Hydro Solar
Innovative Energy

AIR TO WATER DC INVERTER HEAT PUMPS WITH EVI TECHNOLOGY. MONOBLOCK CONFIGURATION 3RD GENERATION R32 REFRIGERANT

Multi-Functions Heat Pumps

DC inverter Air to Water Heat Pumps for Space Heating, Space Cooling, Domestic Hot Water Pre-Heating. Operating Temperatures -30ºC To +45ºC. Water Supply Temperature as high as 140°F (60°C).

HSS 030, 60, 80
V3LM SERIES

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2 INTRODUCTION

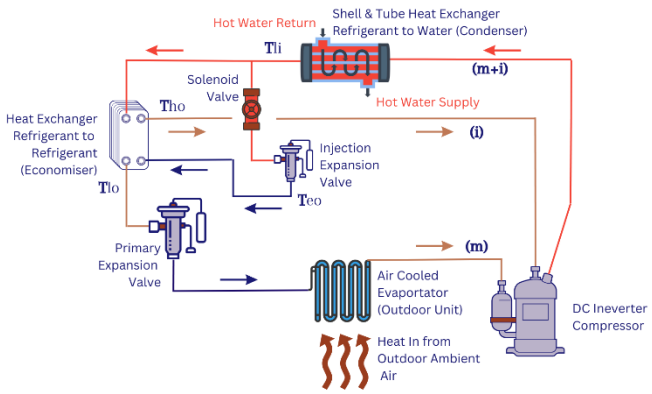
2.1 WHAT IS AIR TO WATER HEAT PUMP?

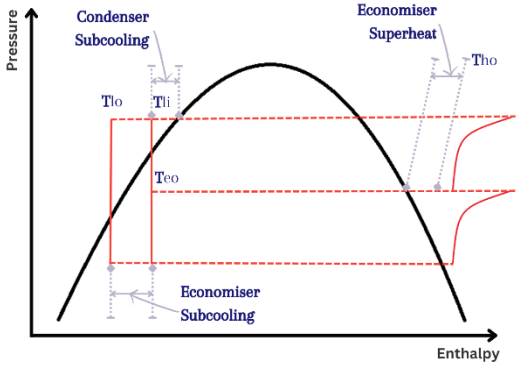
Air to Water Heat Pump is a machine that draws heat from one place (called heat source) and reject the drawn heat to another place (called heat sink). Unlike conventional air to air heat pump, where generated thermal energy is used to cool/heat air, Air to Water Heat Pumps use generated thermal energy to cool/heat water or water/glycol fluid mixture. Our air to water heat pumps are equipped with DC inverter Compressor and EVI (Enhanced vapor injection) technology, which allows them to delivery higher temperature fluid in much colder outdoor temperatures when compared to conventional two stages or DC inverter only (without EVI) Heat Pumps.

2.1.1 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 match 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.

2.1.2 What Is EVI (Enhanced Vapor Injection) Technology?





As shown in the above schematic, the liquid out of the condenser is separated into two parts. A smaller part of the liquid, i, is expanded through an additional expansion valve, and then directed (or flows) into a counter-flow plate heat exchanger, HX. The main part of the liquid out of the condenser, m, is then cooled down through the economizer while evaporating and superheating the injection mass flow. This additional plate heat exchanger, more generally called economizer, acts therefore as a sub cooler for the main mass flow m and as an evaporator for the injection mass flow. Superheated vapor is then injected into the intermediate vapor injection port in the scroll compressor.

The additional subcooling increases the evaporator capacity by reducing the temperature of the liquid from TLI to TLO, thus reducing its enthalpy. The additional condenser mass flow, i, increases the heating capacity by the same amount.

Efficiency with vapor injection scroll compressor cycle is higher than that of a conventional single stage scroll delivering the same capacity because the added capacity is achieved with proportionally less power. The injection mass flow created in the subcooling process is compressed only from the higher inter-stage pressure rather than from the lower suction pressure.

The additional Sub-cooling effect of EVI configuration allows heat pump to draw heat from the outdoor at lower outdoor temperatures. That could explain why DC inverter (Non EVI) Heat Pumps operate between -20ºC and 45ºC (Outdoor BD Temperatures) while DC Inverter EVI Heat Pumps operate between -30ºC and 45ºC (Outdoor BD Temperatures).

2.1.3 Why Air to Water Heat Pumps are 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.

Getting Gradually to the Net Zero Energy will have to make sense, not only from an environmental point of view but from a financial and social point of view too. Even though renewable energies' prices are going down and efficiency is going up, they are still not affordable for a normal middle-class North American Household

when adding the cost of labor to the cost of materials. Also, labor cost increases twofold when retrofitting an existing home with one or a combination of several renewable energy sources (such as solar, geothermal, etc.…).

Before the emergence of Air to Water Heat Pumps, Canadian/US homes and business owners who wished to heat/cool their properties with hydronic systems had only two choices: either Conventional Electric/Gas/Propane/Wood boilers which are affordable but extremely environmentally unfriendly or Geothermal Heat Pumps which are extremely expensive and environmentally friendly.

Air to Water Heat Pumps combine affordability and energy efficiency and do make a great sense when comparing budgets for conventional Boiler based scenario, Air to Water Heat Pump Scenario and Geothermal Scenario.

Geothermal Heat Pump, for a regular Canadian/US home, has an annual COP (Coefficient of Performance) of around 3. A similar capacity Air to Water Heat pump has an annual COP of 2.2-2.4 for a much lower. In General, Air to Water Heat pumps are 20-30% less efficient that their geothermal peers but they are 60% cheaper.

3 FEATURES

3.1 CONTROL PROTOCOL

Our air to water heat pumps use Modbus protocol. Modbus is a communication protocol developed by Modicon systems. In simple terms, it is a method used for transmitting information over serial lines between electronic devices. Modbus is an open protocol, meaning that it is free for manufacturers to build into their equipment without having to pay royalties.

It has become a very common protocol used widely by many manufacturers HVAC Equipment. Modbus is typically used to transmit signals from instrumentation and control devices back to a main controller or data gathering system.

Modbus can be easily integrated with BACnet Controller either through BACnet/Modbus Gateways or simply by integrating the Modbus controller with the BACnet Controller (most BACnet controllers' manufacturer have adapted their firmware to read Points Table of Modbus controllers).

3.2 CONTROL INTERFACE & CONTROL CARDS

Control interface is CAREL PGD1000 interface and Heat Pumps Controller are CAREL Controllers with Modbus Protocol.

Compressor variable speed controller is CAREL Model PS2002523D100 (*Input: 200-240Vac, 50/60Hz, 40-57A; AC output: 0-240V, 25-30A, DC output: 385V, 1500W Software: Class B.*).

Condenser Fan variable Speed Controller is CAREL PSALB00000 (*240-400Vdc, max 1.5Adc*).

3.3 COMPRESSOR

Compressors are Panasonic EVI DC Inverter Twin Rotary Compressors. Panasonic uses high efficiency pump and environmentally friendly refrigerant, to achieve energy efficient and reliable rotary compressor designs.

Panasonic has the smallest size variable speed rotary compressor in the industry. Panasonic rotary compressor has a good reputation with clients all over the world and are commonly used for room air conditioning and refrigeration.

4 COOLING/HEATING CAPACITY RATINGS AND POWER INPUT REQUIREMENTS

All performance data assumes water as heat transfer fluid. Please refer to the table below when mixing water with propylene glycol to see the flow adjustment factor when sizing circulation pump between heat pump and buffer tank.

Heat Pump Nominal Flow for Different Glycol Concentrations						
Propylene Glycol Volume Concentration	0%	10%	20%	30%	40%	50%
Nominal Flow Multiplier	1.00	1.02	1.04	1.08	1.14	1.22
HSS030V3LM	**8.2**	**8.4**	**8.5**	**8.9**	**9.3**	**10.0**
HSS060V3LM	**13**	**13.3**	**13.5**	**14.0**	**14.8**	**15.9**
HSS080V3LM	**19.2**	**19.6**	**20.0**	**20.7**	**21.9**	**23.4**

4.1 RATINGS LIST

Model No.	Power Supply	Electrical Power Input (KW)				Running Current (A) Max Load	Noise Level (dBA)
		Cooling Mode @ Ambient Dry Bulb: 43°C (109.4°F), Water inlet 20°C (68°F)	Heating Mode @ Ambient Dry Bulb: -20°C (-4°F), Water inlet 50°C (122°F)	Cooling Load Max	Heating Load Max		
HSS030V3LM	220-240VAC/1Ph/60Hz	2.74	2.62	3.55	3.25	14.80	52
HSS060V3LM	220-240VAC/1Ph/60Hz	3.96	5.40	5.98	5.26	25.34	55
HSS080V3LM	220-240VAC/1Ph/60Hz	5.54	5.98	7.92	7.27	33.20	58

Model No.	Water Flow (US GPM) – Minimum - Nominal	Water Pressure Drop		Liquid Pipe Connection	Refrigerant Type	Refrigerant Charge (OZ)	Design Refrigerant Pressure (PSI)		MOP (A)	MCA (A)	Maximum Inlet Water Temperature (°C) / (°F)
		kPa	Feet				Low	High			
HSS030V3LM	6.07-8.2	22-35	7.36-11.71	Ø1" - FNPT	R32	56.4	305	609	37.2	20.78	55°C / 131°F
HSS060V3LM	11.35-13.0	27-40	9.04-13.39	Ø1" - FNPT	R32	70.5	305	609	60.75	40.46	55°C / 131°F
HSS080V3LM	15.14-19.2	33-56	11.04-18.74	Ø1¼" - FNPT	R32	105.3	305	609	96.36	53.53	55°C / 131°F

Remarks:

HSS030V3LM is equipped with one Twin Rotary DC Inverter compressor: Panasonic - 9KD240ZAA2J.
HSS060V3LM is equipped with one Twin Rotary DC Inverter compressor: Panasonic - 9KD420ZAA2J.
HSS080V3LM is equipped with one Twin Rotary DC Inverter compressor: Panasonic - 9VD550ZCA2J.

4.2 COOLING PERFORMANCES:

4.2.1 HSS030V3LM

HSS030V3LM					
Outdoor Air DB Temperature (°C)	Outdoor Air DB Temperature (°F)	Supply Water Temperature 44.6°F (7°C) / Return Water Temperature 53.6°F (12°C)			
		Cooling Capacity (KW)	Cooling Capacity (BTU/HR)	Power Consumption (KW)	COP
23	73.4	15.16	51,723	2.98	5.09
26	78.8	13.39	45,685	3.08	4.35
29	84.2	12.12	41,352	3.12	3.88
32	89.6	10.19	34,767	3.22	3.16
35	95	8.64	29,478	3.28	2.63

4.2.2 HSS060V3LM

HSS060V3LM					
Outdoor Air DB Temperature (°C)	Outdoor Air DB Temperature (°F)	Supply Water Temperature 44.6°F (7°C) / Return Water Temperature 53.6°F (12°C)			
		Cooling Capacity (KW)	Cooling Capacity (BTU/HR)	Power Consumption (KW)	COP
23	73.4	28.75	98,090	5.68	5.06
26	78.8	25.95	88,537	5.87	4.42
29	84.2	23.27	79,393	5.92	3.93
32	89.6	19.47	66,428	5.97	3.26
35	95	15.83	54,009	5.98	2.65

4.2.3 HSS080V3LM

HSS080V3LM					
Outdoor Air DB Temperature (°C)	Outdoor Air DB Temperature (°F)	Supply Water Temperature 44.6°F (7°C) / Return Water Temperature 53.6°F (12°C)			
		Cooling Capacity (KW)	Cooling Capacity (BTU/HR)	Power Consumption (KW)	COP
23	73.4	38.95	132,890	7.68	5.07
26	78.8	33.92	115,729	7.73	4.39
29	84.2	30.44	103,856	7.92	3.84
32	89.6	25.88	88,298	8.07	3.21
35	95	21.45	73,184	8.15	2.63

4.3 HEATING PERFORMANCES

4.3.1 HSS030V3LM

Outdoor Air DB Temperature (°C)	Outdoor Air DB Temperature (°F)	Supply Water Temperature 95°F (35°C) / Return Water Temperature 86°F (30°C)				Supply Water Temperature 113°F (45°C) / Return Water Temperature 104°F (40°C)				Supply Water Temperature 131°F (55°C) / Return Water Temperature 122°F (50°C)			
		Heating Capacity (KW)	Heating Capacity (BTU/HR)	Power Input (KW)	COP	Heating Capacity (KW)	Heating Capacity (BTU/HR)	Power Input (KW)	COP	Heating Capacity (KW)	Heating Capacity (BTU/HR)	Power Input (KW)	COP
-30	-22	3.23	11,021	1.94	1.66	3.15	10,748	2.15	1.47	2.99	10,202	2.41	1.24
-25	-13	4.01	13,682	2.16	1.86	3.94	13,443	2.39	1.65	3.74	12,761	2.68	1.40
-20	-4	4.45	15,183	1.98	2.25	4.93	16,821	2.52	1.96	4.82	16,445	2.84	1.70
-15	5	6.36	21,700	2.43	2.62	6.34	21,631	2.86	2.22	6.03	20,574	3.43	1.76
-7	19.4	7.68	26,203	2.33	3.30	7.57	25,828	2.64	2.87	7.29	24,873	3.07	2.37
2	35.6	8.48	28,933	2.50	3.39	8.20	27,977	2.69	3.05	7.97	27,193	2.95	2.70
7	44.6	11.73	40,021	3.39	3.46	11.46	39,100	3.41	3.36	10.46	35,688	3.64	2.87
8.33	47	11.75	40,103	3.16	3.79	11.49	39,209	3.24	3.57	10.36	35,333	3.47	2.99
12	53.6	11.82	40,328	2.52	4.69	11.58	39,509	2.79	4.15	10.07	34,357	3.02	3.33
20	68	11.94	40,737	2.06	5.80	11.64	39,714	2.34	4.97	10.33	35,244	2.66	3.88
23	73.4	11.83	40,362	2.02	5.86	11.68	39,850	2.27	5.15	10.48	35,756	2.60	4.03
26	78.8	11.91	40,635	1.98	6.02	11.72	39,987	2.18	5.38	10.52	35,893	2.56	4.11
29	84.2	11.96	40,806	1.66	7.20	11.71	39,953	2.02	5.80	10.73	36,609	2.53	4.24
32	89.6	11.99	40,908	1.59	7.54	11.73	40,021	1.91	6.14	10.78	36,780	2.51	4.29
35	95	12.12	41,352	1.53	7.92	11.76	40,123	1.82	6.46	10.72	36,575	2.48	4.32

4.3.2 HSS060V3LM

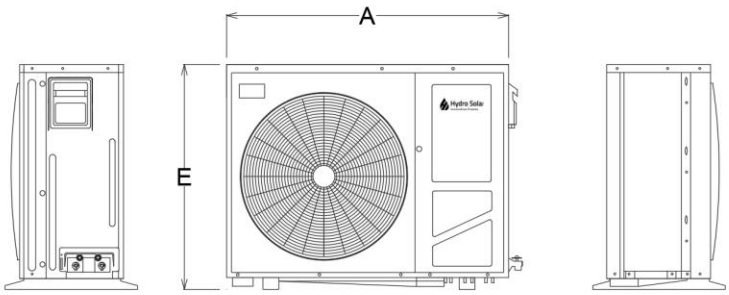
Outdoor Air DB Temperature (°C)	Outdoor Air DB Temperature (°F)	Supply Water Temperature 95°F (35°C) / Return Water Temperature 86°F (30°C)				Supply Water Temperature 113°F (45°C) / Return Water Temperature 104°F (40°C)				Supply Water Temperature 131°F (55°C) / Return Water Temperature 122°F (50°C)			
		Heating Capacity (KW)	Heating Capacity (BTU/HR)	Power Input (KW)	COP	Heating Capacity (KW)	Heating Capacity (BTU/HR)	Power Input (KW)	COP	Heating Capacity (KW)	Heating Capacity (BTU/HR)	Power Input (KW)	COP
-30	-22	7.44	25,384	4.21	1.77	6.84	23,337	4.63	1.48	6.36	21,700	5.12	1.24
-25	-13	9.63	32,856	5.27	1.83	9.37	31,969	5.76	1.63	8.45	28,830	6.11	1.38
-20	-4	12.18	41,556	5.37	2.27	10.83	36,950	5.88	1.84	10.71	36,541	6.44	1.66
-15	5	13.29	45,343	4.94	2.69	12.64	43,126	5.52	2.29	12.02	41,010	6.36	1.89
-7	19.4	15.35	52,372	4.82	3.18	14.98	51,109	5.27	2.84	14.23	48,550	6.06	2.35
2	35.6	16.31	55,647	4.77	3.42	15.93	54,350	5.44	2.93	15.39	52,508	6.29	2.45
7	44.6	18.75	63,972	4.73	3.96	18.88	64,415	5.54	3.41	18.39	62,744	6.34	2.90
8.33	47	19.28	65,764	4.70	4.10	19.15	65,352	5.52	3.47	18.58	63,399	6.23	2.99
12	53.6	20.72	70,693	4.61	4.49	19.91	67,929	5.48	3.63	19.11	65,200	5.92	3.23
20	68	23.14	78,950	3.94	5.87	21.67	73,934	4.45	4.87	21.07	71,887	5.42	3.89
23	73.4	24.11	82,259	3.75	6.43	22.25	75,913	4.41	5.05	21.97	74,958	5.35	4.11
26	78.8	25.46	86,865	3.73	6.83	23.15	78,984	4.28	5.41	22.76	77,653	5.26	4.33
29	84.2	26.15	89,219	3.64	7.18	24.52	83,658	4.06	6.04	23.81	81,235	5.17	4.61
32	89.6	27.01	92,153	3.61	7.48	25.61	87,377	3.96	6.47	22.79	77,755	4.88	4.67
35	95	24.36	83,112	3.25	7.50	23.35	79,666	3.54	6.60	21.56	73,559	4.36	4.94

