	31,730	9.3	2.9	4.2	53.6	12	6.60	9.25	44.6	7.0	9.0	5.0	41,624	12.2
90	32.22	8.8	10.56	97.6	36.5	7.6	4.2	30,331	8.89	2.96	4.0	53.6	12	6.16	8.81	44.5	6.9	9.1	5.1	40,430	11.85

GEO060V1LM

HEATING PERFORMANCE

Outdoor Loop										Electrical		Indoor Loop									
Entering Liquid Temperature		Flow (USGPM)		Leaving Liquid Temperature (@ Max Flow)		Delta T		Heat Absorbed		Power Input	Coefficient of Performance	Entering Liquid Temperature		Flow (USGPM)		Leaving Liquid Temperature (@ Max Flow)		Delta T		Heating Capacity	
(° F)	(°C)	Min	Max	(° F)	(°C)	(° F)	(°C)	Btu/Hr	KW	KW	COP	(° F)	(°C)	Min	Max	(° F)	(°C)	(° F)	(°C)	Btu/Hr	KW
23	-5.00	11.44	15.84	17.0	-8.3	6.0	3.3	28,659	8.4	5.6	2.5	104	40	7.5	10.6	113.0	45.0	9.0	5.0	47,765	14
25	-3.89	11.44	15.84	18.7	-7.4	6.3	3.5	32,003	9.38	5.42	2.7	104	40	7.9	11.4	112.8	44.9	8.8	4.9	50,495	14.8
30	-1.11	11.44	15.84	23.3	-4.8	6.7	3.7	35,380	10.37	5.23	3.0	104	40	8.4	11.9	112.9	45.0	8.9	5.0	53,224	15.6
32	0.00	11.44	15.84	24.4	-4.2	7.6	4.2	43,364	12.71	5.09	3.5	104	40	9.7	13.6	112.9	44.9	8.9	4.9	60,730	17.8
35	1.67	11.44	15.84	27.1	-2.7	7.9	4.4	46,128	13.52	4.98	3.7	104	40	10.1	14.1	112.9	45.0	8.9	5.0	63,118	18.5
40	4.44	11.44	15.84	31.7	-0.2	8.3	4.6	49,062	14.38	4.92	3.9	104	40	10.6	15.0	112.8	44.9	8.8	4.9	65,848	19.3
45	7.22	11.44	15.84	36.2	2.3	8.8	4.9	53,702	15.74	4.86	4.2	104	40	11.0	15.4	113.1	45.0	9.1	5.0	70,283	20.6
50	10.00	11.44	15.84	41.0	5.0	9.0	5.0	55,715	16.33	4.77	4.4	104	40	11.4	15.9	113.0	45.0	9.0	5.0	71,989	21.1
55	12.78	11.44	15.84	45.8	7.7	9.2	5.1	57,898	16.97	4.53	4.7	104	40	11.4	15.9	113.2	45.1	9.2	5.1	73,354	21.5
60	15.56	11.44	15.84	50.7	10.4	9.3	5.2	60,014	17.59	4.21	5.2	104	40	11.4	15.9	113.3	45.2	9.3	5.2	74,377	21.8

HEATING PERFORMANCE

Outdoor Loop										Electrical		Indoor Loop									
Entering Liquid Temperature		Flow (USGPM)		Leaving Liquid Temperature (@ Max Flow)		Delta T		Heat Absorbed		Power Input	Coefficient of Performance	Entering Liquid Temperature		Flow (USGPM)		Leaving Liquid Temperature (@ Max Flow)		Delta T		Heating Capacity	
(° F)	(°C)	Min	Max	(° F)	(°C)	(° F)	(°C)	Btu/Hr	KW	KW	COP	(° F)	(°C)	Min	Max	(° F)	(°C)	(° F)	(°C)	Btu/Hr	KW
23	-5.00	11.44	15.84	18.5	-7.5	4.5	2.5	14,739	4.32	6.18	1.7	122	50	4.8	7.9	131.0	55.0	9.0	5.0	35,824	10.5
25	-3.89	11.44	15.84	20.0	-6.7	5.0	2.8	18,765	5.5	6.1	1.9	122	50	5.7	8.8	130.9	55.0	8.9	5.0	39,577	11.6
30	-1.11	11.44	15.84	24.6	-4.1	5.4	3.0	22,723	6.66	6.04	2.1	122	50	6.6	9.7	130.9	54.9	8.9	4.9	43,330	12.7
32	0.00	11.44	15.84	26.3	-3.1	5.7	3.1	25,281	7.41	5.79	2.3	122	50	6.6	9.7	131.3	55.1	9.3	5.1	45,036	13.2
35	1.67	11.44	15.84	29.2	-1.5	5.8	3.2	26,885	7.88	5.62	2.4	122	50	7.0	10.1	131.1	55.0	9.1	5.0	46,059	13.5
40	4.44	11.44	15.84	34.0	1.1	6.0	3.4	30,297	8.88	5.22	2.7	122	50	7.5	10.6	131.1	55.0	9.1	5.0	48,106	14.1
45	7.22	11.44	15.84	38.7	3.7	6.3	3.5	32,344	9.48	5.12	2.9	122	50	7.9	11.0	131.0	55.0	9.0	5.0	49,812	14.6
50	10.00	11.44	15.84	43.4	6.4	6.6	3.6	35,926	10.53	4.77	3.2	122	50	8.4	11.4	131.1	55.0	9.1	5.0	52,201	15.3
55	12.78	11.44	15.84	48.3	9.1	6.7	3.7	37,769	11.07	4.53	3.4	122	50	8.8	11.9	130.9	55.0	8.9	5.0	53,224	15.6
60	15.56	11.44	15.84	53.2	11.8	6.8	3.8	39,202	11.49	4.41	3.6	122	50	8.8	11.9	131.1	55.0	9.1	5.0	54,248	15.9

COOLING PERFORMANCE

Outdoor Loop										Electrical		Indoor Loop									
Entering Liquid Temperature		Flow (USGPM)		Leaving Liquid Temperature (@ Max Flow)		Delta T		Heat Rejected		Power Input	Coefficient of Performance	Entering Liquid Temperature		Flow (USGPM)		Leaving Liquid Temperature (@ Max Flow)		Delta T		Cooling Capacity	
(° F)	(°C)	Min	Max	(° F)	(°C)	(° F)	(°C)	Btu/Hr	KW	KW	COP	(° F)	(°C)	Min	Max	(° F)	(°C)	(° F)	(°C)	Btu/Hr	KW
55	12.78	11.44	15.84	64.8	18.2	9.8	5.4	91,675	26.87	4.02	5.7	53.6	12	12.3	17.2	44.6	7.0	9.0	5.0	77,960	22.85
60	15.56	11.44	15.84	69.5	20.8	9.5	5.3	89,423	26.21	4.06	5.5	53.6	12	11.9	16.7	44.6	7.0	9.0	5.0	75,571	22.15
65	18.33	11.44	15.84	74.2	23.4	9.2	5.1	87,240	25.57	4.12	5.2	53.6	12	11.4	16.3	44.7	7.0	8.9	5.0	73,183	21.45
70	21.11	11.44	15.84	78.9	26.1	8.9	4.9	85,022	24.92	4.17	5.0	53.6	12	11.0	15.9	44.7	7.1	8.9	4.9	70,795	20.75
75	23.89	11.44	15.84	83.8	28.8	8.8	4.9	84,203	24.68	4.18	4.9	53.6	12	11.0	15.4	44.6	7.0	9.0	5.0	69,942	20.5
80	26.67	11.44	15.84	88.3	31.3	8.3	4.6	80,416	23.57	4.22	4.6	53.6	12	10.6	14.5	44.6	7.0	9.0	5.0	66,018	19.35
85	29.44	11.44	15.84	92.8	33.8	7.8	4.3	76,731	22.49	4.29	4.2	53.6	12	9.7	13.6	44.5	7.0	9.1	5.0	62,095	18.2
90	32.22	11.44	15.84	99.4	37.5	9.4	5.2	75,162	22.03	4.38	4.0	53.6	12	10.6	13.2	44.5	7.0	9.1	5.0	60,218	17.65