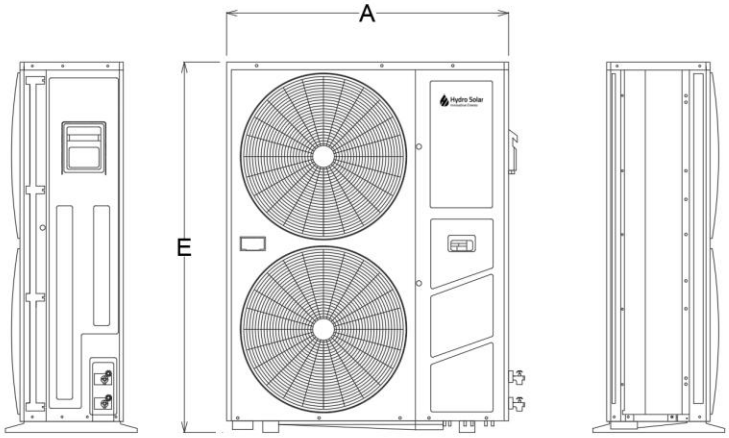
4.3.3 HSS080V3LM

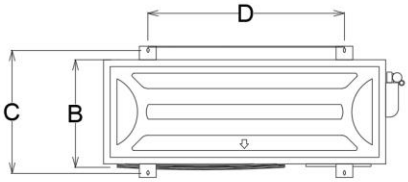
Outdoor Air DB Temperature (°C)	Outdoor Air DB Temperature (°F)	Supply Water Temperature 95°F (35°C) / Return Water Temperature 86°F (30°C)				Supply Water Temperature 113°F (45°C) / Return Water Temperature 104°F (40°C)				Supply Water Temperature 131°F (55°C) / Return Water Temperature 122°F (50°C)			
		Heating Capacity (KW)	Heating Capacity (BTU/HR)	Power Input (KW)	COP	Heating Capacity (KW)	Heating Capacity (BTU/HR)	Power Input (KW)	COP	Heating Capacity (KW)	Heating Capacity (BTU/HR)	Power Input (KW)	COP
-30	-22	10.61	36,200	5.83	1.82	9.78	33,368	6.43	1.52	8.86	30,229	7.09	1.25
-25	-13	12.82	43,740	7.19	1.78	12.51	42,682	7.71	1.62	11.28	38,486	8.12	1.39
-20	-4	16.23	55,374	7.59	2.14	15.18	51,792	7.85	1.93	14.14	48,243	8.59	1.65
-15	5	17.17	58,581	7.13	2.41	16.85	57,489	7.36	2.29	16.19	55,238	8.25	1.96
-7	19.4	20.48	69,874	6.68	3.07	19.98	68,168	7.03	2.84	18.99	64,791	8.08	2.35
2	35.6	23.22	79,222	6.83	3.40	22.72	77,517	7.26	3.13	21.97	74,958	8.36	2.63
7	44.6	27.08	92,392	7.64	3.54	26.91	91,812	7.84	3.43	25.98	88,639	8.45	3.07
8.33	47	27.84	94,994	7.51	3.71	27.59	94,141	7.69	3.59	26.52	90,495	8.29	3.20
12	53.6	29.94	102,150	7.16	4.18	29.47	100,546	7.29	4.04	28.02	95,599	7.86	3.56
20	68	31.62	107,882	6.76	4.68	31.83	108,598	6.97	4.57	30.98	105,698	7.29	4.25
23	73.4	32.92	112,317	6.63	4.97	31.31	106,824	6.94	4.51	30.63	104,504	7.08	4.33
26	78.8	33.77	115,217	6.61	5.11	32.74	111,703	6.84	4.79	32.09	109,485	6.99	4.59
29	84.2	35.02	119,482	6.56	5.34	33.77	115,217	6.63	5.09	32.76	111,771	6.78	4.83
32	89.6	35.35	120,608	6.33	5.58	33.83	115,422	6.62	5.11	32.83	112,010	6.69	4.91
35	95	35.13	119,857	6.25	5.62	33.96	115,865	6.51	5.22	32.96	112,453	6.62	4.98

5 DIMENSIONS & WEIGHTS

5.1 HEAT PUMP DIMENSIONS







Dimension	HSS030V3LM-mm (inches)	HSS060V3LM -mm (inches)	HSS080V3LM -mm (inches)
A	1030 (40.55)	1156 (45.51)	1206 (47.48)
B	392 (15.43)	458 (18.03)	467 (18.39)
C	448 (17.63)	484 (19.06)	503 (19.80)
D	718 (28.26)	825 (32.48)	883 (34.76)
E	820 (32.28)	1343 (52.87)	1455 (57.28)

5.2 SHIPPING DIMENSIONS AND WEIGHTS

Model Number	Unit Dimensions	Unit Weight
HSS030V3LM	44.5"x19"x36"	200 Lb
HSS060V3LM	47.5"x21.75"x58"	300 Lb
HSS080V3LM	49.75"x22.75"x62"	350 Lb

*Hydro Solar Innovative Energy works continually to improve its products. As a result, the design and specifications of each product at the time of order may be changed without notice and may not be as described herein.

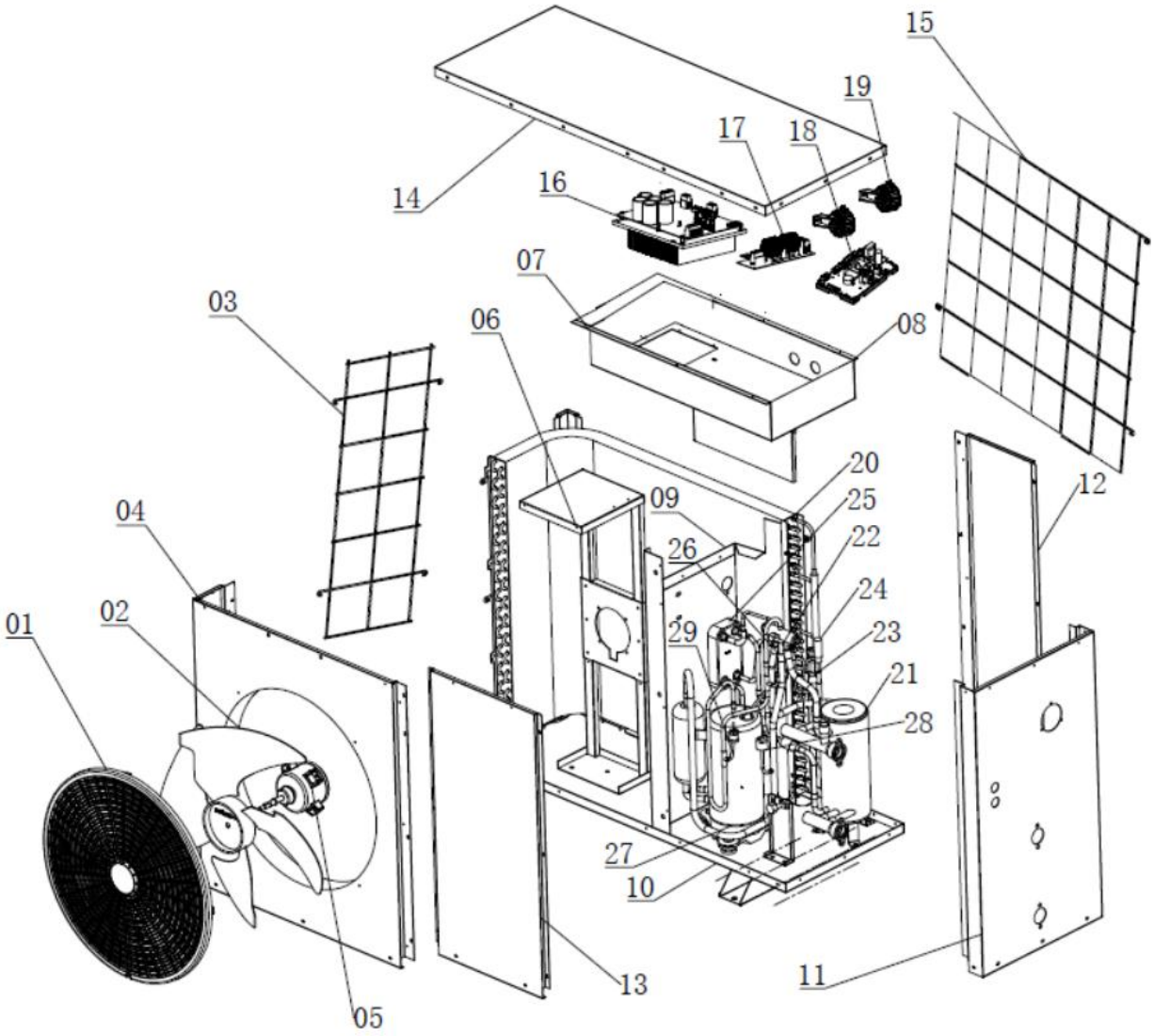
6 ITEMS SHIPPED WITH HEAT PUMP

The following items are shipped with the heat pump:

- Heat Pump (including all sensors, CAREL Controller, etc.…).
- WIFI Adapter (with Free to download WIFI app).

7 EXPLODED PICTURES

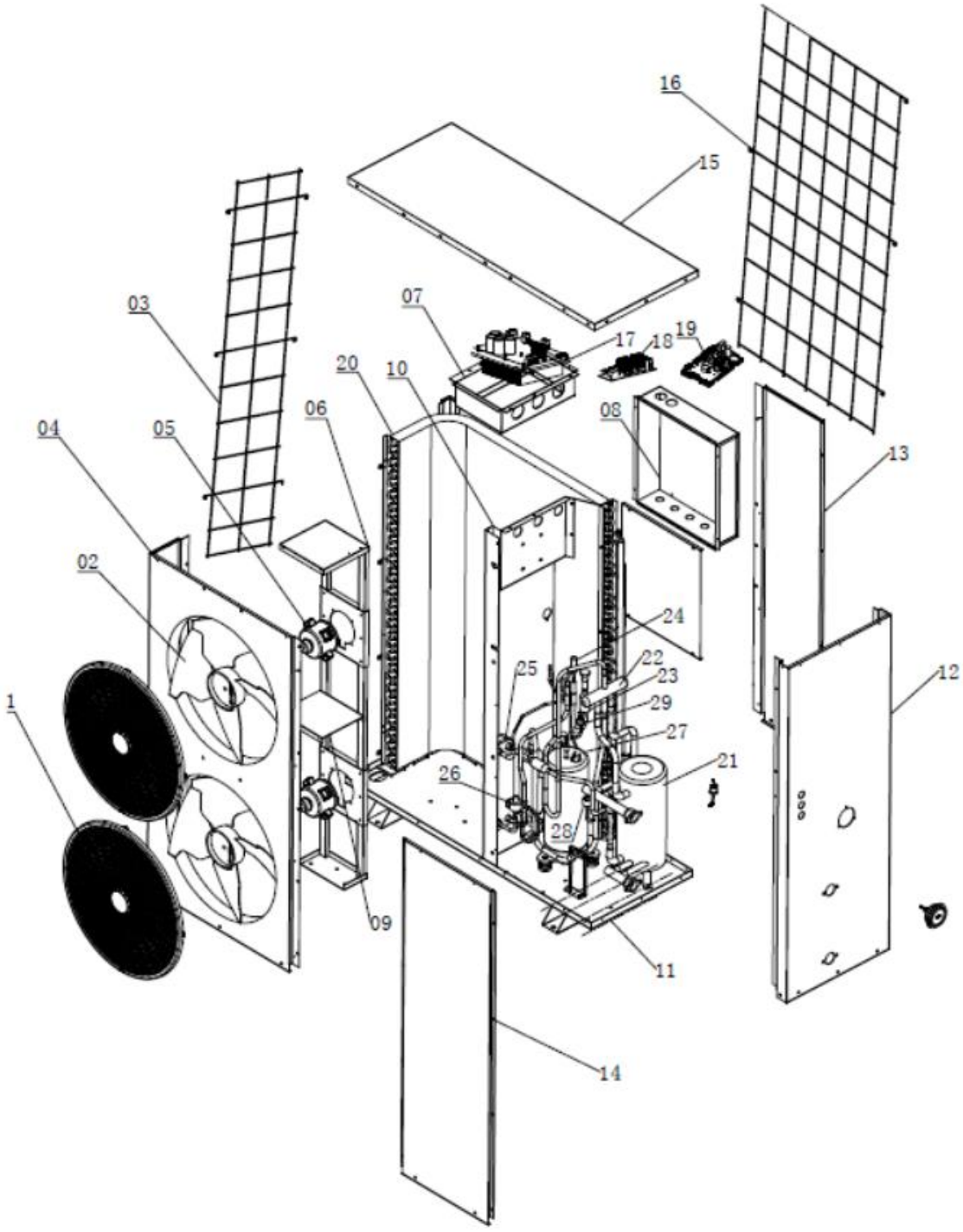
7.1 HSS030V3LM



Number ID	Description
01	Front Panel
02	Fan Blade
03	Left Guard Net
04	Front Air Outlet Panel Assembly
05	DC motor
06	Motor Bracket Assembly
07	Driver Electrical Box
08	Main Control Panel Electrical Box
09	Middle Diaphragm Assembly
10	Chassis Assembly
11	Right Side Panel
12	Rear Side Panel
13	Front Side Panel
14	Top Cover Plate
15	Rear Guard Net

Number ID	Description
16	DC Inverter Board
17	DC Inverter Filter Plate
18	Carel Main electrical control board
19	Inductor
20	Air Cooled Condenser Assembly
21	Refrigerant to Water Shell & Tube Heat Exchanger
22	Four Way Valve
23	Filter
24	Carel Electronic Expansion Valve (EEV)
25	Economizer
26	Auxiliary EEV
27	Panasonic Compressor
28	Low Pressure Switch
29	High Pressure Switch

7.2 HSS060V3LM



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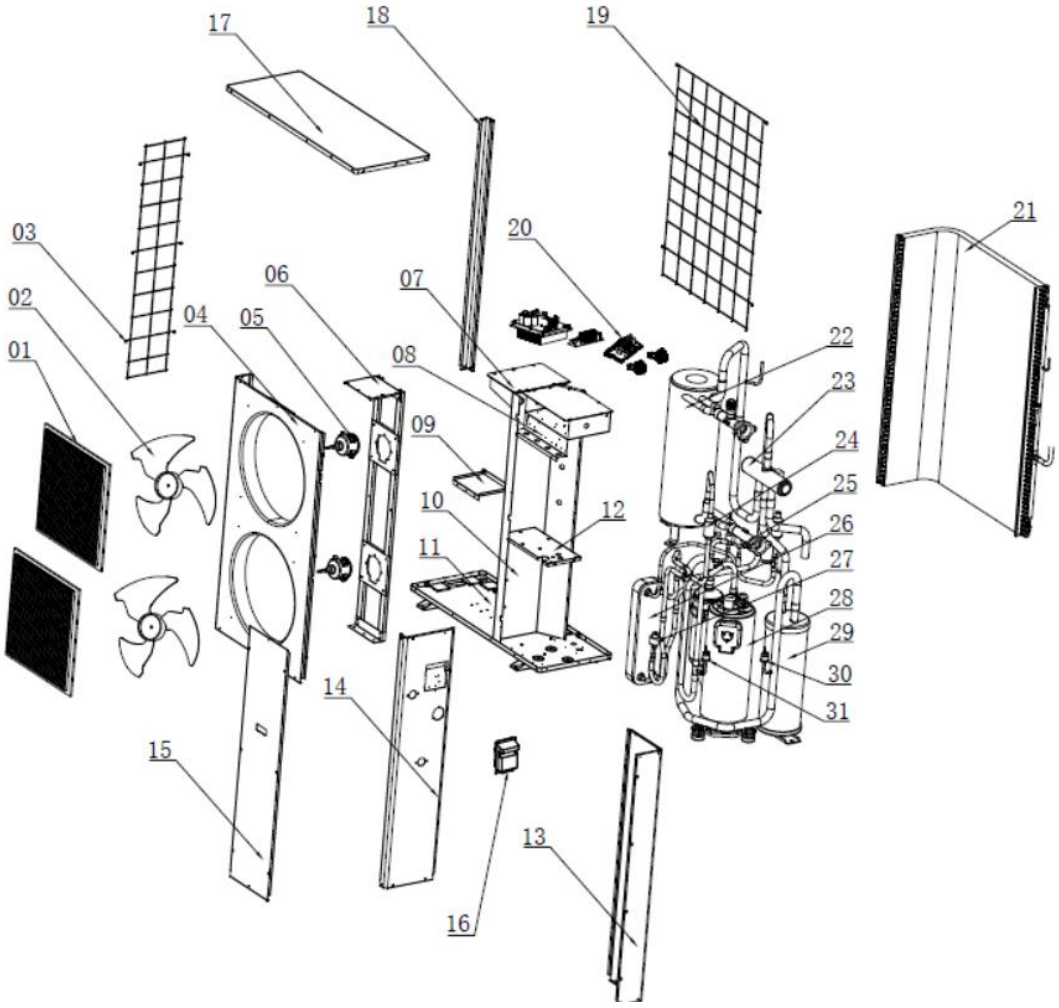
09	Middle Diaphragm Assembly
10	Chassis Assembly
11	Right Side Panel
12	Rear Side Panel
13	Front Side Panel
14	Top Cover Plate
15	Rear Guard Net

Number ID	Description
16	DC Inverter Board
17	DC Inverter Filter Plate
18	Carel Main electrical control board
19	Inductor
20	Air Cooled Condenser Assembly
21	Refrigerant to Water Shell & Tube Heat Exchanger
22	Four Way Valve
23	Filter
24	Carel Electronic Expansion Valve (EEV)
25	Economizer
26	Auxiliary EEV
27	Panasonic Compressor
28	Low Pressure Switch
29	High Pressure Switch