GEO080V1LM

HEATING PERFORMANCE

Outdoor Loop										Electrical		Indoor Loop									
Entering Liquid Temperature		Flow (USGPM)		Leaving Liquid Temperature (@ Max Flow)		Delta T		Heat Absorbed		Power Input	Coefficient of Performance	Entering Liquid Temperature		Flow (USGPM)		Leaving Liquid Temperature (@ Max Flow)		Delta T		Heating Capacity	
(° F)	(°C)	Min	Max	(° F)	(°C)	(° F)	(°C)	Btu/Hr	KW	KW	COP	(° F)	(°C)	Min	Max	(° F)	(°C)	(° F)	(°C)	Btu/Hr	KW
23	-5.00	15.84	21.12	17.0	-8.3	6.0	3.3	38,076	11.16	7.44	2.5	104	40	8.4	14.1	**113.0**	**45.0**	9.0	5.0	63,459	18.6
25	-3.89	15.84	21.12	18.7	-7.4	6.3	3.5	41,556	12.18	7.32	2.7	104	40	9.2	15.0	**112.8**	**44.9**	8.8	4.9	66,530	19.5
30	-1.11	15.84	21.12	23.0	-5.0	7.0	3.9	49,881	14.62	7.28	3.0	104	40	11.0	16.7	**112.9**	**44.9**	8.9	4.9	74,718	21.9
32	0.00	15.84	21.12	24.4	-4.3	7.7	4.3	57,966	16.99	6.81	3.5	104	40	12.3	18.1	**113.0**	**45.0**	9.0	5.0	81,201	23.8
35	1.67	15.84	21.12	27.1	-2.7	7.9	4.4	61,276	17.96	6.64	3.7	104	40	12.8	18.5	**113.0**	**45.0**	9.0	5.0	83,930	24.6
40	4.44	15.84	21.12	31.9	-0.1	8.1	4.5	64,210	18.82	6.48	3.9	104	40	13.6	19.4	**112.9**	**44.9**	8.9	4.9	86,319	25.3
45	7.22	15.84	21.12	36.4	2.4	8.6	4.8	69,669	20.42	6.38	4.2	104	40	15.0	20.7	**112.8**	**44.9**	8.8	4.9	91,436	26.8
50	10.00	15.84	21.12	41.0	5.0	9.0	5.0	74,173	21.74	6.36	4.4	104	40	15.4	21.1	**113.0**	**45.0**	9.0	5.0	95,872	28.1
55	12.78	15.84	21.12	45.8	7.7	9.2	5.1	76,834	22.52	6.08	4.7	104	40	15.9	21.1	**113.2**	**45.1**	9.2	5.1	97,577	28.6
60	15.56	15.84	21.12	50.7	10.4	9.3	5.2	79,666	23.35	5.55	5.2	104	40	15.9	21.1	**113.3**	**45.2**	9.3	5.2	98,601	28.9

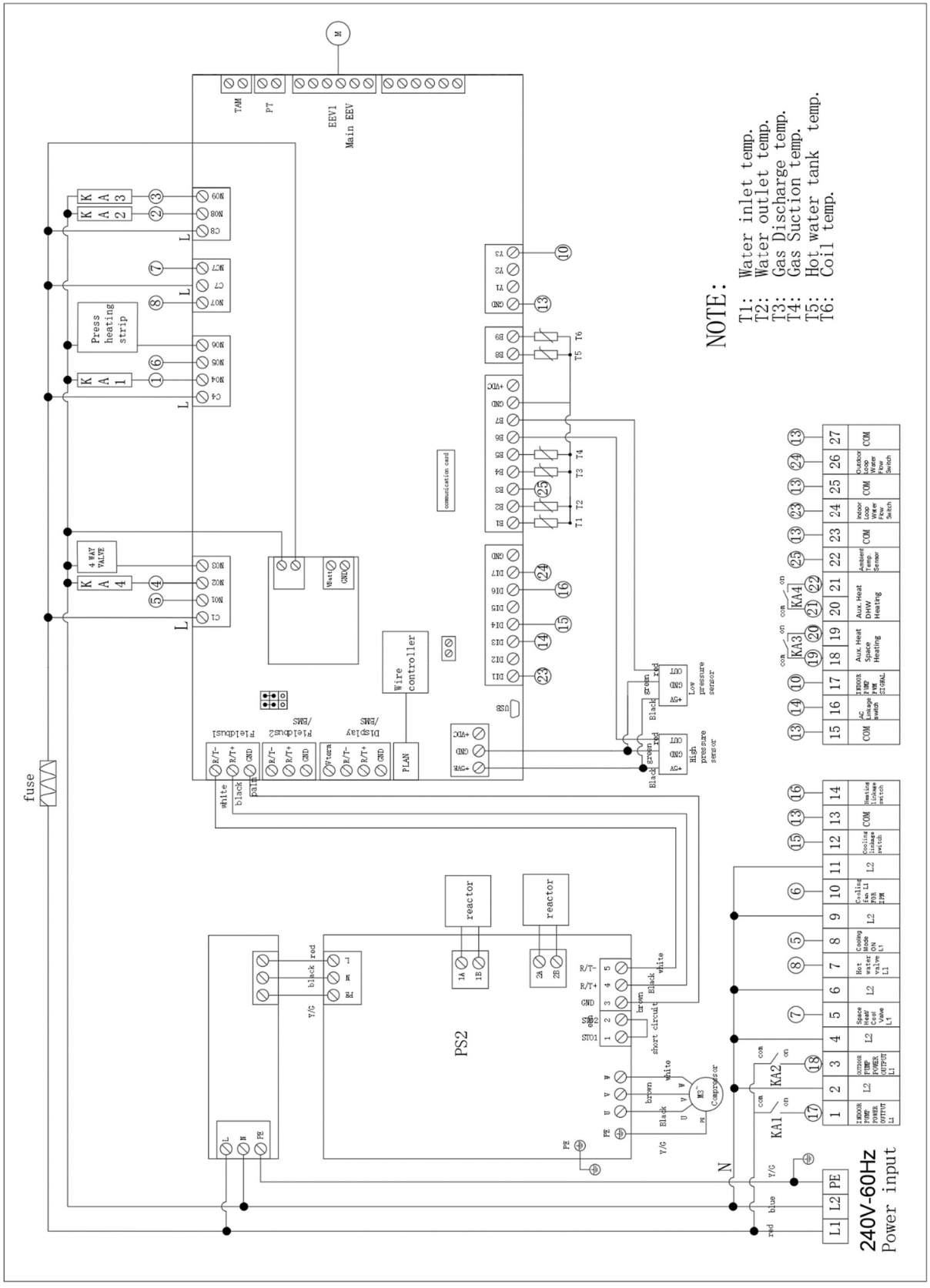
HEATING PERFORMANCE

Outdoor Loop										Electrical		Indoor Loop									
Entering Liquid Temperature		Flow (USGPM)		Leaving Liquid Temperature (@ Max Flow)		Delta T		Heat Absorbed		Power Input	Coefficient of Performance	Entering Liquid Temperature		Flow (USGPM)		Leaving Liquid Temperature (@ Max Flow)		Delta T		Heating Capacity	
(° F)	(°C)	Min	Max	(° F)	(°C)	(° F)	(°C)	Btu/Hr	KW	KW	COP	(° F)	(°C)	Min	Max	(° F)	(°C)	(° F)	(°C)	Btu/Hr	KW
23	-5.00	15.84	21.12	17.6	-8.0	5.4	3.0	27,704	8.12	8.68	1.9	122	50	8.4	12.8	**130.9**	**55.0**	8.9	5.0	57,318	16.8
25	-3.89	15.84	21.12	19.3	-7.0	5.7	3.1	31,081	9.11	8.49	2.1	122	50	8.8	13.2	**131.1**	**55.0**	9.1	5.0	60,048	17.6
30	-1.11	15.84	21.12	24.1	-4.4	5.9	3.3	34,084	9.99	8.41	2.2	122	50	9.2	13.6	**131.2**	**55.1**	9.2	5.1	62,777	18.4
32	0.00	15.84	21.12	25.8	-3.4	6.2	3.4	37,803	11.08	8.12	2.4	122	50	10.1	14.5	**131.0**	**55.0**	9.0	5.0	65,507	19.2
35	1.67	15.84	21.12	28.5	-1.9	6.5	3.6	41,658	12.21	7.89	2.5	122	50	10.6	15.0	**131.1**	**55.1**	9.1	5.1	68,577	20.1
40	4.44	15.84	21.12	33.3	0.7	6.7	3.7	45,411	13.31	7.39	2.8	122	50	11.0	15.4	**131.1**	**55.1**	9.1	5.1	70,624	20.7
45	7.22	15.84	21.12	38.1	3.4	6.9	3.9	49,130	14.4	7.2	3.0	122	50	11.9	16.3	**131.0**	**55.0**	9.0	5.0	73,695	21.6
50	10.00	15.84	21.12	42.8	6.0	7.2	4.0	52,781	15.47	7.03	3.2	122	50	12.3	16.7	**131.1**	**55.1**	9.1	5.1	76,766	22.5
55	12.78	15.84	21.12	47.7	8.7	7.3	4.1	54,930	16.1	6.7	3.4	122	50	12.8	17.2	**131.0**	**55.0**	9.0	5.0	77,789	22.8
60	15.56	15.84	21.12	52.5	11.4	7.5	4.1	57,318	16.8	6.4	3.6	122	50	13.2	17.6	**130.9**	**55.0**	8.9	5.0	79,154	23.2

COOLING PERFORMANCE

Outdoor Loop										Electrical		Indoor Loop									
Entering Liquid Temperature		Flow (USGPM)		Leaving Liquid Temperature (@ Max Flow)		Delta T		Heat Rejected		Power Input	Coefficient of Performance	Entering Liquid Temperature		Flow (USGPM)		Leaving Liquid Temperature (@ Max Flow)		Delta T		Cooling Capacity	
(° F)	(°C)	Min	Max	(° F)	(°C)	(° F)	(°C)	Btu/Hr	KW	KW	COP	(° F)	(°C)	Min	Max	(° F)	(°C)	(° F)	(°C)	Btu/Hr	KW
55	12.78	15.84	21.12	64.1	17.8	9.1	5.0	113,442	33.25	5.05	5.6	53.6	12	15.9	21.1	**44.5**	**7.0**	9.1	5.0	96,213	28.2
60	15.56	15.84	21.12	68.8	20.4	8.8	4.9	110,815	32.48	5.08	5.4	53.6	12	15.4	20.7	**44.6**	**7.0**	9.0	5.0	93,483	27.4
65	18.33	15.84	21.12	73.6	23.1	8.6	4.8	108,871	31.91	5.11	5.2	53.6	12	15.0	20.3	**44.6**	**7.0**	9.0	5.0	91,436	26.8
70	21.11	15.84	21.12	78.5	25.8	8.5	4.7	107,199	31.42	5.12	5.1	53.6	12	14.5	19.8	**44.6**	**7.0**	9.0	5.0	89,730	26.3
75	23.89	15.84	21.12	83.2	28.4	8.2	4.6	104,606	30.66	5.16	4.9	53.6	12	14.1	19.4	**44.7**	**7.0**	8.9	5.0	87,001	25.5
80	26.67	15.84	21.12	88.0	31.1	8.0	4.4	103,002	30.19	5.39	4.6	53.6	12	13.6	18.9	**44.7**	**7.1**	8.9	4.9	84,613	24.8
85	29.44	15.84	21.12	92.7	33.7	7.7	4.3	101,706	29.81	5.71	4.2	53.6	12	13.2	18.5	**44.7**	**7.1**	8.9	4.9	82,224	24.1
90	32.22	15.84	21.12	97.7	36.5	7.6	4.2	101,501	29.75	5.95	4.0	53.6	12	12.8	18.1	**44.6**	**7.0**	9.0	5.0	81,201	23.8

Controls


NOTE:
T1: Water inlet temp.
T2: Water outlet temp.
T3: Gas Discharge temp.
T4: Gas Suction temp.
T5: Hot water tank temp.
T6: Coil temp.
EEV1
Main EEV
Press heating strip
4 WAY VALVE
Wire controller
communication card
Low pressure sensor
High pressure sensor
reactor
reactor
PS2
Compressor
fuse
240V-60Hz
Power input

1	2	3	4	5	6	7	8	9	10	11	12	13	14
INDOOR PUMP POWER OUTPUT L1	L2	OUTDOOR PUMP POWER OUTPUT L1	L2	SPACE/ HEAT COOL VALVE L1	L2	HOT WATER VALVE L1	COOL MODE ON L1	L2	COOLING FAN FOR IPM L1	L2	Cooling linkage switch	COM	Heating linkage switch