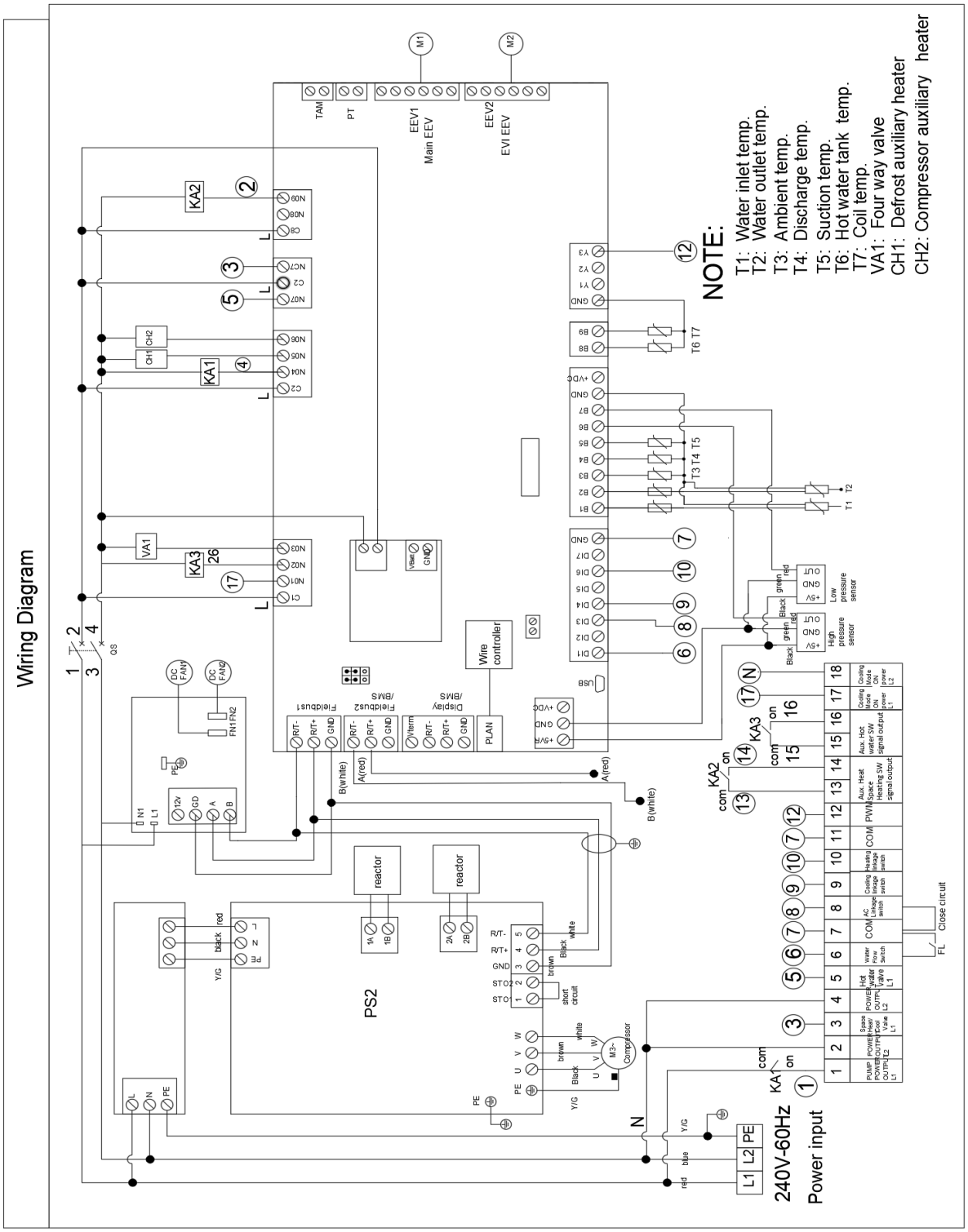
7.3 HSS080V3LM



Number ID	Description
01	Front Panel
02	Fan Blade
03	Left Guard Net
04	Front Air Outlet Panel Assembly
05	DC motor
06	Motor Bracket Assembly
07	Driver Electrical Box
08	Main Control Panel Electrical Box
09	Intermediate Fixing Plate
10	Middle Diaphragm Assembly
11	Chassis Assembly
12	Middle Bottom Support Plate
13	Rear Side Panel
14	Front Right Side Panel
15	Front Access Panel
16	Handle

Number ID	Description
17	Top Cover Plate
18	Rear Column
19	Rear Guard Net
20	Carel Main electrical control board
21	Air Cooled Condenser Assembly
22	Refrigerant to Water Shell & Tube Heat Exchanger
23	Four Way Valve
24	Filter
25	Carel Electronic Expansion Valve (EEV)
26	Economizer
27	Auxiliary EEV
28	Panasonic Compressor
29	Gas Liquid Separator
30	Low Pressure Switch
31	High Pressure Switch

8 CONTROL CARD AND WIRING DIAGRAMS



8.1 TERMINALS DESCRIPTION

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
PUMP POWER OUTPUT (L1)	PUMP POWER OUTPUT (L2)	floor heat valve (L1)	(L2)	Hot water valve (L1)	Water flow sw	COM	A.C turn on/ off sw	Cool linkage sw	Heat linkage sw	COM	PWM signal	Aux.elec. heater Space Heating		Aux.elec. heater DHW		Cooling mode signal ouput 220VAC/60Hz	

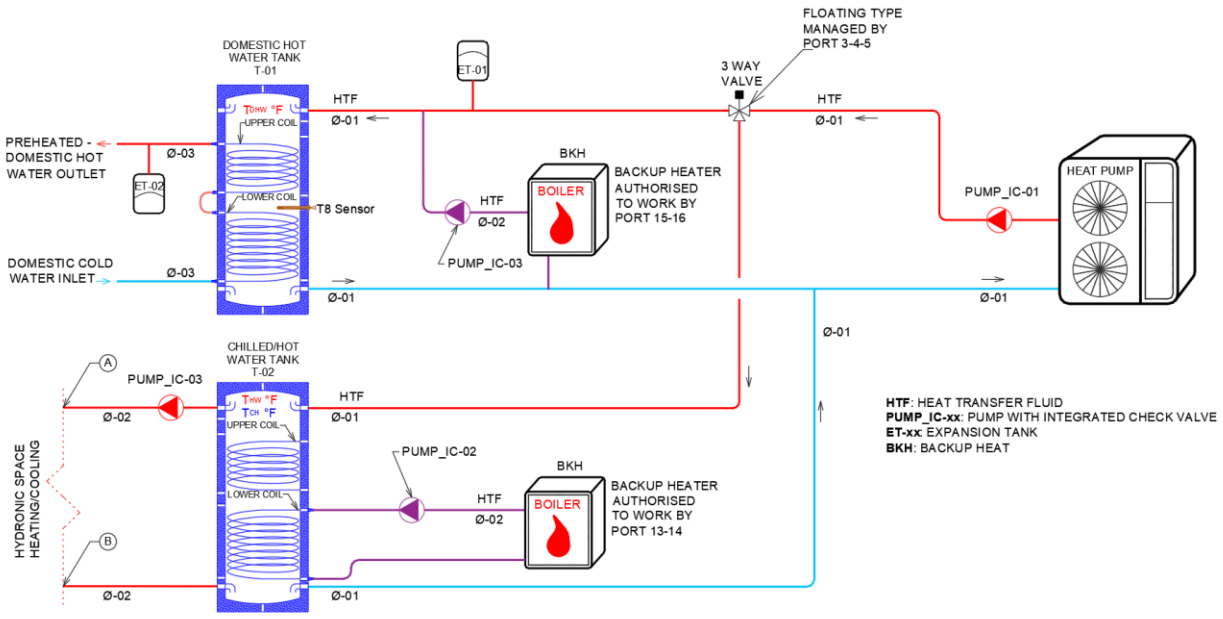
Terminal	Function	Type
1-2: PUMP POWER OUTPUT	Power Supply for Heat Pump Circulation Pump (Pump not included)	220-240V/1Ph/60Hz
3-4-5: THREE WAY VALVE POWER OUTPUT	Floating Type 3 Way Valve, Switches between DHW tank and Space Heating/Cooling Tank	220-240V/1Ph/60Hz
6: WATER FLOW SWITCH	Water flow switch (in the indoor unit) connection port (6-7). Must be wired to outdoor	Dry Contact (can be configured NO or NC from Carel Controller)
7: COM	Common	
8: ON/OFF SWITCH	Switches Heat Pump ON or OFF. Factory Jumper between 7 (COM) and 8	Dry Contact (can be configured NO or NC from Carel Controller)
9: COOLING LINKAGE SWITCH	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)
10: HEATING LINKAGE SWITCH	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)
11: COM	Common	
12: CIRCULATION PUMP SPEED CONTROL	Modulates the speed of circulation Pump (optional)	PWM (Pulse Width Modulation)
13-14: AUXILIARY HEATER CONTROL SWITCH FOR SPACE HEATING	Enables the operation of the backup heater dedicated for space heating	Dry Contact (NO)
15-16: AUXILIARY HEATER CONTROL SWITCH FOR DOMESTIC HOT WATER HEATING (DHW)	Enables the operation of the backup heater dedicated for DHW heating	Dry Contact (NO)
17-18: COOLING MODE VALVE	ON/OFF Type 3 Way Valve, Switches between chilled and hot water tank (2 Tanks configuration) or by-passes tank when HP is in cooling mode (1 Tank configuration)	220-240V/1Ph/60Hz

Power and control wiring shall be done by qualified personnel. Please check your Federal, Provincial and any local regulation requirements related to the purchase/installation and operation of this equipment. It is the buyer's responsibility to comply with such regulatory requirements.

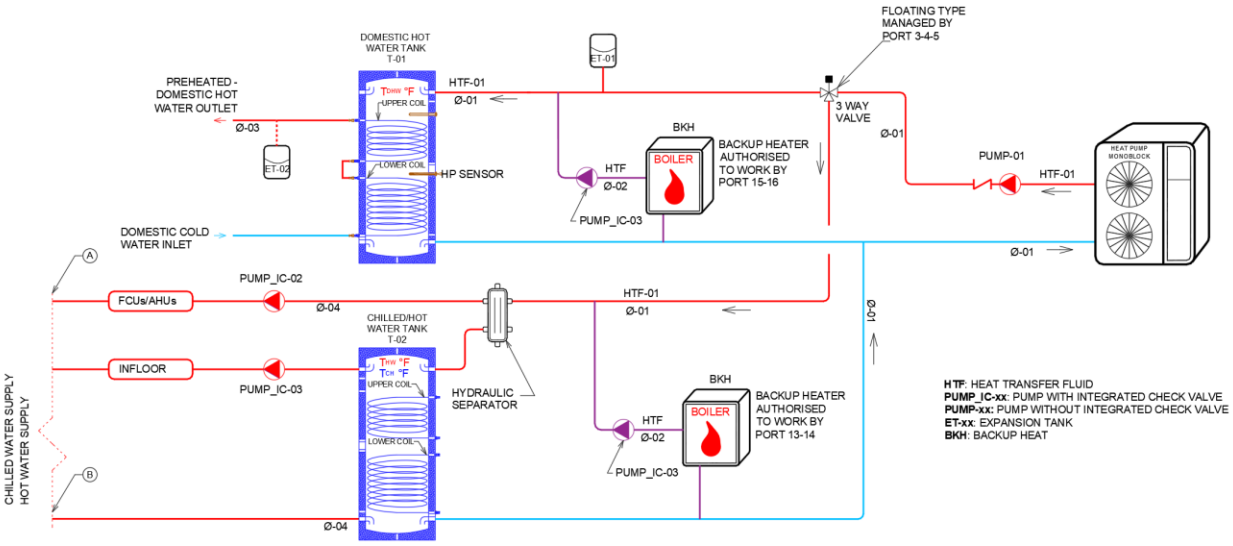
9 PIPING DIAGRAMS

9.1 DUAL TANK – THREE FUNCTIONS (ALL YEAR)

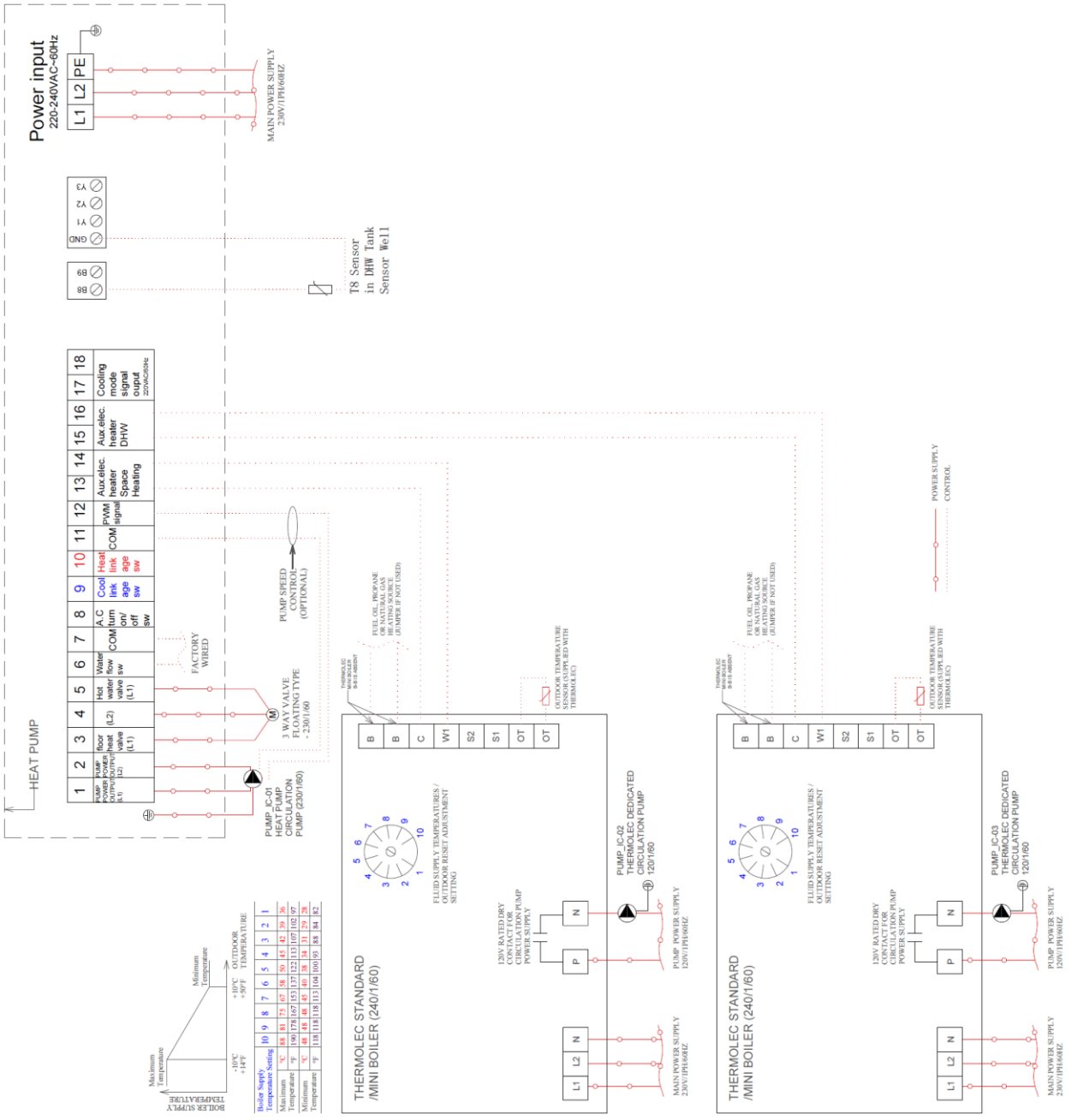
In this configuration, a tank is dedicated for the DHW heating and another one is dedicated for either space heating or space cooling. This allows each tank to be maintained at a separate temperature.



A hydraulic separator is used when the space cooling is done, via fan coil units (FCU) or an air handling units (AHU), with hydronic coils designed to dehumidify with chilled supply temperature of 7°C (44.6°F). The hydraulic separator allows water at 7°C (44.6°F) to be directly supplied to FCU and/or AHU and avoid thermal stratification from the tank which might increase chilled water supply temperatures above 7°C (44.6°F).