Terminal	Function	Type
1-2: INDOOR LOOP'S PUMP POWER OUTPUT	Power Supply for Heat Pump Circulation Pump of the indoor loop (Pump not included)	220-240V/1Ph/60Hz
3-4: OUTDOOR LOOP'S PUMP POWER OUTPUT	Power Supply for Heat Pump Circulation Pump of the outdoor loop (Pump not included)	220-240V/1Ph/60Hz
5-6-7: THREE WAY VALVE POWER OUTPUT	Power Supply for Floating Type 3 Way Valve, Switches between DHW tank and Space Heating/Cooling Tank	220-240V/1Ph/60Hz
8-9: TWO WAY VALVE POWER SUPPLY	Power Supply for Cooling Mode Signal – ON when Heat Pump is in cooling mode (Used in 2 tanks Hot/Chilled Configuration)	220-240V/1Ph/60Hz
10-11: INTERNAL FAN	Power Supply for integrated Cooling Fan (not to be wired by installer)	220-240V/1Ph/60Hz
12-13: COOLING LINKAGE	Changes Heat Pump Operating Mode to Cooling. Heat Pump must be turned off before changing operating mode.	Dry Contact (can be configured NO or NC from Carel Controller)
13-14: HEATING LINKAGE	Changes Heat Pump Operating Mode to Heating. Heat Pump must be turned off before changing operating mode.	Dry Contact (can be configured NO or NC from Carel Controller)

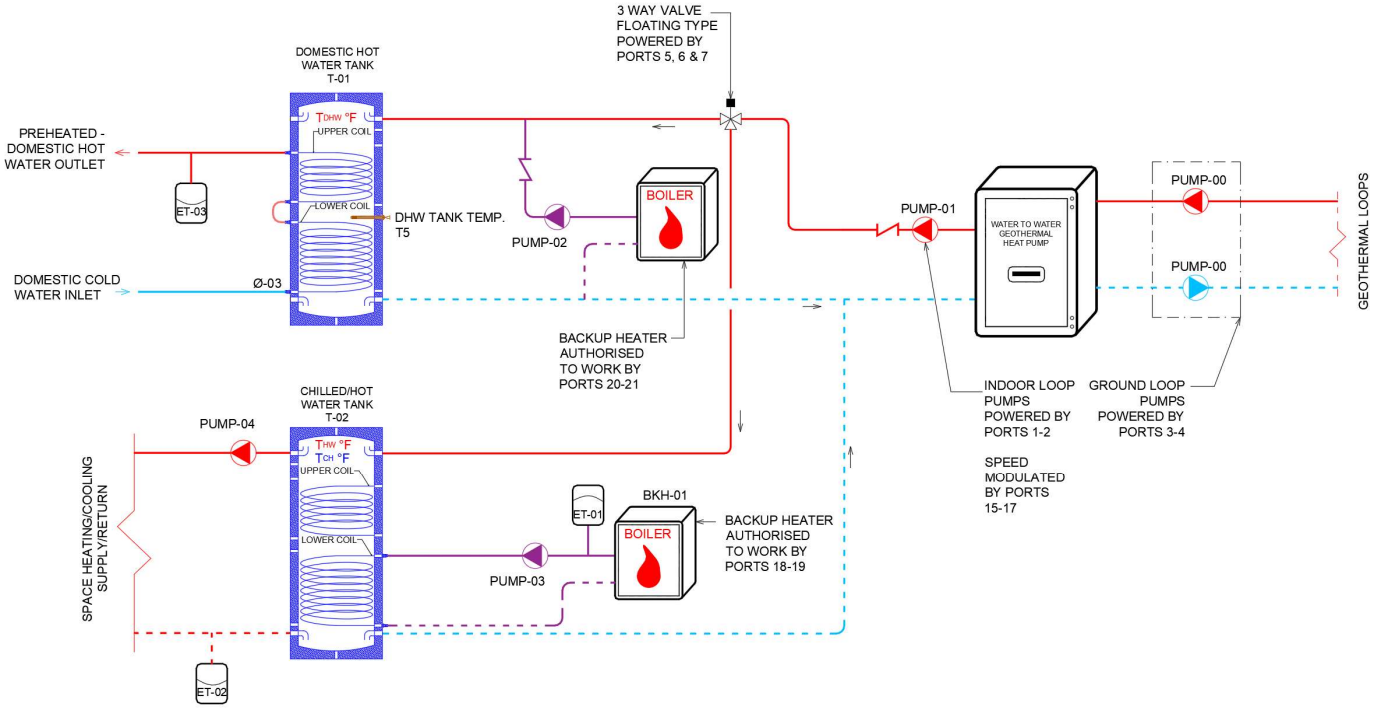
15	16	17	18	19	20	21	22	23	24	25	26	27
COM	AC Linkage switch	INDOOR PUMP PWM SIGNAL	Aux. Heat Space Heating		Aux. Heat DHW Heating		Ambient Temp. Sensor	COM	Indoor Loop Water Flow Switch	COM	Outdoor Loop Water Flow Switch	COM

Terminal	Function	Type
15-16: HEAT PUMP ON/OFF LINKAGE	Switches Heat Pump ON or OFF	Dry Contact (can be configured NO or NC from Carel Controller)
15-17: INDOOR LOOP PUMP MODULATION	Modulates the speed of indoor loop circulation Pump (optional)	PWM (Pulse Width Modulation)
18-19: AUXILIARY HEAT FOR SPACE HEATING	Enables the operation of the backup heater for space heating	Dry Contact (NO)
20-21: AUXILIARY HEAT FOR DHW HEATING	Enables the operation of the backup heater for Domestic Hot Water Heating	220-240V/1Ph/60Hz
22-23: AMBIENT TEMPERATURE SENSOR	Connection for ambient temperature sensor (Optional for outdoor reset of Heat Pump supply temperatures in heating and cooling modes)	1000 Ohms Resistance
23-24: FLOW SWITCH FOR INDOOR LOOP	Closes when indoor loop pump is turned ON by the controller of the Heat Pump	Dry Contact (can be configured NO or NC from Carel Controller)
25-26: FLOW SWITCH FOR OUTDOOR LOOP	Closes when outdoor loop pump is turned ON by the controller of the Heat Pump	Dry Contact (can be configured NO or NC from Carel Controller)

Applications

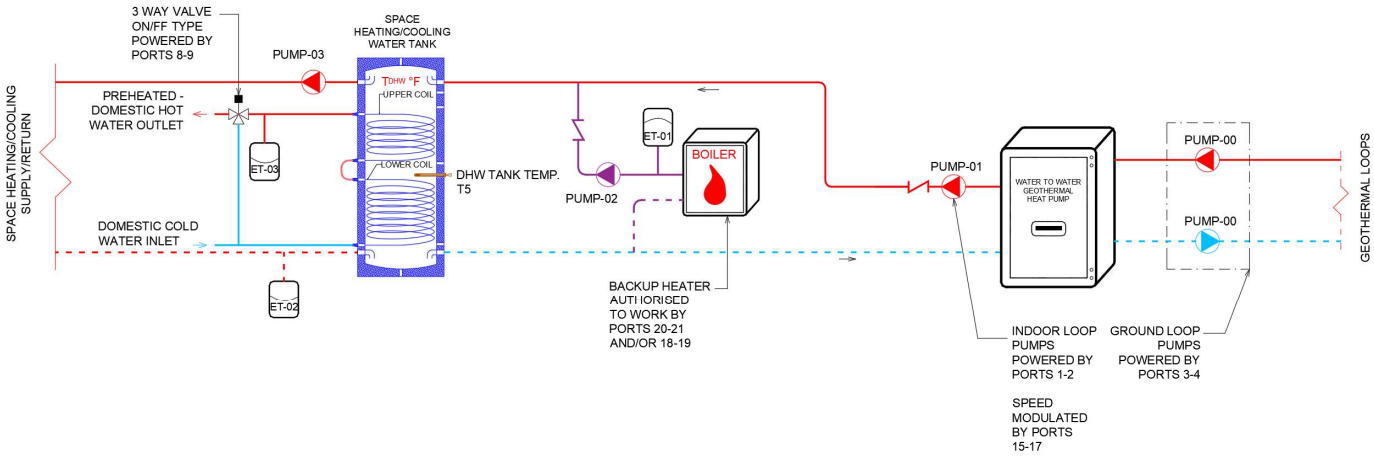
Space Heating or Cooling and Domestic Hot Water Pre-Heating (DHW)-2T3AP1T

In this configuration, Heat Pump is connected to two separate buffer tanks: one dedicated for DHW Preheating and the other tank dedicated for either space heating in winter or space cooling in the summer. In this operating mode, priority for tank T-01 and T-02 can be set up via the control interface of the heat pump.



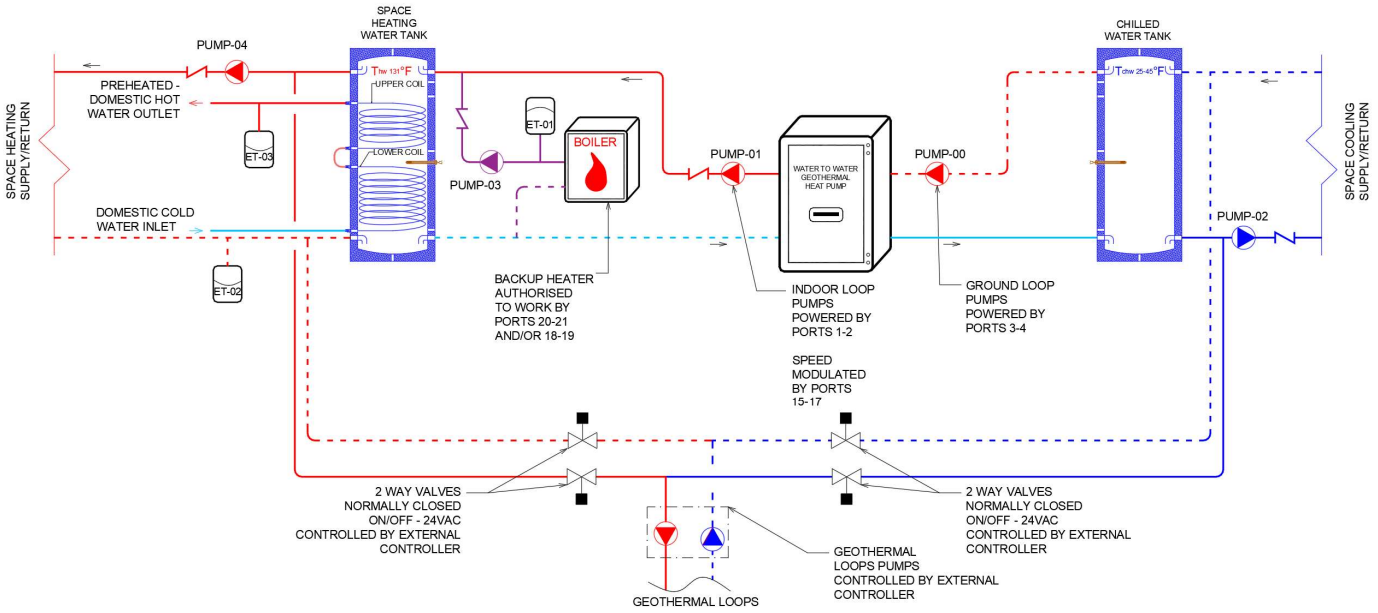
Space Heating and Domestic Hot Water Pre-Heating (DHW) or Space Cooling-1T3AP1T

In this configuration, Heat Pump is connected to only one buffer tank with an indirect coil: the indirect coil will be used to preheat DHW when HP is in heating mode (when in cooling mode, indirect coil will be bypassed via the three-way valve). Tank will be heated in heating mode and cooled in cooling mode.



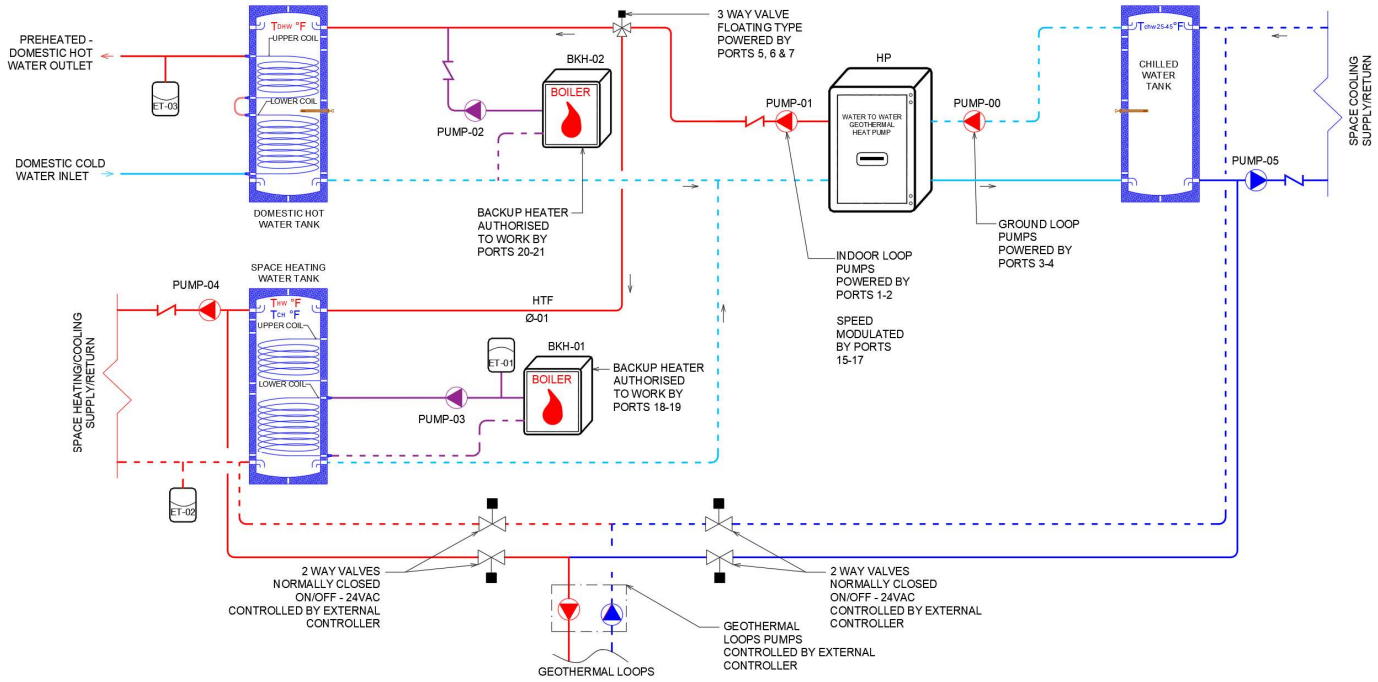
Simultaneous Heating and Cooling and/or Domestic Hot Water Pre-Heating (DHW)-2T3AP3T

In this configuration, Heat Pump works in heating mode only, extracting heat from the chilled water tank and dumping that heat into the hot water tank. Hot Water tank shall have an indirect coil if used to preheat DHW beside space heating.