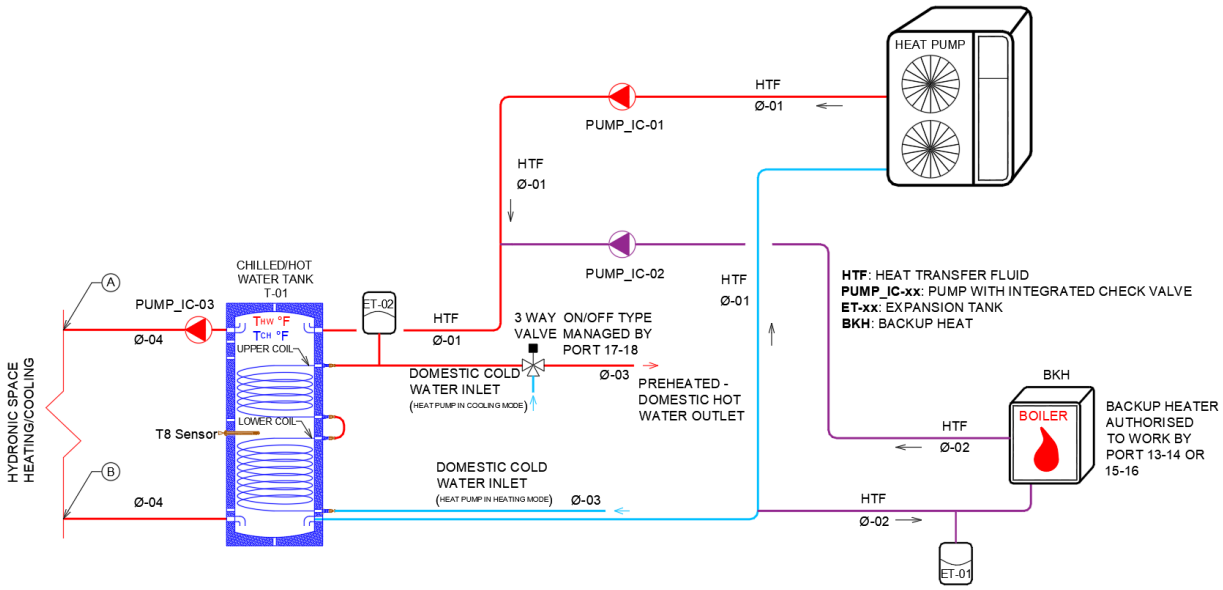


Sample Wiring diagram with two Thermolec Boilers as a backup heaters

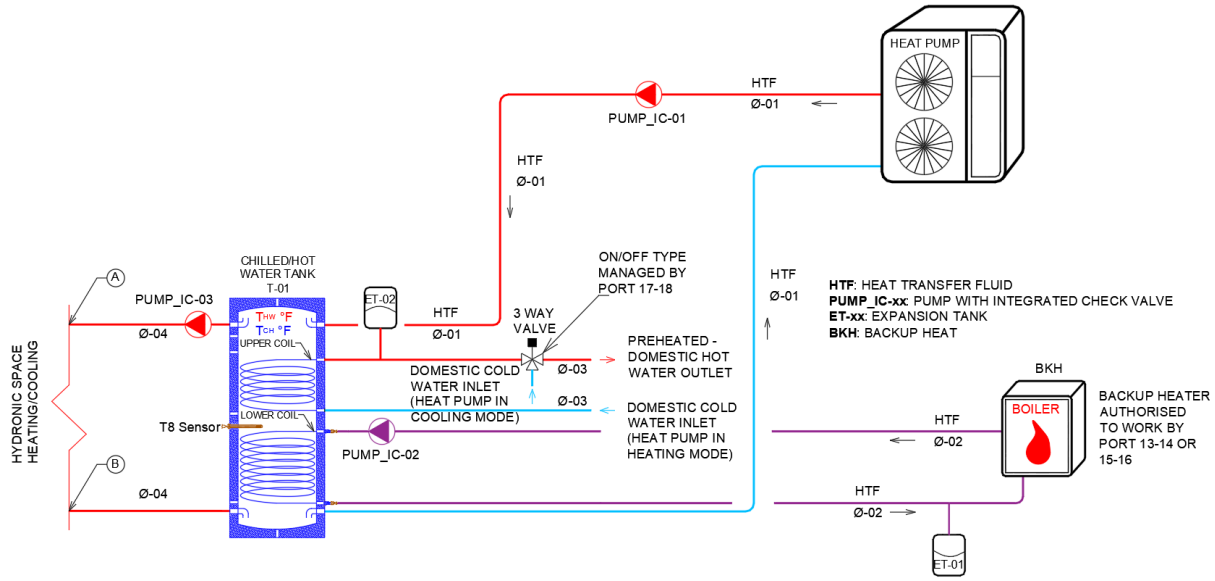


9.2 SINGLE TANK – THREE FUNCTIONS (ALL YEAR-EXCEPT SUMMER)

In this configuration, we only use one tank, either in cooling mode or heating mode. When Heat Pump is in heating mode, indirect coil can be used for pre-heating domestic hot water. To Maximize the energy efficiency of the system and prevent DHW from being cooled when heat pump is in cooling mode, a three-way valve shall be installed to by-pass the indirect coil when in cooling mode.



Or backup heat can be connected to the indirect coil



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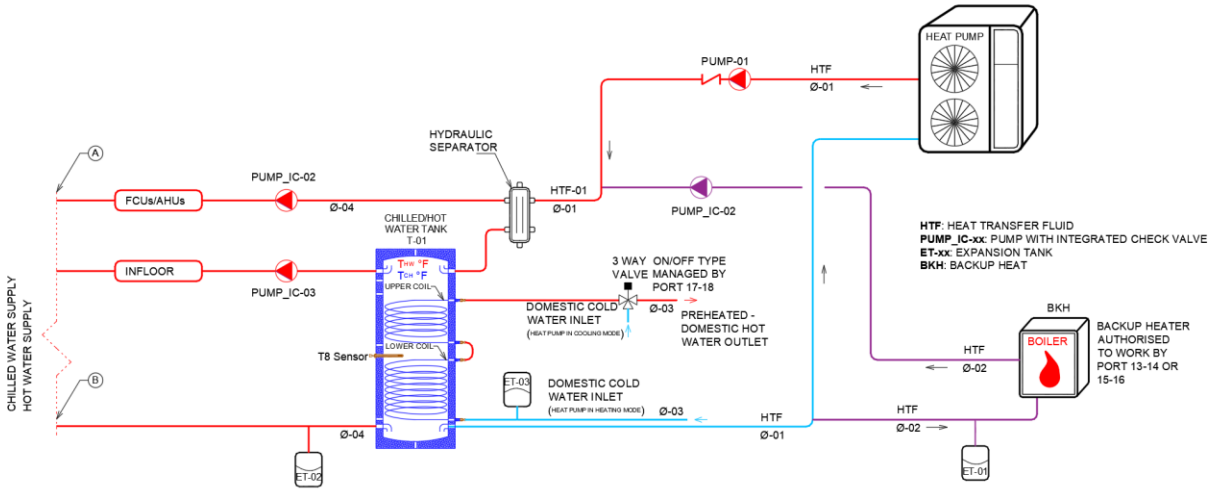
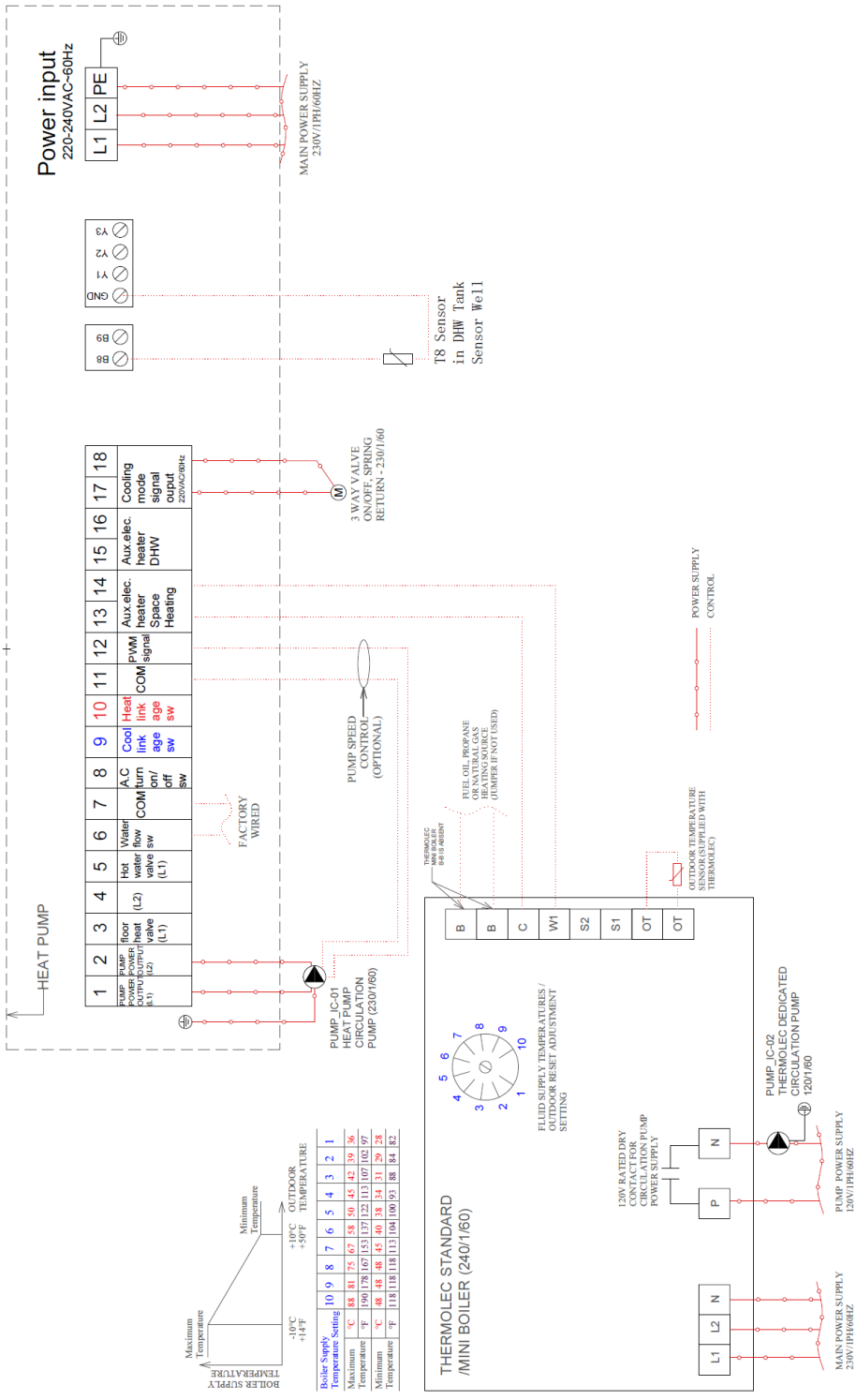
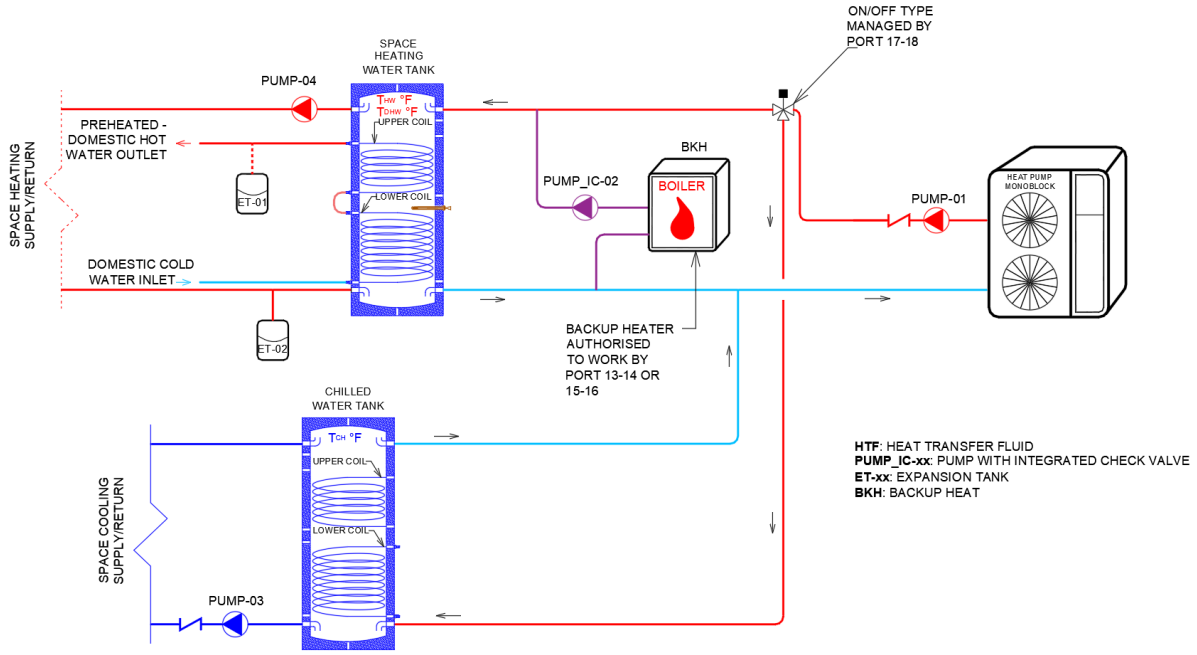


Sample Wiring diagram with Thermolec Boiler as a backup heater

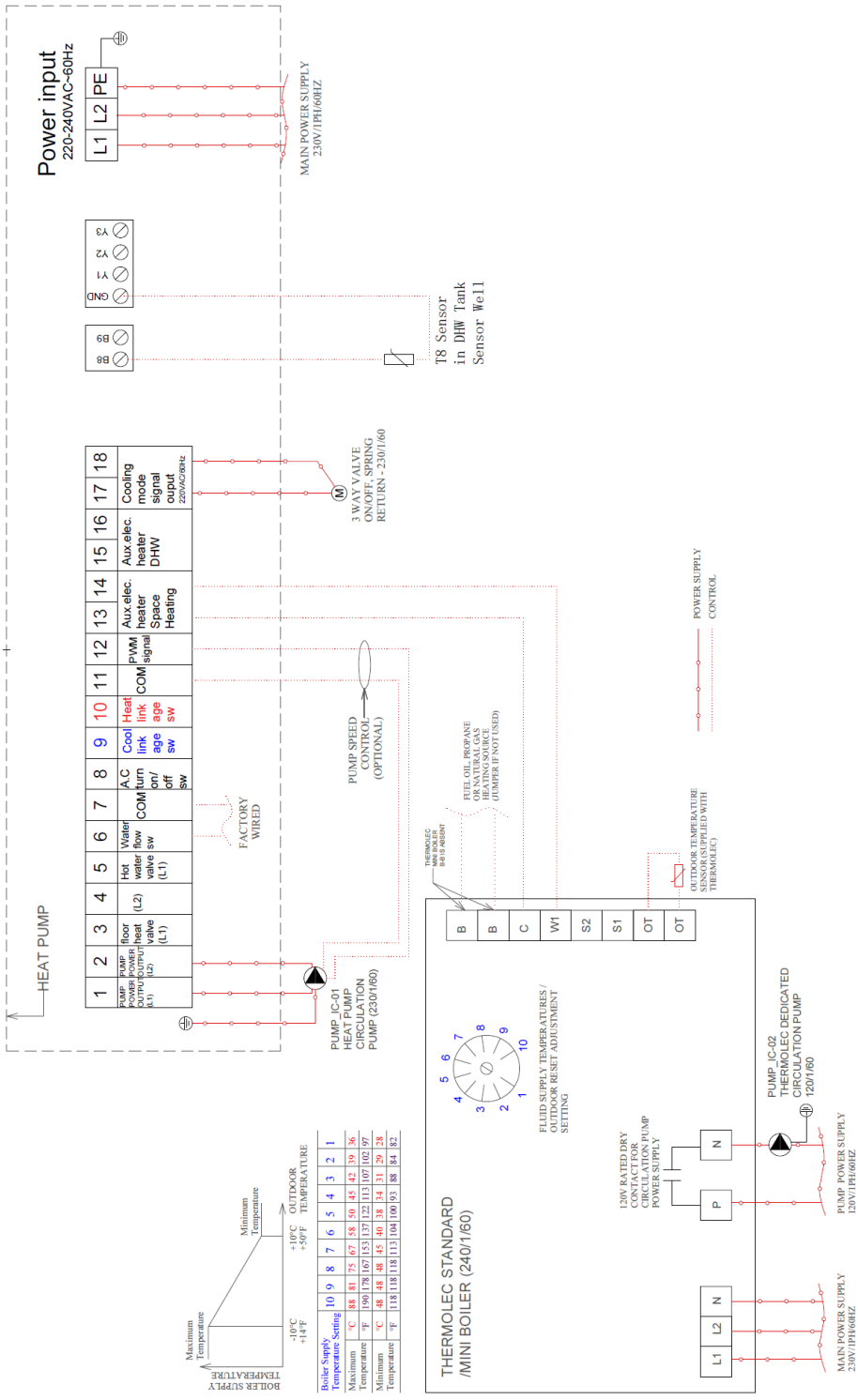


9.3 DUAL TANK – HEATING AND COOLING OR DOMESTIC HOT WATER PRE-HEATING (DHW)

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.



Sample Wiring diagram with Thermolec Boiler as a backup heater



10 DEFROST MODE SEQUENCE OF CONTROL

When the air-cooled unit is in heating mode, the outdoor coil is the evaporator (it draws heat to the outside to inside). For outdoor temperatures below freezing, humidity present in the ambient air will freeze on the outdoor coil, which lower the heat pump thermal efficiency. To melt the ice accumulated on the outside coil we switch the heat pump into cooling mode. Heat is drawn for the inside (*usually from the thermal storage tank*) and used for melting the accumulated ice on the outdoor coil.

10.1 DEFROST MODE SEQUENCE OF CONTROL:

Defrost mode is enabled when all the following conditions are met:

(1) Time between two defrosting cycles ≥ defrosting interval, unit: min, default value: 45 min;
(2) Ambient temperature ≤ defrosting ambient temperature, lasting for 2s, default value is 20°C (this condition is ignored when there is ambient temperature sensor error);
(3) Ambient temperature - evaporating temperature ≥ defrosting temperature difference, lasting for 2min, the default value is 5°C; this condition is ignored when there is ambient temperature sensor error.
(4) Evaporating temperature ≤ defrosting set point, lasting for 2s, default value is -1°C;

Defrost mode is switched off when any of the following conditions is met:

(1) Defrosting time ≥ maximum defrosting time, the default value is 8 min;
(2) Condensation/coil temperature ≥ the setting point of exiting defrosting, default value is 15°C;
(3) Power is off.

11 INSTALLATION

11.1 OBJECTIVES:

This Installation Paragraph is targeted towards helping understand the equipment as well as assisting in installation for individuals licensed in their respective fields (electricians, plumbers, and HVAC contractors, etc.).

It is a guide that helps determine good practice rules and may include information that is not applicable for a given application and usage of the equipment. These parameters are subject to change without prior notice and the person responsible for the installation should contact Hydro Solar inc. or any certified service and installation contractors. In the case there are any issues with the equipment which was installed without the use of a certified design, or the equipment is allowed to operate outside of its rated range; equipment failure and damage is possible.