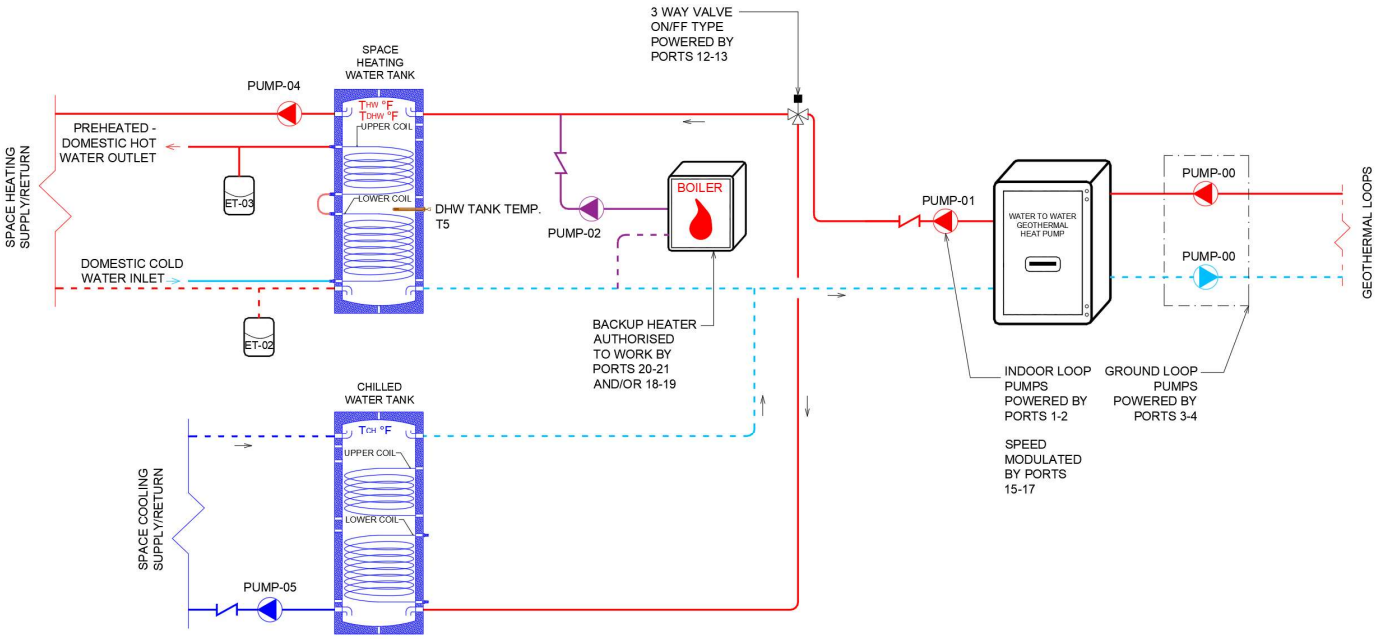
Simultaneous Heating and Cooling and Domestic Hot Water Pre-Heating (DHW)-3T3AP3T

In this configuration, Heat Pump works in heating mode only, extracting heat from the chilled water tank and dumping that heat into either the space heating tank or DHW preheating tank.



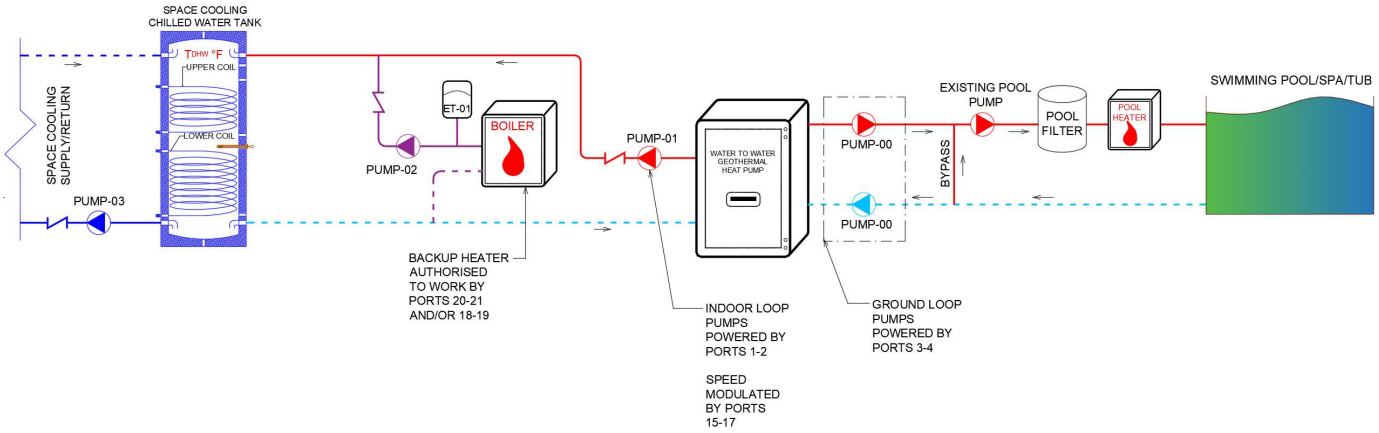
Heating and Cooling or Domestic Hot Water Pre-Heating (DHW)-2T3AP2T

In this configuration, Heat Pump is connected to two separate buffer tanks: one dedicated for space heating hot water and the other dedicated for space cooling chilled water. In this operating mode, priority for tank T-01 and T-02 can be set up via the control interface of the heat pump.



Space Cooling and Swimming Pool Heating (DHW)-1T2AP1T

In this configuration, Heat Pump is connected to one buffer tank used for space cooling on the indoor loop side. The outdoor loop side will be hooked up to swimming pool directly with a hydraulic separator or by-pass (the nominal flow on the ground loop side might be lower than the nominal flow of the swimming pool pump).



The maximum entering ground loop temperature is 90°F (32.22°C). This configuration works if the temperature of the water pumped from the pool to the ground loop side of the HP is less or equal than 90°F (32.22°C).

Main Components List

Item No.	Object/part no.	Manufacturer/ Trademark	Type/Mode l	Technical Data	Standard	Mark(s) of Conformity
1	Fan	SHENZHEN SANJU ELECTRIC MACHINERY CO LTD	SJ1238HA 2	220V-240VAC, 50/60Hz, 0.13A. IMPEDANCE PROTECTED.	UL 507, CSA-C22.2 No. 113	cURus E314698
2	Control PCB- 1 (Compressor control)	CAREL INDUSTRIES SPA	PS200252 3D100	Input: 200-240Vac, 50/60Hz, 40-57A; AC output: 0-240V, 25- 30A, DC output: 385V, 1500W. Software: Class B.	UL 60730-1, CSA- E60730-1	cURus E198839
3	PFC choke	SHANGHAI CII ELECTRONIC CO., LTD	09C747A0 08	4.5uH, 50A. For connecting to Control PCB-1.	–	Tested in appliance
4	Control PCB- 2 (Operating control)	CAREL INDUSTRIES SPA	UP3A0220 0T3S0	Input: 24Vac/dc, 50/60Hz, 28W; 100-240Vac, 50/60Hz, 28W; 36-72Vdc, 28W.	UL 60730-2- 9, CSA- E60730-2-9	cURus E198839
5	Fuse	DONGGUAN BETTER ELECTRONICS TECHNOLOGY CO LTD	524 Series	250V, 3.15A. For connecting to Control PCB-2.	UL 248-1, CSA-C22.2 No. 248.1	cURus E300003
6	Fuse holder	Honyone Electrical Co Ltd	FH15	250V, 15A. For connecting to Control PCB-2.	UL 4248-1, CSA-C22.2 No. 4248.1	cURus E343685
7	Relay	XIAMEN HONGFA ELECTROACOUST IC CO LTD	HF105F-4	240VAC, 30A. For connecting to Control PCB-1.	UL 60947-1, UL 60947-4- 1, SA- C22.2 No. 0947-1, CSA-C22.2 No. 60947- 4-1	cURus E134517
8	Terminal block 1	HUANGZHONG ELECTRICAL EQUIPMENT CO LTD OF SHUNDE FOSHAN	ET1001	660V, 32A.	UL 1059, CSA-C22.2 No. 158	cURus E225297
9	Terminal block 2	HUANGZHONG ELECTRICAL EQUIPMENT CO LTD OF SHUNDE FOSHAN	TC1-1	250V, 20A.	UL 1059, CSA-C22.2 No. 158	cURus E225297
10	Internal wire for compressor connection	Various	Various	AWM, min. 10AWG, min. 300V, min. 105°C, VW-1.	UL 758, CSA-C22.2 No. 210	cURus
11	Internal wire for signal connection	Various	Various	AWM, min. 22AWG, min. 300V, min. 105°C, VW-1.	UL 758, CSA-C22.2 No. 210	cURus
12	Internal wire for other electrical connection	Various	Various	AWM, 16-12AWG, min. 300V, min. 105°C, VW-1.	UL 758, CSA-C22.2 No. 210	cURus
13	Four-way valve	ZHEJIANG SANHUA CLIMATE & APPLIANCE CONTROLS GROUP CO LTD	SHF-11H- 45D1	220-240VAC, 50/60Hz. For model GEO040V1LM.	UL 429, CSA-C22.2 No. 139	cURus MH25894
			SHF-20D- 46A-04	220-240VAC, 50/60Hz. For model GEO060V1LM, GEO080V1LM.	UL 429, CSA-C22.2 No. 139	cURus MH25894
14	Expansion valve	CAREL INDUSTRIES SPA	E2V18FSA C1	12V, 50Hz, 40Ω±10%. For models GEO040V1LM,	UL 429, CSA-C22.2 No. 139	cURus E304579
			E2V24FSA C1	12V, 50Hz, 40Ω±10%. For models GEO060V1LM, GEO080V1LM.	UL 429, CSA-C22.2 No. 139	cURus E304579
15	Pressure sensor- 1	BRIDGEPORT Srl	SPKT0033 P0	4.5-5.5Vdc, -40~120°C, pressure 15~515PSIG, limit 1030 PSIG.	UL 60730-2- 6, CSA- E60730-2-6	cURus E485918
16	Pressure sensor 2	BRIDGEPORT Srl	SPKT00B6 P0	4.5-5.5Vdc, -40~120°C, pressure 15~667PSIG, limit 1335 PSIG.	UL 60730-2- 6, CSA- E60730-2-6	cURus E485918
17	Heating element Cover on Compressor	Changzhou match- well pressure sensor Co Ltd	JRD series	Rated 220Vac, 35+7%W, 1424±7%Ω (20°C).	UL/CSA 60335-1, UL/CSA 60335-2-89	cURus SA44356
18	NTC cover on water tube	CAREL INDUSTRIES - Headquarters	NTC030W H	-50~105°C, 10kΩ at 25°C	–	Tested in appliance
19	Heat exchanger 1	Foshan Shunguan Heat Exchanger Co., Ltd.	WYA-TTG- 4.0P-C8-08	Refrigerant Titanium sleeve, 12.7mm diameter, 0.75mm thickness. For model GEO040V1LM.	–	Tested in appliance
		Foshan Shunguan Heat Exchanger Co., Ltd.	WYA-TTG- 4.0P-C8-08	Refrigerant Titanium sleeve, 12.7mm diameter, 0.75mm thickness. For model GEO040V1LM.	–	Tested in appliance

Item No.	Object/part no.	Manufacturer/ Trademark	Type/Mode l	Technical Data	Standard	Mark(s) of Conformity
		Foshan Shunguan Heat Exchanger Co., Ltd.	WYA-TTG- 6.0P-C8-08	Refrigerant Titanium sleeve, 15.88mm diameter, 0.8mm thickness. For model GEO060V1LM.	–	Tested in appliance
		Foshan Shunguan Heat Exchanger Co., Ltd..	WYA-TTG- 8.0P-C8-08	Refrigerant Titanium sleeve, 19.05mm diameter, 1.0mm thickness. For model GEO080V1LM.	–	Tested in appliance
20	Heat exchanger-2	Foshan Shunguan Heat Exchanger Co., Ltd.	WYA- BPDWLRS - 4.0P-C10- GS118	Refrigerant brass tube, 15.88mm diameter, 1.0mm thickness. For model GEO040V1LM.	–	Tested in appliance
		Foshan Shunguan Heat Exchanger Co., Ltd.	WYA- BPDWLRS - 6.0P-C10- GS118	Refrigerant brass tube, 15.88mm diameter, 1.0mm thickness. For model GEO060V1LM.	--	Tested in appliance
		Foshan Shunguan Heat Exchanger Co., Ltd.	WYA- BPDWLRS - 8.0P-C10- GS118	Refrigerant brass tube, 15.88mm diameter, 1.0mm thickness. For model GEO080V1LM.	--	Tested in appliance
21	Compressor- 1	Panasonic Wanbao Appliance Compressor (Guangzhou) Co., Ltd	9VD330XA B21	Rated 280Vdc, 3450RPM. Brushless motor, 4pole, Rated output 1.7KW. Refrigerant type R32. For model GEO040V1LM.	EN 60335-1, EN 60335-2- 34	TUV 50483203 001
22	Compressor- 2	Panasonic Wanbao Appliance Compressor (Guangzhou) Co., Ltd	9KD420ZA A21	Rated 280Vdc, 3450RPM. Brushless motor, 6pole, Rated output 3.0KW. Refrigerant type R32. For model GEO060V1LM.	EN 60335-1, EN 60335-2-34	TUV 50537034 001
23	Compressor- 3	Panasonic Wanbao Appliance Compressor (Guangzhou) Co., Ltd	9VD550XA A21	Rated 520Vdc, 3600RPM. Brushless motor, 6pole, Rated output 3.8KW. Refrigerant type R32. For model GEO080V1LM.	EN 60335-1, EN 60335-2-34	TUV 50483203 001
24	Glass fiber sleeving	Various	Various	600V, 200°C, VW-1.	UL 1441, CSA-C22.2 No. 198.3	cURus