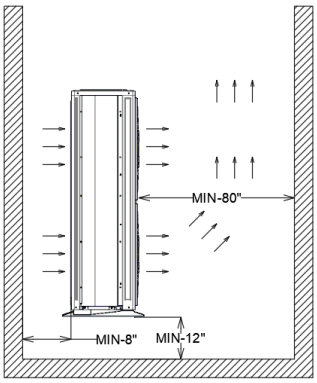
11.2 OVERVIEW:

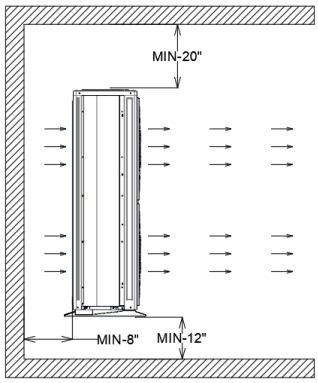
This section will outline a basic common overview of what is required by the installer for the installation:

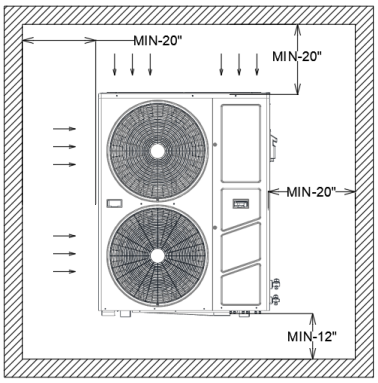
- ***The equipment and all auxiliary equipment are thoroughly inspected for damage and proper functioning prior to being commissioned.***
- ***Proper tools, fasteners, brackets, and all other components are being used in the installation.***
- ***There is a project plan that ensures all lines, pipes and connections are appropriately sized and all maximum and minimum distances are respected. It is important to know the limitations of the equipment prior to installing any components.***
- ***All components are properly fastened and secured to appropriate structures, buildings or mounting systems.***
- ***All hydraulic, electrical, and refrigerant lines are properly terminated, affixed, and are not leaking.***
- ***All components are protected by over-current protection devices, pressure relief valves and other safety measures.***
- ***Once all equipment is operating then warranty information card is filled out and sent to Aqua Solanor Inc. (Owner of Hydro Solar Innovative Energy).***

11.3 INSTALLATION AND CLEARANCES REQUIREMENTS:

11.3.1 Minimum Clearance Requirements







The installation and clearance requirements are the minimum. These distances need to be respected to allow the heat pump to function properly. Failure to do so will result in a loss of performance, equipment failure. Other limitations include but are not limited to:

- Heat pump shall not be installed in locations where combustible gas may leak.
- Heat pump shall not be installed in locations where oil or corrosive materials are present.
- Heat pump shall not be installed in a location where falling objects such as snow or ice from rooftops could damage the equipment.
- The heat pump must be installed with all local, provincial, state, and federal requirements and regulations regarding the correct methods of affixing the equipment, refrigerant line-sets, piping and electrical connections to the equipment or structures.
- Heat pump should be installed in an open and naturally ventilated space.
- Heat pump should be installed on concrete base or steel bracket, and on antivibration pads.
- Install a Strainer at the inlet of heat pump when circulating water quality is not adequate.
- Use adequate fasteners to install the unit to the structure, rack, bracket, or pad. Failure to do so may result in accidental tip-over of the machine and damage to the equipment.
- For Multiple Heat Pump Installation, never install heat pumps in series. Only parallel installation is allowed.

11.3.2 Good Practices

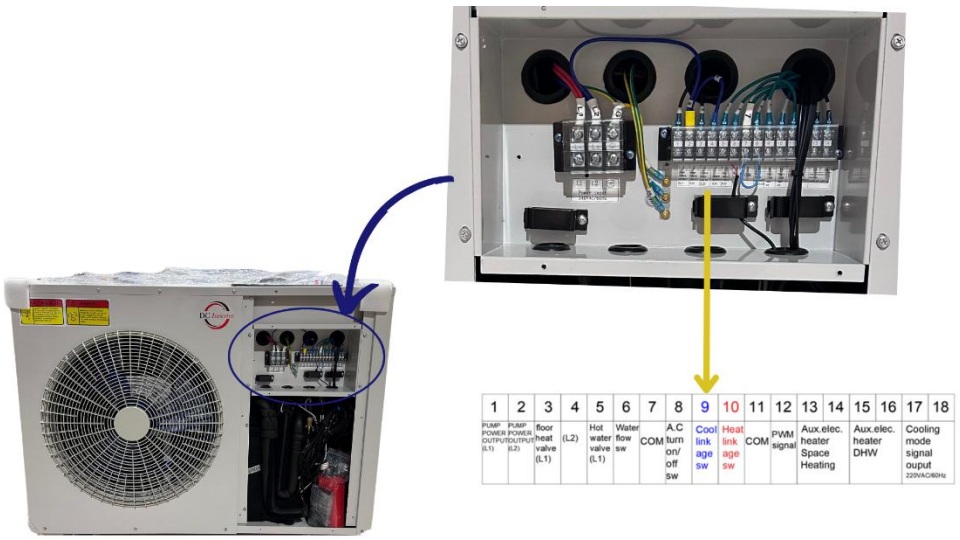
- Install an automatic air vent at the highest point of each water circulations network for releasing air from water system.
- Verify annually all the support fasteners, brackets and other related equipment for corrosion, damage, and proper torque specifications.
- Remove excess snow and ice around the heat pump to prevent damage to the equipment.

11.3.3 Installation Prerequisites:

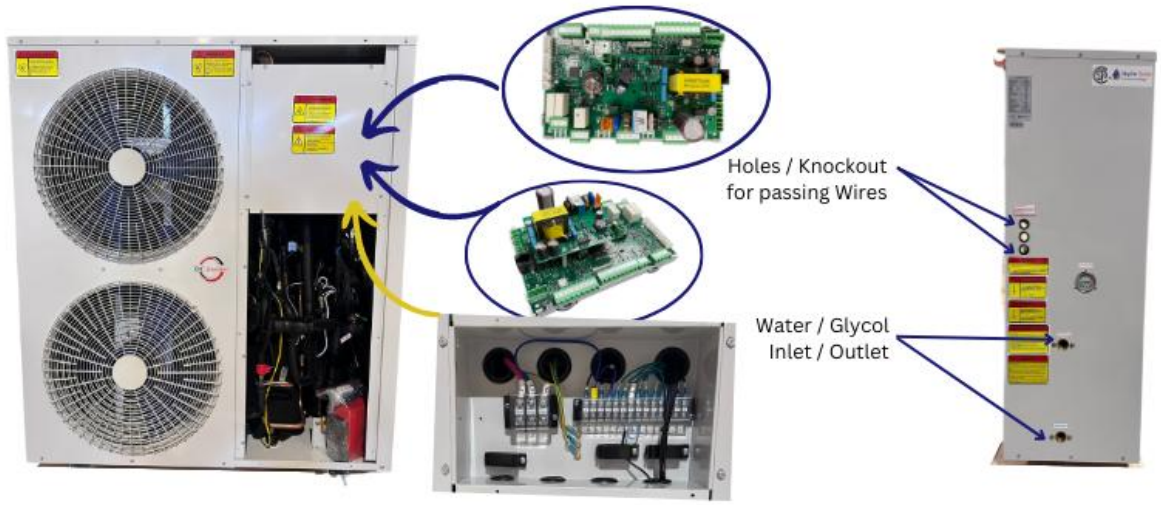
Heat Pumps are shipped in closed crates. Please open crates as well as front panel to have access to wiring (Power Supply and Control) terminals:



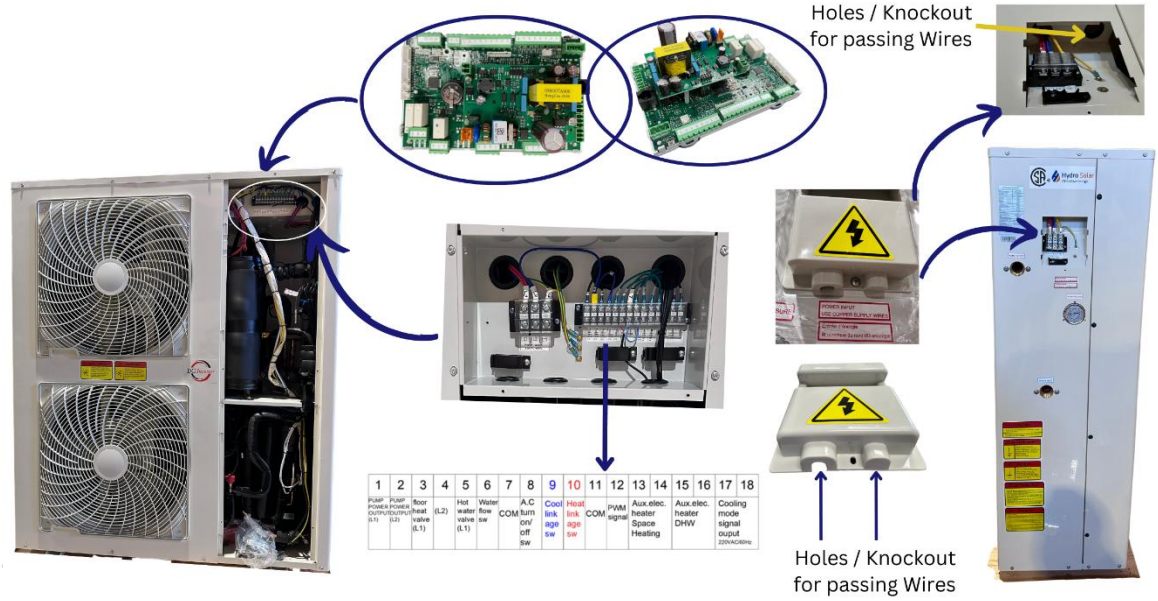
11.3.3.1 HSS030V3LM



11.3.3.2 HSS060V3LM



11.3.3.3 HSS080V3LM



12 OPERATION

12.1 CHECK LIST BEFORE STARTUP

Introduction:
Engineering and quality control are built into every heat pump unit. Good performance depends on proper application and correct installation. This air to water heat pump provides heated water and chilled water as well as optional domestic water heating capability.

Notices, Cautions, Warnings, & Dangers:
"NOTICE" Notification of installation, operation, or maintenance information, which is important, but which is NOT hazard related.

"CAUTION" Indicates a potentially hazardous situation or an unsafe practice which, if not avoided, COULD result in minor or moderate injury or product or property damage.

"WARNING" Indicates potentially hazardous situation which, if not avoided, COULD result in death or serious injury.

"DANGER" Indicates an immediate hazardous situation which, if not avoided, WILL result in death or serious injury.

Inspection:
Upon receipt of any equipment, carefully check the shipment against the packing slip and the freight company bill of lading. Verify that all units and packages have been received. Inspect the packaging of each package and each unit for damages. Ensure that the carrier makes proper notation of all damages or shortage on all bill of lading papers. Concealed damage should be reported to the freight company within 5 days.
If not filed within 5 days the freight company can deny all claims.

***Note**: Notify Aqua Solanor Inc. shipping department of all damage within five (5) days. It is the responsibility of the purchaser to file all necessary claims with the freight company.*

Unpackaging:
Aqua Solanor Inc. HSS Series are mounted to wooden pallets for easy handling during shipment and installation. Units are protected during shipment with durable cardboard corner posts, top and air coil panels. Shrink wrap is applied covering the entire unit and attachment to the pallet.
Upon receipt of the unit, carefully remove the shrink wrap. Using a box cutter, slit the shrink wrap on the cardboard top and corner posts. Use caution to not damage the finished surface of the unit. Keep all cardboard or other packaging material for safe storage and transport to the job site prior to installation.
Remove the front service panel to locate technical documents; manuals, bulletins or instructions and accessory items; Control Display, WIFI Adapter and other accessories.

⚠ NOTICE ⚠
AQUA SOLANOR INC. REQUIRES THAT A STRAINER BE INSTALLED ON THE INLET OF WATER HEAT EXCHANGER WHEN INCOMING FLUID CONTAINS MATERIALS THAT CAN REDUCE HEAT EXCHANGE BETWEEN REFRIGERANT AND HEAT TRANSFER FLUID.

⚠ CAUTION ⚠
DO NOT OPERATE THE AIR TO WATER HEAT PUMP UNIT DURING BUILDING CONSTRUCTION PHASE.

⚠ WARNING ⚠
FAILURE TO FOLLOW THIS CAUTION MAY RESULT IN PERSONAL INJURY. USE CARE AND WEAR APPROPRIATE PROTECTIVE CLOTHING, SAFETY GLASSES, AND GLOVES WHEN SERVICING UNIT OR HANDLING PARTS.

Unit Protection:
Protect units from damage and contamination due to plastering (spraying), painting and all other foreign materials that may be used at the job site. Keep all units covered on the job site with either the original packaging or equivalent protective covering. Cap or recap unit connections and all piping until unit is installed. Precautions must be taken to avoid physical damage and contamination which may prevent proper start-up and may result in costly equipment repair.

Storage:
All heat pump units should be stored inside the original packaging in a clean, dry location. Units should be always stored in an upright position. Units should not be stacked unless specially noted on the packaging.

Removal and Disposal:
All air-to-water units removed from service should have all components, oils, antifreeze, and refrigerants properly disposed of according to local and national environmental recycling codes, regulations, local by-laws, standards, and rules.

Pre-Installation Checks:
Before you fully install the air-to-water equipment, it is recommended you do the following:

a. Fully inspect the unit after unpacking.
b. Compare the electrical data on the unit nameplate with packing slip and ordering information to verify that the correct unit has been shipped.
c. Inspect all electrical connections and wires. Connections must be clean and tight at the terminals, and wires should not touch any sharp edges or copper pipe.
d. Verify that all refrigerant tubing is free of dents and kinks. Refrigerant tubing should not be touching other unit components.
e. Before unit start-up, read all manuals and become familiar with unit components and operation. Thoroughly check the unit before operating.
f. Locate the Unit Start-Up Form from this manual and have it available as the unit installation proceeds.

Indoor Units Installation:
All indoor units should be installed in an indoor area where the ambient temperature will remain above 45°F and should be placed in a way that piping and ductwork or other permanently installed fixtures do not have to be removed for servicing the unit. Installation shall leave enough clearances for accessing all components of the heat pump.

⚠ CAUTION ⚠
OUTDOOR UNIT IS DESIGNED FOR OUTDOOR INSTALLATION. DO NOT INSTALL OR STORE UNIT IN A CORROSIVE ENVIRONMENT OR IN A LOCATION WHERE HEAT REJECTION OR EXTRACTION IS OBSTRUCTED. IMPROPER INSTALLATION WILL VOID ALL WARRANTIES.

⚠ CAUTION ⚠

BEFORE DRILLING OR DRIVING ANY SCREWS INTO CABINET, CHECK TO BE SURE THE SCREW WILL NOT HIT ANY INTERNAL PARTS OR REFRIGERANT LINES.

Unit Placement:
When installing An Air to water HP unit, there are items the installer should consider before placing the equipment.

1. Service Access: Is there enough space for service access? A general rule of thumb is at least 2 feet in the front and 2 feet on at least one side.
2. Vibration Isolation: All HP equipment should be placed on a high-density rubber pad, a formed plastic air pad, or a high density, closed cell polystyrene pad. This helps eliminate vibration noise that could be transmitted through the floor.
3. Unit Racking: If units are being placed on racking, the unit must be placed on a solid foundation covering the full base of the unit. Also, utilize a foam pad between the unit and the rack.
4. The installer must verify that all applicable wiring, piping, and accessories are correct and on the job site.

Electrical:
All wiring, line, and low voltage should comply with the manufacturer's recommendations, The National Electrical Code, and all local codes and ordinances.

Thermostat or External Controllers:

Thermostats should be installed approximately 54 inches off the floor on an inside wall in the return air pattern and where they are not in direct sunlight at any time.

Loop Pumping Modules / or Individual Pumps:

Must be wired to the heat pump's electric control box. When pumps amperage draw exceeds 5-amp, a pump module connection block (connected to the master contactor) and a properly sized circuit breaker shall be provided (by installer) to connect the Pump Module wiring.

Hydronic Piping and Pumps design:

The type and diameter of hydronic fluid piping shall be appropriate for the operating conditions of the heat pump.

Pumps and pipe diameters shall be properly sized for the minimum and maximum operating flows of the heat pumps. Proper sizing is the responsibility of the installer or his client or whoever they hire for the design (such as engineers, technologist of other).

Improperly designing the hydronic pipes connected to this heat pump in a way that might cause damage to the heat pump, will void the warranty.

Hydronic Piping Accessories

Proper fittings and accessories shall be installed on the hydronic closed loop network. Accessories such as automatic air vents, air separators, expansion tanks, water hammer arrestors and any other accessories required for a healthy operation of the heat Pump.

Components:

Master Contactor: Energizes Compressor and Hydronic Pumps.

Logic Board: Logic Board operates the compressor and protects unit by locking out when safety switches are engaged. It also provides fault indicator(s).

Dry Contacts: Provides connection to a third-party controller (or thermostat) or other accessories to the low voltage circuit.

Inverter Boards: Converts incoming AC voltage to DC voltage and modulate compressor speed (there is 2 smaller inverter boards for Fan and Indoor loop circulation Pump)

Reversing Valve: Controls the cycle of the refrigerant system (heating or cooling). Energized in cooling mode.

High Pressure Switch: Protects the refrigerant system from high refrigerant pressure by locking unit out if pressure exceeds setting.

Low Pressure Switch: Protects the refrigerant system from low suction pressure if suction pressure falls below setting.

Flow Switch (Freeze Protection Device): Protects the water heat exchanger from freezing by shutting down compressor if water flow decreases.

Compressor: Pumps refrigerant through the heat exchangers and pressurizes the refrigerant, which increases the temperature of the refrigerant.

Consumer Instructions:

Dealers should instruct the consumer in proper operation, maintenance, filter replacements, thermostat and indicator lights. Also provide the consumer with the manufacturer's Owner's Manual for the equipment being installed.

Aqua Solanor Inc. (ASI) D-I-Y Policy:

ASI's air to water heat pumps and system installations may include electrical, refrigerant and/or water connections. Federal, state and local codes and regulations apply to various aspects of the installation. Improperly installed equipment can lead to equipment failure and health/ safety concerns. For these reasons, only qualified technicians should install an Aqua Solanor Inc. built air to water heat pump system.

Because of the importance of proper installation, Aqua Solanor Inc. does sell equipment direct to homeowners, however a warranty is only granted when homeowner submit a proof that installation was done by a professional certified technician.

Certification of technician shall comply with local state or provincial applicable trade law.

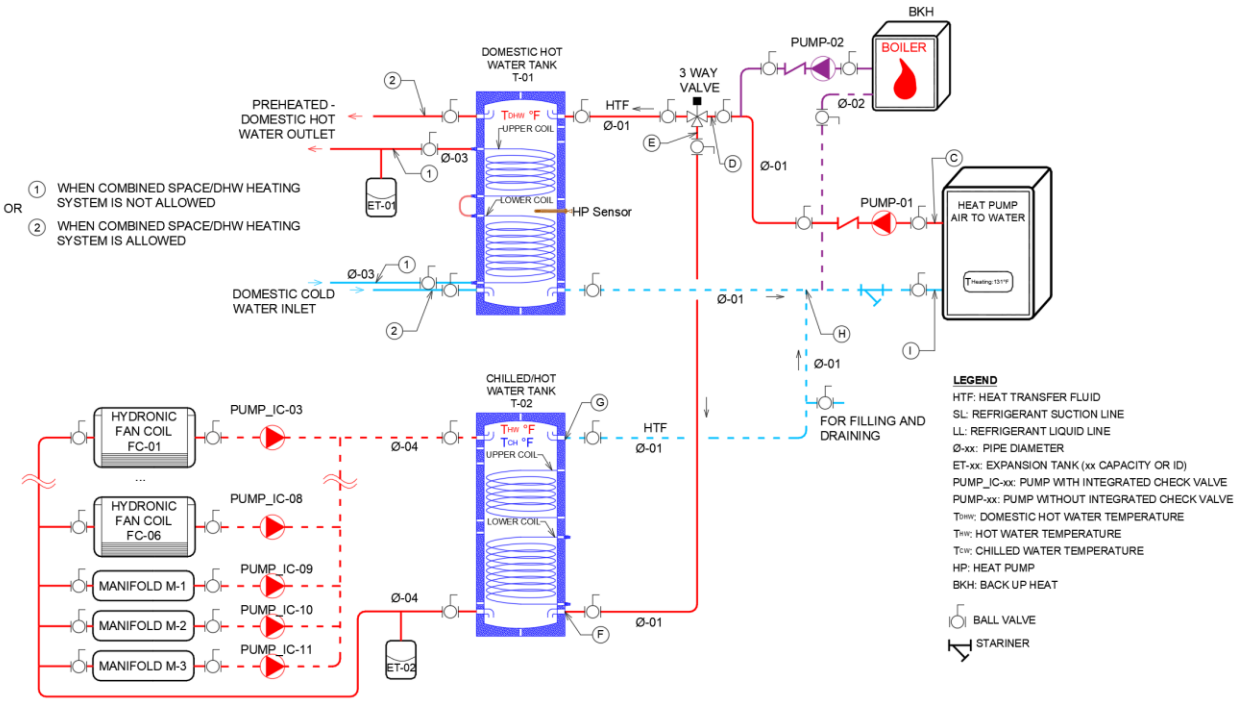
Homeowners are supposed to register the warranty of the installed heat pump. Registration entitles the submittal of installer license certificate as well as a startup and commissioning report.

Registration form is only available online on www.hydrosolar.ca website

12.2 FLOW REQUIREMENTS:

For a healthy operation of the heat pump, circulation pump shall be properly sized for the available friction loss between Refrigerant to Water heat exchnager of heat Pump and Buffer Tank. Circulation Pump shall be sized for the maximum operating flow of the Heat Pump.

ALL HYDRONIC CLOSED LOOPS SHALL CONTAIN HEAT TRANSFER FLUID ONLY AND SHALL BE FREE FROM AIR OR ANY OTHER MATERIALS THAT CAN OBSTRUCT THE FLOW OF FLUID BACK AND FORTH. AUTOMATIC AIR VENTS OR AIR SEPARATORS SHALL BE INSTALLED AT THE HIGHEST POINTS IN THE HYDRAULIC CIRCUIT. FAILURE TO DO SO, WILL SHORTEN THE LIFESPAN OF THE COMPRESSOR AND VOID THE WARRANTY.

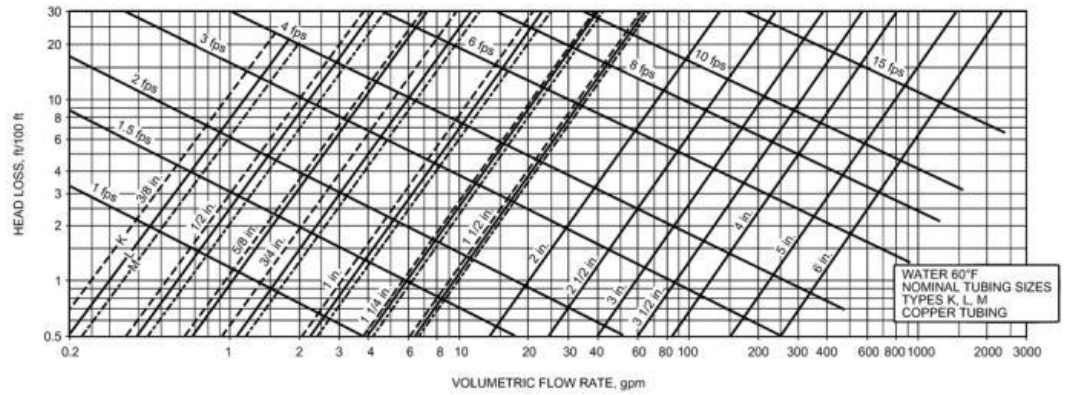


Circulation pump friction losses shall consider the fluid path at the outlet of the heat pump (C), to the three-way valve (D and E), to the tank (F) and back to the heat Pump G, H &I).

Pressure drop on the above path, is divided into four categories: Straight pipe runs, Fittings (Elbows, Tees, etc…), Heat Pump internal heat exchanger friction loss and accessories (such as Ball valves, Strainer, check valves, 3-way valves etc.…).

12.2.1 Straight Pipe Runs:

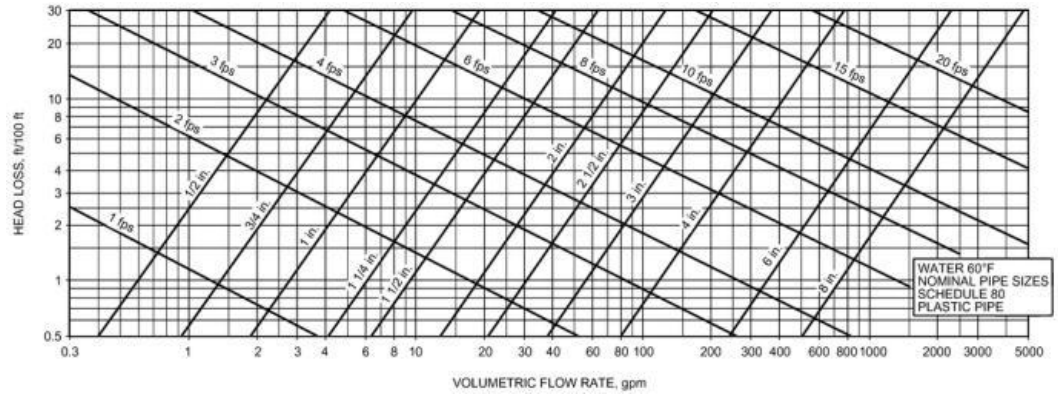
We recommend using either copper, stainless steel or plastic pipes on both ground and indoor loops. Black steel pipe can be used when heat transfer fluid contains enough anti-corrosion inhibitor to prevent corrosion. When using black steel pipes, install dielectric connectors between pipes and heat pump since internal parts of the heat pump contain copper.



Friction Loss Curve for Copper Pipes Type K, L and M.

Recommended linear friction loss 4 ft / 100 Linera feet of straight runs.

Recommended Fluid velocity inside pipes is 4 ft/s (never exceed 6 ft/s).



Friction Loss Curve for Schedule 80 Plastic Pipes (could be PVC, HDPE, PEX, etc.)

Recommended linear friction loss 4 ft / 100 Linera feet of straight runs.

Recommended Fluid velocity inside pipes is 4 ft/s (never exceed 6 ft/s).

12.2.2 Fittings and Accessories Pressure Drop:

The friction loss through any type of fittings is a K factor multiplier times the velocity pressure of the fluid. Velocity pressure is 0.5 x ρ x V² (ρ is the fluid density in Kg/m³ or Lb/ft³ and V is the fluid velocity in m/s or ft/s)

Table 3 *K* Factors: Threaded Steel Pipe Fittings

Nominal Pipe Dia., in.	90° Standard Elbow	90° Long-Radius Elbow	45° Elbow	Return Bend	Tee- Line	Tee-Branch	Globe Valve	Gate Valve	Angle Valve	Swing Check Valve	Bell Mouth Inlet	Square Inlet	Projected Inlet
3/8	2.5	—	0.38	2.5	0.90	2.7	20	0.40	—	8.0	0.05	0.5	1.0
1/2	2.1	—	0.37	2.1	0.90	2.4	14	0.33	—	5.5	0.05	0.5	1.0
3/4	1.7	0.92	0.35	1.7	0.90	2.1	10	0.28	6.1	3.7	0.05	0.5	1.0
1	1.5	0.78	0.34	1.5	0.90	1.8	9	0.24	4.6	3.0	0.05	0.5	1.0
1 1/4	1.3	0.65	0.33	1.3	0.90	1.7	8.5	0.22	3.6	2.7	0.05	0.5	1.0
1 1/2	1.2	0.54	0.32	1.2	0.90	1.6	8	0.19	2.9	2.5	0.05	0.5	1.0
2	1.0	0.42	0.31	1.0	0.90	1.4	7	0.17	2.1	2.3	0.05	0.5	1.0
2 1/2	0.85	0.35	0.30	0.85	0.90	1.3	6.5	0.16	1.6	2.2	0.05	0.5	1.0
3	0.80	0.31	0.29	0.80	0.90	1.2	6	0.14	1.3	2.1	0.05	0.5	1.0
4	0.70	0.24	0.28	0.70	0.90	1.1	5.7	0.12	1.0	2.0	0.05	0.5	1.0

Source: Engineering Data Book (Hydraulic Institute 1990).

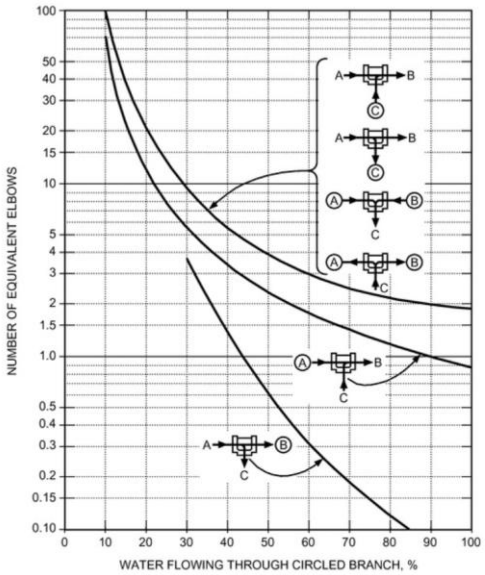
Table 4 *K* Factors: Flanged Welded Steel Pipe Fittings

Nominal Pipe Dia., in.	90° Standard Elbow	90° Long-Radius Elbow	45° Long- Radius Elbow	Return Bend Standard	Return Bend Long-Radius	Tee- Line	Tee- Branch	Globe Valve	Gate Valve	Angle Valve	Swing Check Valve
1	0.43	0.41	0.22	0.43	0.43	0.26	1.0	13	—	4.8	2.0
1 1/4	0.41	0.37	0.22	0.41	0.38	0.25	0.95	12	—	3.7	2.0
1 1/2	0.40	0.35	0.21	0.40	0.35	0.23	0.90	10	—	3.0	2.0
2	0.38	0.30	0.20	0.38	0.30	0.20	0.84	9	0.34	2.5	2.0
2 1/2	0.35	0.28	0.19	0.35	0.27	0.18	0.79	8	0.27	2.3	2.0
3	0.34	0.25	0.18	0.34	0.25	0.17	0.76	7	0.22	2.2	2.0
4	0.31	0.22	0.18	0.31	0.22	0.15	0.70	6.5	0.16	2.1	2.0
6	0.29	0.18	0.17	0.29	0.18	0.12	0.62	6	0.10	2.1	2.0
8	0.27	0.16	0.17	0.27	0.15	0.10	0.58	5.7	0.08	2.1	2.0
10	0.25	0.14	0.16	0.25	0.14	0.09	0.53	5.7	0.06	2.1	2.0
12	0.24	0.13	0.16	0.24	0.13	0.08	0.50	5.7	0.05	2.1	2.0

Source: Engineering Data Book (Hydraulic Institute 1990).

The graph on the right shows an alternative method for calculating friction loss through tees as a function of elbow equivalent.

This Graph can not be used for 3-way valves since friction loss of 3-way valves has to be taken from manufacturer test data.



The below table can be used for elbows. Once velocity is known, pressure drop is calculated and tabulated as below:

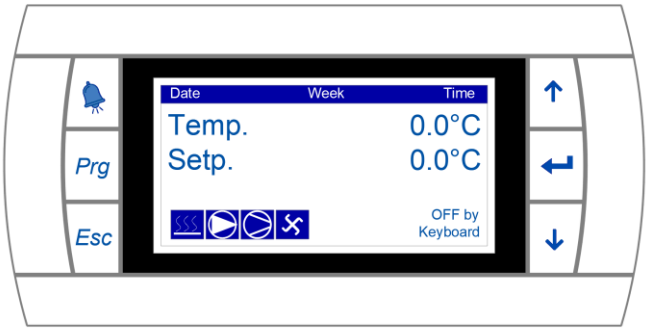
Table 27 Equivalent Length in Feet of Pipe for 90° Elbows

	Pipe Size														
Velocity, fps	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12
1	1.2	1.7	2.2	3.0	3.5	4.5	5.4	6.7	7.7	8.6	10.5	12.2	15.4	18.7	22.2
2	1.4	1.9	2.5	3.3	3.9	5.1	6.0	7.5	8.6	9.5	11.7	13.7	17.3	20.8	24.8
3	1.5	2.0	2.7	3.6	4.2	5.4	6.4	8.0	9.2	10.2	12.5	14.6	18.4	22.3	26.5
4	1.5	2.1	2.8	3.7	4.4	5.6	6.7	8.3	9.6	10.6	13.1	15.2	19.2	23.2	27.6
5	1.6	2.2	2.9	3.9	4.5	5.9	7.0	8.7	10.0	11.1	13.6	15.8	19.8	24.2	28.8
6	1.7	2.3	3.0	4.0	4.7	6.0	7.2	8.9	10.3	11.4	14.0	16.3	20.5	24.9	29.6
7	1.7	2.3	3.0	4.1	4.8	6.2	7.4	9.1	10.5	11.7	14.3	16.7	21.0	25.5	30.3
8	1.7	2.4	3.1	4.2	4.9	6.3	7.5	9.3	10.8	11.9	14.6	17.1	21.5	26.1	31.0
9	1.8	2.4	3.2	4.3	5.0	6.4	7.7	9.5	11.0	12.2	14.9	17.4	21.9	26.6	31.6
10	1.8	2.5	3.2	4.3	5.1	6.5	7.8	9.7	11.2	12.4	15.2	17.7	22.2	27.0	32.0

12.3 STANDALONE MODE

Annex "C" has the full controller menu of for Heat Pump. It shows the tree sequences of menus and sub-menus.

12.3.1 Main interface



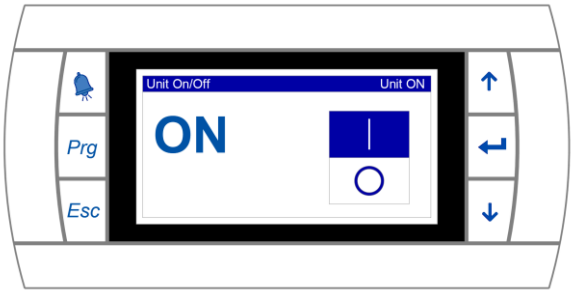
Heating Mode		Compressor	
Pump		Fan	
Defrost		Cooling Mode	
Alarm		Esc	Exit
Enter, menu & confirm		Up Select	
Prg	Advanced Factory Parameters	Down Select	

12.3.2 Turn on/off

Press ↵ to access menu, press↑↓button to On/Off Unit, press ↵ to confirm. Press↑↓Button to turn on/off press ↵ to confirm ：

This control allows user access to the ON/OFF switch of the heat pump.

Press ↵ to access the below digital ON/OFF button.



Use arrows ↑ ↓ to switch Heat Pump between ON and OFF mode.

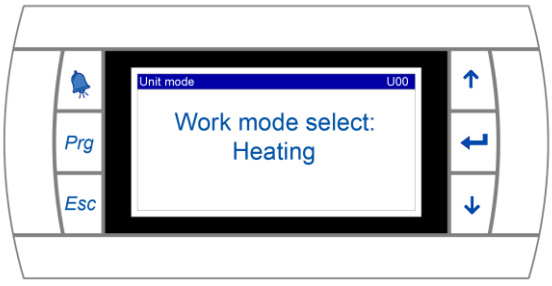
12.3.3 Operating Modes （Heating, Cooling, Hot water, Hot water+cooling, Hot water+heat）

*Press ↵ to access menu， press↑↓botton to select User Mask， then press ↵ to confirm. Press↑↓Botton to switch mode， and press ↵ to confirm, Egc. Mode switching &Temperature setting. (**N.B: Turn Off Heat Pump before changing operating mode.**)*

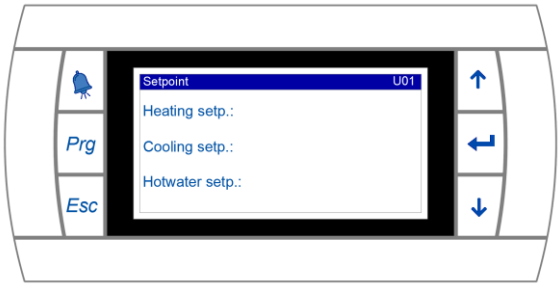
This control allows user access operating mode five possible selections.