Warranty (limited Residential Warranty)

Aqua Solanor Inc (Owner of ***Hydro Solar Innovative Energy***) warrants that the heat pumps supplied by it shall be free from defects in materials and workmanship for a period of **Five *(5) Five YEARS*** after the date of installation or for a period ***(5) Five YEARS*** AND **(30) THIRTY DAYS** after the date of shipment, whichever occurs first.

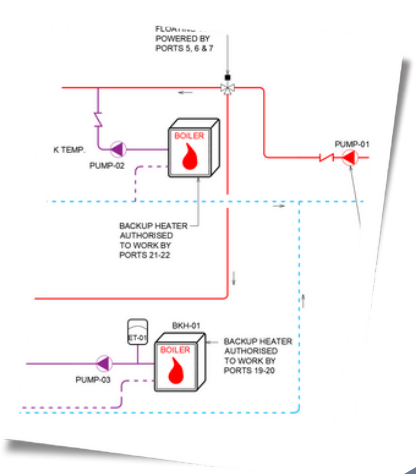
Aqua Solanor Inc shall, at its option repair or replace any part or parts covered by this warranty which shall be returned to **Aqua Solanor Inc**, transportation charges prepaid (by customer), which, upon examination proves to be defective in materials or workmanship.

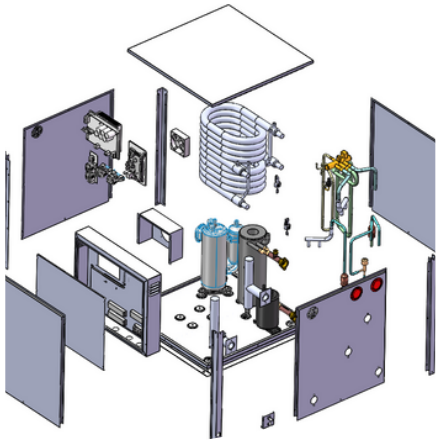
Replacement or repaired parts and components are warranted only for the remaining portion of the original warranty period.

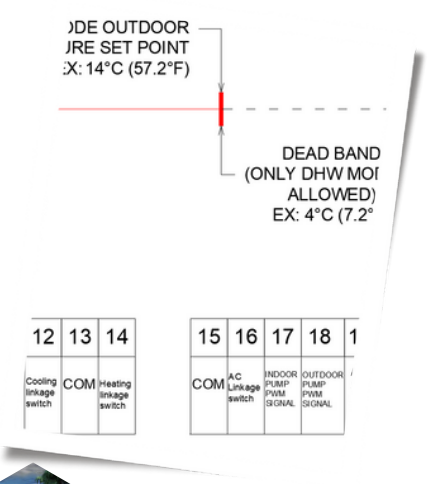
This warranty is subject to the following conditions:

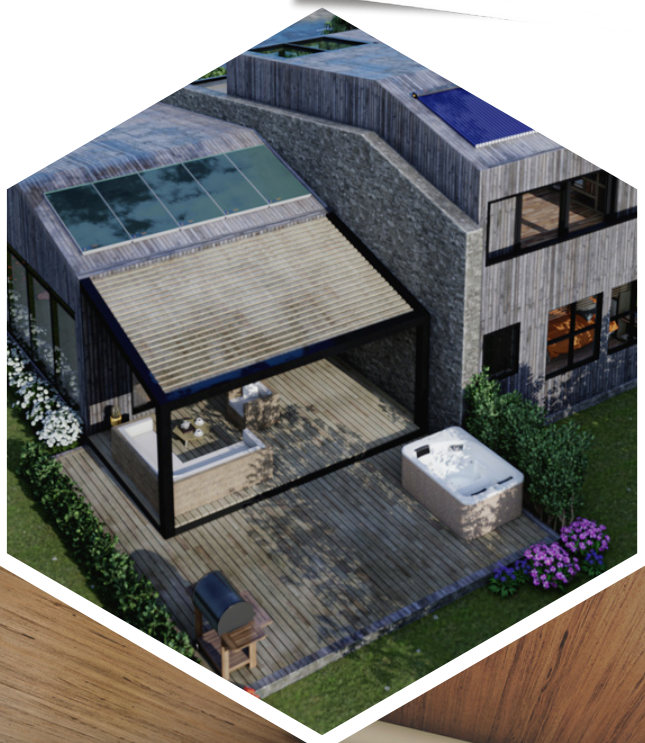
1. The **Hydro Solar Innovative Energy** heat pump must be properly installed and maintained in accordance with this installation and maintenance document and in compliance with Federal, Provincial, Municipal, and local codes and regulations.
2. The installer must be a certified qualified heat pump installer in the province/state where the heat pump is installed. Failure to comply with this requirement will void this warranty.
3. The installer must complete an installation and commissioning report have it endorsed by the owner and return it to **Hydro Solar Innovative Energy** within 21 days of installation of the unit. The installer must fill up the Heat Pump Warranty Registration Form which will provide them with a Warranty Unique ID. To make a warranty claim, the buyer must present a valid Warranty Unique ID.
4. It is the responsibility of the building or general contractor to supply temporary heat to the structure prior to occupancy. These heat pumps are designed to provide heat only to the finished and insulated structure. Start-up of the unit shall not be scheduled prior to completion of construction and final Duct/Pipe installation for validation of this warranty.
5. It is the customer's responsibility to supply the proper quantity and quality of water.

If the heat pump, supplied by **Aqua Solanor Inc**, fails to conform to this warranty, **Aqua Solanor Inc** 's sole and exclusive liability shall be, at its option, to repair or replace any part or component which is returned by the customer during the applicable warranty period set forth above, provided that (1) **Aqua Solanor Inc** is promptly notified in writing upon discovery by the customer that such part or component fails to conform to this warranty. (2) The customer returns such part or component to **Aqua Solanor Inc**, transportation charges prepaid, within (30) thirty days of failure, and (3) **Aqua Solanor Inc**'s examination of such component shall disclose to its satisfaction that such part or component fails to meet this warranty and the alleged defects were not caused by accident, misuse, neglect, alteration, improper installation, repair, or improper testing.









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