Press ↵ to access the below digital selection button.

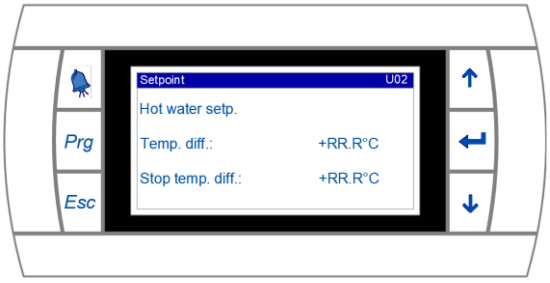
Temperature Set Point interface is as follows:



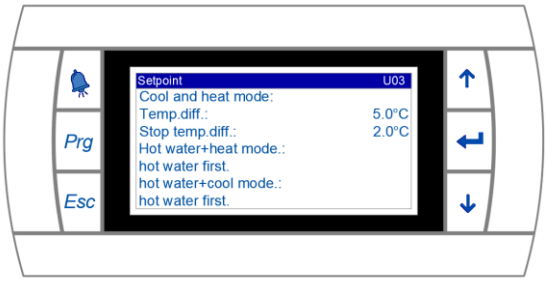
There are 5 possible operating modes: Heating (Space Heating) ，Cooling (Space Cooling), **Hot water** (domestic Hot Water), Hot water + cooling Combination, Hot water + heating Combination.



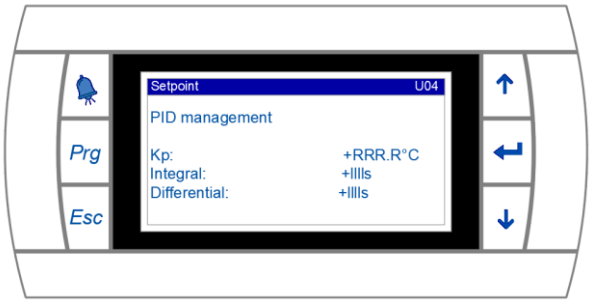
This control allows changing the set points of the heat transfer fluid temperatures. By default, setpoints are assigned to return fluid temperatures. This means that heat pump, by default modulates its capacity to maintain fluid return temperature sensor at its setpoint. In the advanced settings, set points can be assigned to supply fluid temperatures.



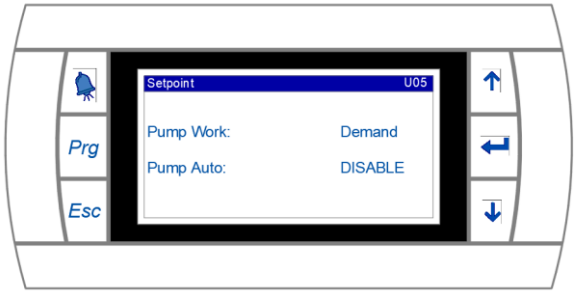
This control allows changing the domestic hot water (DHW) temperature setpoint of the DHW heating tank. Temperature difference between supply and return setting is by default 5°C and Stop Temperature difference is the temperature difference at which heat pump stops heating DHW tank.



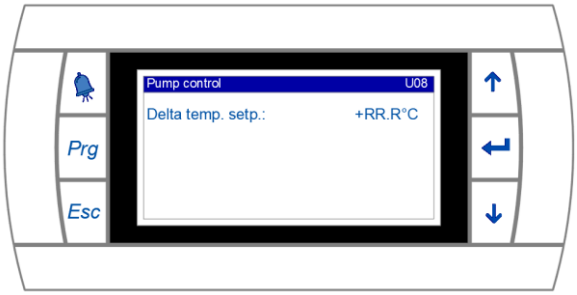
Defines temp differential and priorities setpoints and dead band of space heat/cool mode. If setpoint for heating is set to 40.0°C and the start temperature differential is set to 5.0°C; The unit will only turn on the compressor when the return temp from the tank is 34.9°C It will heat the tank until the return temperature reaches 40.0°C if the stop temperature is set to 0.0°C. In the case that the stop temperature is set to 2.0°C; the unit will shut down when return temperature is 2.0°C above setpoint.



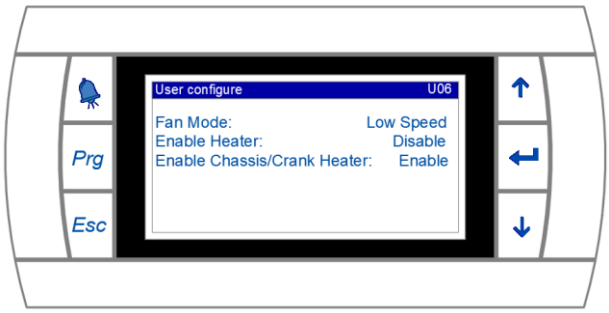
Specifications of PID control loop. PI loop is used to modulate compressor, fan and pump speeds. **KP**: Allows user to set temperature differential that compressor modulates around. **Integral**: Allows user to set time required to let compressor ramp up to full capacity. **Differential**: Allows user to set delay time. N.B: Please note that these settings can affect the performance, longevity, and warranty on the units. It is not recommended to adjust these settings without confirming prior with your installer.



This control allows the selection of the pump operation: Always ON, On Demand or Intermittently Open. When Fluid Supply or Return Temperature Sensor is inserted in the space Heating/Cooling tank's thermal well, Pump Work Option can be set to ON Demand. When no sensor is inserted into the thermal well of the tank, Pump Work Option shall be set to either always ON or to Intermittently Open. In this case Pump will run for every pre-set time interval to be able to measure demand temperature.



Control of this heat pump has a PWM signal for modulating heat transfer fluid circulation pump speed. Pump speed is modulated, via the Carel Controller in order to maintain temperature difference setpoint between supply and return at its set point.



Heater (Backup Heater) shall be Enabled in this control. Crank Heater shall be Enabled when Heat Pump is equipped with Crank Heater and is in snowy area.

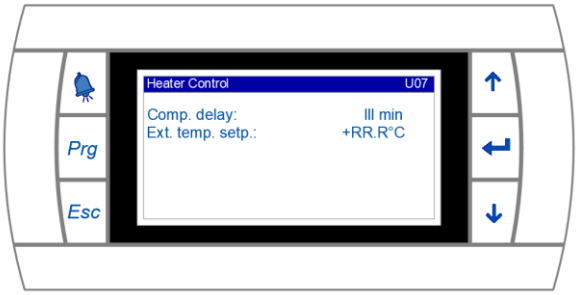
Fan Mode set up has three options: Day Mode, Night Mode and Low Speed Mode. When Day Mode is selected, Compressor runs at the current ambient temperature maximum speed.

Fan Speed is increased when compressor speed is increased.

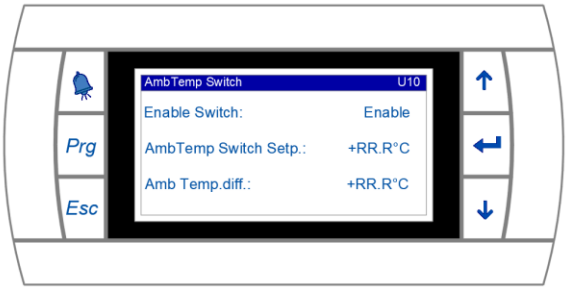
When Night Mode is selected and during the period between 20:00 to 8:00 of the real-time clock (adjustable in clock settings), Fan Speed is Limited to its upper limit (500 rpm Adjustable), and compressor speed is limited to its upper limit (50Hz adjustable).

When Low Speed Mode is selected, compressor and speed is modulated to match heating/cooling demand and fan speed is modulated accordingly.

Compressor Speed Vs Outdoor Temperature		
Outdoor Dry Bulb Temperature (°C)	**Compressor Max Frequency (Hz)**	**Operating Mode**
9<AmbTemp	50	**Hot Water Heating / Heating**
4<AmbTemp<=9	60	
-3< AmbTemp <=4	60	
-9<AmbTemp<=-3	65	
-15<AmbTemp<=-9	65	
AmbTemp<=-15	70	
38<AmbTemp	65	**Cooling**
33<AmbTemp<=38	65	
30<AmbTemp<=33	60	
26<AmbTemp<=30	60	
AmbTemp<=26	55	



The Comp.delay Control defines time delay between Back-up Heater and compressor operation (default 50min – that means that Backup Heater is authorized to work after 50 min of compressor operation.
Ext.temp.setp. is the upper limit of Back-up Heater operating temperature (Default value is -15°C – that means that if the outdoor temperature is above -15°C, Back-up heater is not authorized to run).



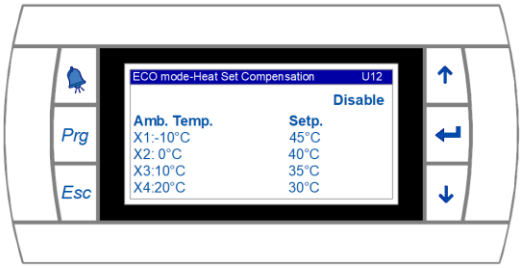
This Control allows user to enable/disable heat pump operating modes (mainly Space Heating and Cooling) based on outdoor temperature. When outdoor temperature is above "AmbTem Switch Setp." assigned value, Heat Pump goes into cooling mode (default 20°C). When outdoor temperature drops below "AmbTem Switch Setp." (20°C) – "Amb Temp.diff"(4°C), Heat Pump goes into heating mode.

N.B:

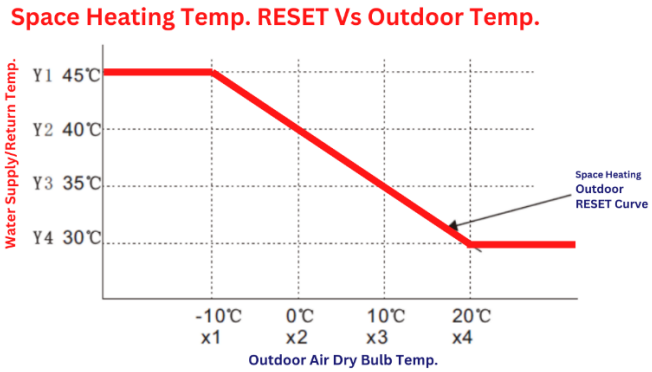
When cooling/Heating demand is not sent to the heat pump by an external source (via cooling/Heating linkage) and is managed by the heat pump Ambient Temperature Sensor (Located outdoor), Ambient Temperature switch ***AmbTemp Switch (in U10)*** shall be enabled. Typical set point ***Setp: (in U10)*** ranges between 10-18°C (45 to 65°F). Ambient Temperature Differential ***Amb Tem.diff (in U10)*** is simply a dead band. When Heating / Cooling signal is sent to the heat pump via Cooling/Heating Linkages or via modbus, Ambient Temperature switch ***AmbTemp Switch (in U10)*** shall be disabled.

12.3.4 Outdoor Temperature Reset for HP Supply/Return Temperature

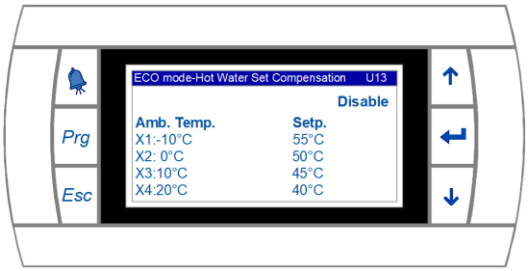
12.3.4.1 Outdoor Temperature Reset for Space Heating Hot Water Temperature



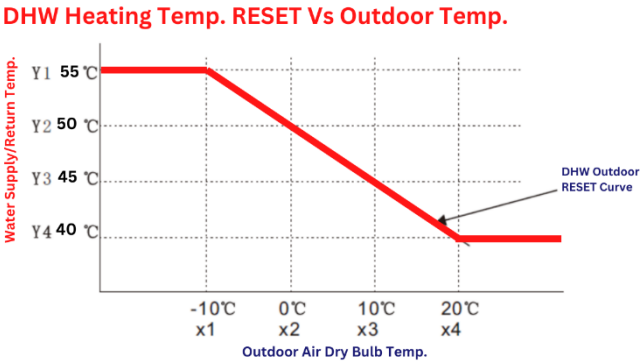
This control allows the increasing of Space Heating hot water temperature when outdoor temperature decreases and the decreasing of space heating hot water temperature when outdoor increases. Disabled by Default. To enable, go to disable and change it to Enable.



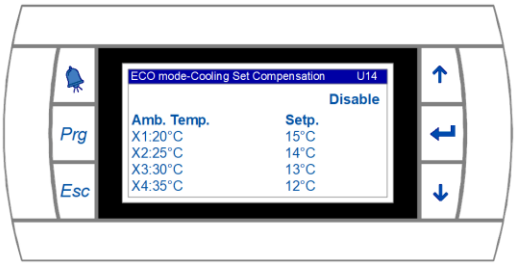
12.3.4.2 Outdoor Temperature Reset for DHW Temperature



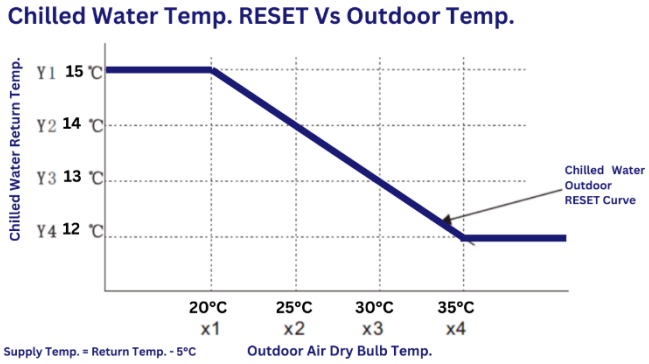
This control allows the increasing of Domestic Hot Water (DHW) temperature when outdoor temperature decreases and the decreasing of DHW temperature when outdoor increases. Disabled by Default. To enable, go to disable and change it to Enable.



12.3.4.3 Outdoor Temperature Reset for Chilled Water Temperature



This control allows the increasing of chilled water temperature when outdoor temperature decreases and the decreasing of chilled water temperature when outdoor increases. Disabled by Default. To enable, go to disable and change it to Enable.

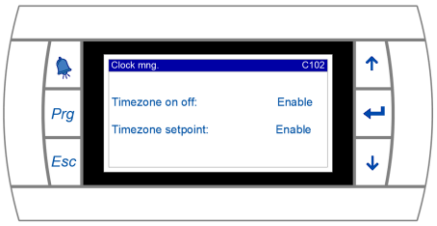


12.3.5 TimeZone/CLOCK

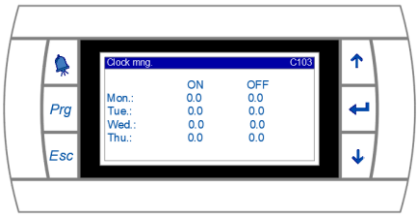
Press ↵ to access menu， press↑↓botton to select TimeZone/CLOCK , then press ↵ to confirm， Press↑↓Botton to change the setting, and press ↵ to confirm.

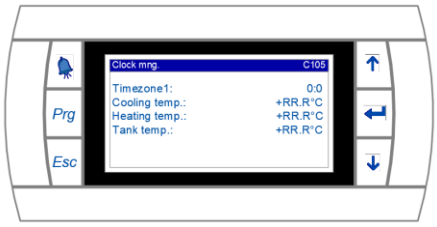
M03 menu allows user to set heat pump ON/OFF schedules and assign different temperature setpoints values to each schedule.

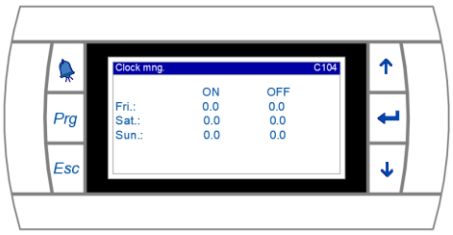
M03/C101 submenu, allows user to change date/time/day.
Enabling the Timezone on/off and the Timezone setpoint unlocks multiple pages that allow the unit to be programmed to run during certain hours of the day and to set specific temperatures for those hours of operation if required.

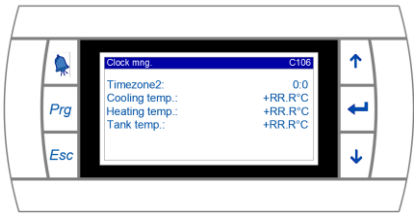


Timezone On/Off: Enable or disable unit operation using specific times of the day.
Timezone Setpoint: Set specific temperature for cooling, heating and DHW during the on times as set by previous setting.





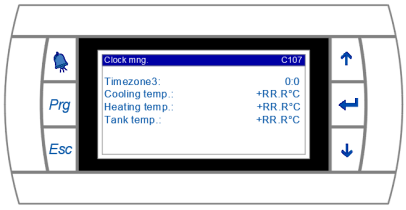


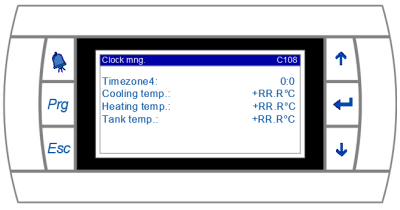


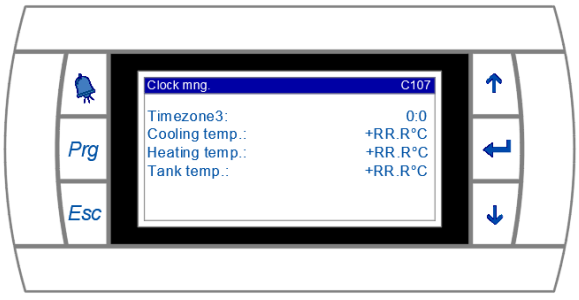
C103 & 104: Schedule setup interface. Heat Pump is authorized to work when time reaches “ON” time of the day, and it’s turned off when time reaches “OFF” time of the day.

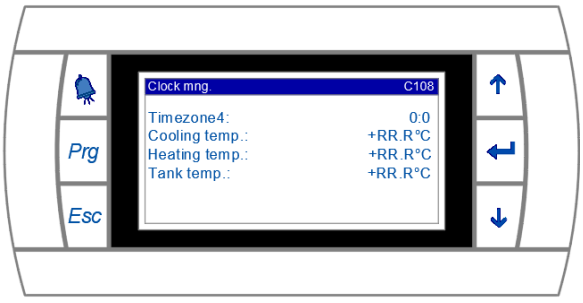
C105, 106, 107 & 108; Timezone1 is the start time of the first period, Timezone2 is the cut-off time of the first period and the start time of the second period, and so on (Timezone 3 and 4).

“Cooling temp.”, “Heating temp.” and “Tank temp.” Set temperatures for cooling, heating, and domestic hot water for the corresponding period.







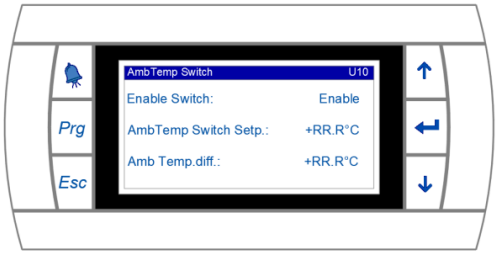


12.3.6 Default Settings

Setting Parameter	Initial Value
Unit mode	Heating
Space Heating setpoint	45°C
Space Cooling setpoint	12°C
Domestic Hot water setpoint	50°C
Temp. diff.	5°C
Stop temp. diff.	0°C
Cool and heat mode Temp. diff.	5°C
Stop temp. diff.	2°C
Kp (PID Control Loop)	5°C
Integral (PID Control Loop)	200s
Differential (PID Control Loop)	0s
Pump Operation	Demand
Pump Auto	Enable
Fan model	Daytime
Enable heater	Enable
Enable chassis/crack heater	Enable
Heater control-Comp. delay	60min
Heater control-Exterior temp.setp.	5°C
Pump control, Delta temp. set.	5°C
Auto start	Enable

12.4 HYBRID OPERATING MODE: HEATING COOLING DEMAND BY EXTERNAL SOURCES

In this operating mode, heating and or cooling demand are sent to the heat pump via either switching relays (such as Taco, Tekmar, Caleffi, etc…) or via binary outputs of a Digital Controller. In either cases, and since switching between heating and cooling is not managed by the heat pump ambient temperature switch, it shall be disabled:



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
PUMP POWER OUTPUT (L1)	PUMP POWER OUTPUT (L2)	floor heat valve (L1)	(L2)	Hot water valve (L1)	Water flow sw	COM	A.C turn on/ off sw	Cool linkage sw	Heat linkage sw	COM	0-10V Pump Speed Modulation	Aux.elec. heater Space Heating		Aux.elec. heater DHW		Cooling mode signal output 220VAC / 60HZ	

When Heating / Cooling signal is sent to the heat pump via Cooling/Heating Linkages, Ambient Temperature switch ***AmbTemp Switch (in U10)*** shall be disabled.

12.5 INSTALLATION OF WIFI ADAPTER

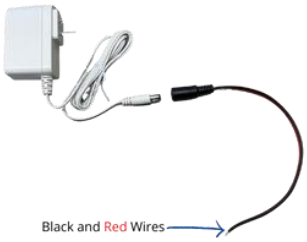
While the Wi-fi adapter is not required to the functioning of the unit; it allows for faster diagnosis as well as remote diagnosis and monitoring. The application is designed in a way to be significantly more user-friendly to the client when compared to the Carel controller and reduces time. Technicians will be able to troubleshoot the equipment without going on site.

12.5.1 Hardware Installation & Connection:

The WIFI adapter kit is shipped inside the Heat Pump and has the following components:

Wires Signal (pre-connected to Main Board)

Power Supply Adapter

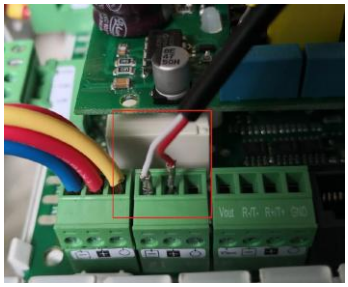


Wi-Fi Adapter connection Kit

WIFI Module

please note that the pictured equipment, wiring is subject to change without prior notice and will be supplemented with revision sheets if required*

The signal cable has 2 wires: one red and one white.



On the **control board** of the Heat Pump outdoor unit:

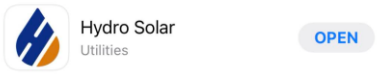
1- Check that **white** wire of the signal line is connected to the Minus (**-**) port .
2- Check that **red** wire of the signal line is connected to the Plus (**+**) port.

On the **Green Plug** of the WIFI Cable:

1- Connect the **white** wire of the signal line to the **B** port.
2- Connect the **red** wire of the signal line to the **A** port.
3- Connect the **Black/White** wire of the Power Supply Adapter to the **plus (+)** port.
4- Connect the **Black** wire of the Power Supply Adapter to **the minus (-)** port.
5- Connect the power supply adapter to a 110-240VAC power supply plug.

Please strictly follow the above wires connection instructions or else WIFI module will not work.

12.5.2 Application downloads and setup:

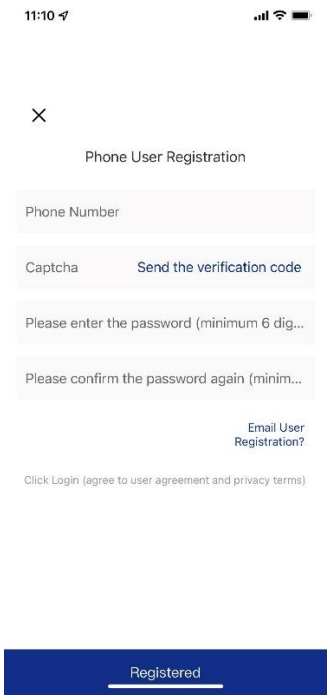


Heat Pump application is called **Hydro Solar** and is available for Apple and Android devices. Go to the application stores of your smart phone and download the **free Heat Pump Pro** App. After downloading Heat Pump's application look for the application icon on your smartphone screen and click on it. Register your device as shown below:

When logging in for the first time, you will need to create an account. You could do so by clicking on **User Register** icon.

Once clicked the screen on the right will appear, where you have the option of either registering by phone or by email.

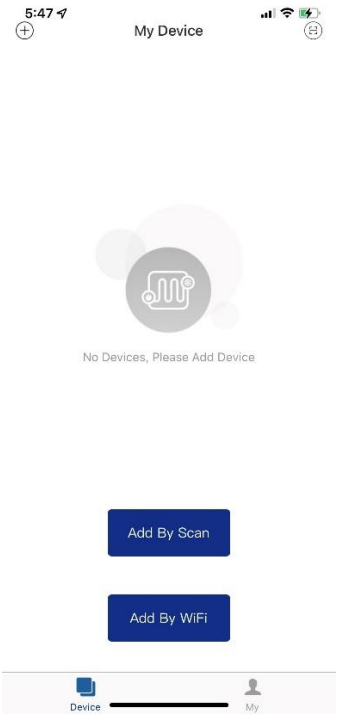
We do recommend email registration.



To register by phone, please enter your phone number and click on Send the verification code. Once code is received enter it below and go the next screen.

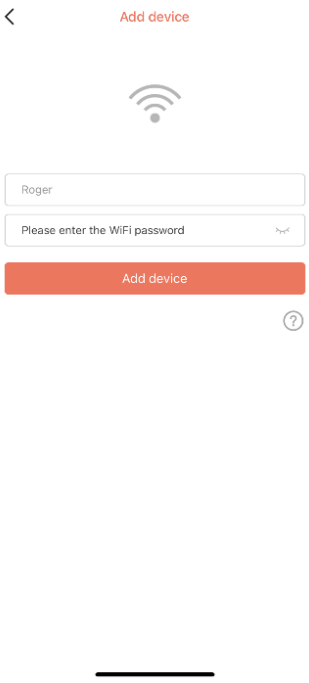
For email registration click on **Email User Registration?**

Once **Email User Registration?** is clicked, the below screen will appear



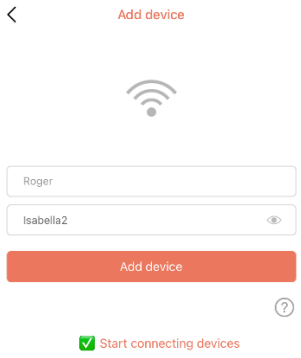
To add the heat pump, you could either click on **Add by WIFI** or **Add by Scan:**

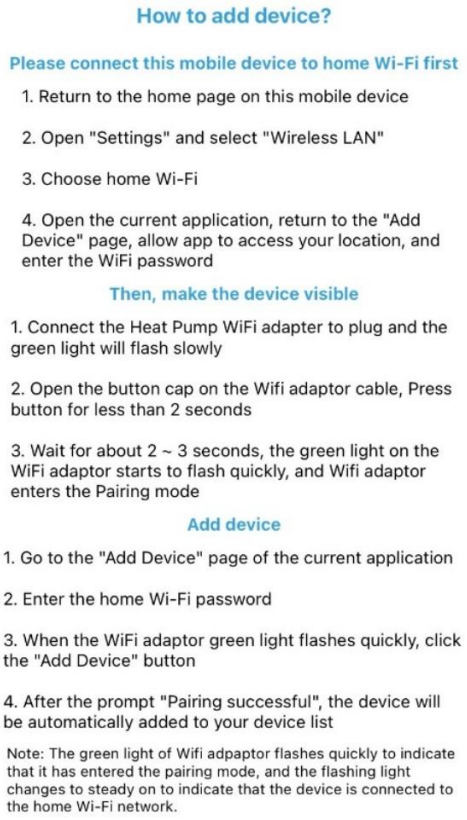
Simply scan the barcode on your heat pump (add by scan option)



Add By WIFI:

Choose your WIFI network from the list and enter the password below.





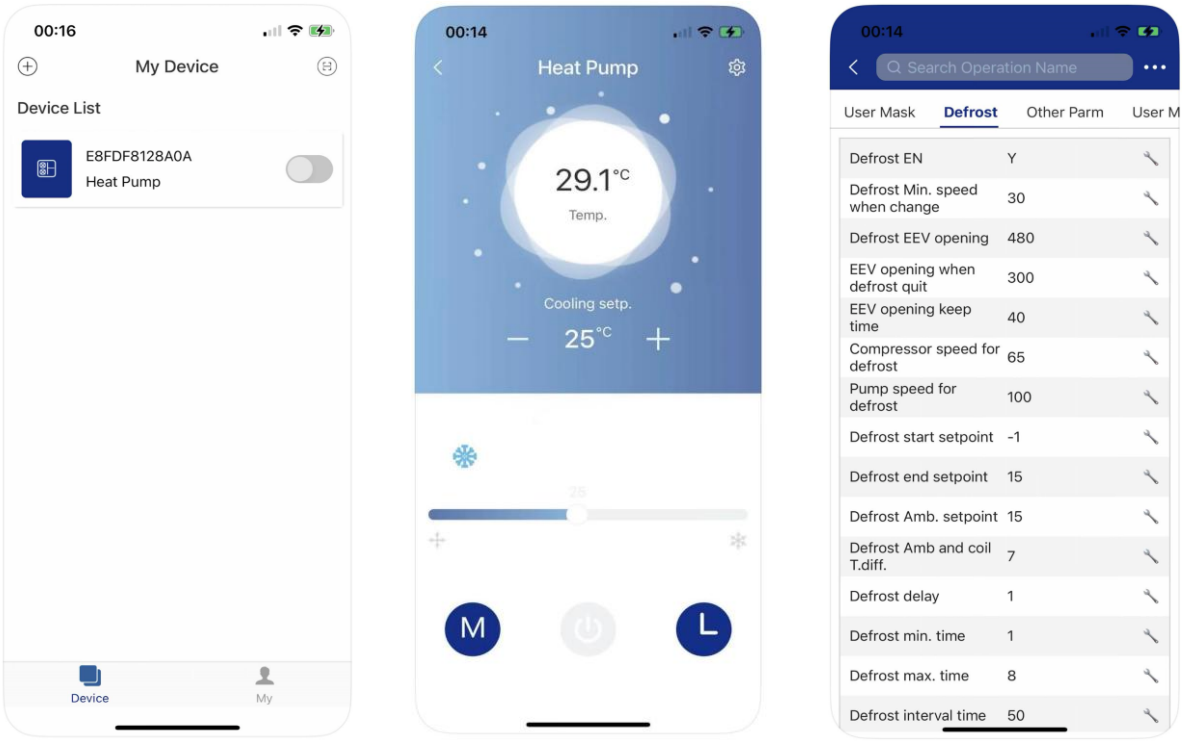
To pair the application with heat pump WIFI adapter,
Simply open the button's black cap as shown below

And gently press the button for 2-3 seconds as described on the left instructions.

You could connect more than one heat pump to the app. Simply click on add device and repeat the above steps again.

12.5.3 Device List Windows:

- The device list displays the device (Heat Pumps) associated with this user and shows the device's online and offline status. When the device is offline, the device icon is gray, and the device is online color.
- The switch on the right side of each device row indicates whether the device is currently turned on.
- The user can disconnect the device or modify the device name. When swiping to the left, the delete and edit buttons appear on the right side of the device row. Click Edit to modify the device name, and click Delete to disconnect the device and delete it from the application, as shown below:



12.5.4 Application usage guide:

1. Click a device in the device list to enter this page.
2. The background color of the bubble indicates the current operating state of the device:
    a. Gray indicates that the device is in the shutdown state, at this time, you can change the working mode, set the mode temperature, set the timing, or you can press the key to switch on and off.
    b. Multicolor indicates that the device is turned on, each working mode corresponds to a different color, orange indicates heating mode, red indicates hot water mode, and blue indicates cooling mode。
    c. When the device is in the power-on state, you can set the mode temperature, set the timer, press the key to switch on and off, but you cannot set the working mode (that is, the working mode can only be set when the device is off)
3. The bubble shows the current temperature of the device.
4. Below the bubble is the set temperature of the device in the current operating mode.
5. Set the temperature is about + , − button , each click adds or subtracts 1 to the set point value to the device.
6. Below the bottom left, of set point temperature window, is the Fault and Alert. When the device starts to alarm, the specific Alert.
7. Fault or alarm's reason will be displayed next to the yellow warning icon. In case of device Fault or Alert, the Fault and Alert content will be displayed in the bottom right of the set point temperature window. Click this area to jump to the details of the Error.

13 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.

Error Code	Description
AL001	Too many mem writings
AL002	Retain mem write error
AL003	Inlet probe error
AL004	Outlet probe error
AL005	Ambient probe error
AL006	Condenser coil temp
AL007	Water flow switch
AL008	Phase sequ.prot.alarm
AL009	Unit work hour warning
AL010	Pump work hour warning
AL011	Comp.work hour warning
AL012	Cond.fan work hourWarn
AL013	Low superheat - Vlv.A
AL014	Low superheat - Vlv.B
AL015	LOP - Vlv.A
AL016	LOP - Vlv.B
AL017	MOP - Vlv.A
AL018	MOP - Vlv.B
AL019	Motor error - Vlv.A
AL020	Motor error - Vlv.B
AL021	Low suct.temp. - Vlv.A
AL022	Low suct.temp. - Vlv.B
AL023	High condens.temp.EVD
AL024	Probe S1 error EVD
AL025	Probe S2 error EVD
AL026	Probe S3 error EVD
AL027	Probe S4 error EVD
AL028	Battery discharge EVD
AL029	EEPROM alarm EVD
AL030	Incomplete closing EVD
AL031	Emergency closing EVD
AL032	FW not compatible EVD
AL033	Config. error EVD
AL034	EVD Driver offline

Error Code	Description
AL035	BLDC-alarm:High startup DeltaP
AL036	BLDC-alarm:Compressor shut off
AL037	BLDC-alarm:Out of Envelope
AL038	BLDC-alarm:Starting fail wait
AL039	BLDC-alarm:Starting fail exceeded
AL040	BLDC-alarm:Low delta pressure
AL041	BLDC-alarm:High discarge gas temp
AL042	Envelope-alarm:High compressor ratio
AL043	Envelope-alarm:High discharge press.
AL044	Envelope-alarm:High current
AL045	Envelope-alarm:High suction pressure
AL046	Envelope-alarm:Low compressor ratio
AL047	Envelope-alarm:Low pressure diff.
AL048	Envelope-alarm:Low discharge pressure
AL049	Envelope-alarm:Low suction pressure
AL050	Envelope-alarm:High discharge temp.
AL051	Power+ alarm:01-Overcurrent
AL052	Power+ alarm:02-Motor overload
AL053	Power+ alarm:03-DCbus overvoltage
AL054	Power+ alarm:04-DCbus undervoltage
AL055	Power+ alarm:05-Drive overtemp.
AL056	Power+ alarm:06-Drive undertemp.
AL057	Power+ alarm:07-Overcurrent HW
AL058	Power+ alarm:08-Motor overtemp.
AL059	Power+ alarm:09-IGBT module error
AL060	Power+ alarm:10-CPU error
AL061	Power+ alarm:11-Parameter default
AL062	Power+ alarm:12-DCbus ripple
AL063	Power+ alarm:13-Data comm. Fault
AL064	Power+ alarm:14-Thermistor fault
AL065	Power+ alarm:15-Autotuning fault
AL066	Power+ alarm:16-Drive disabled
AL067	Power+ alarm:17-Motor phase fault
AL068	Power+ alarm:18-Internal fan fault

Error Code	Description
AL069	Power+ alarm:19-Speed fault
AL070	Power+ alarm:20-PFC module error
AL071	Power+ alarm:21-PFC overvoltage
AL072	Power+ alarm:22-PFC undervoltage
AL073	Power+ alarm:23-STO DetectionError
AL074	Power+ alarm:24-STO DetectionError
AL075	Power+ alarm:25-Ground fault
AL076	Power+ alarm:26-Internal error 1
AL077	Power+ alarm:27-Internal error 2
AL078	Power+ alarm:28-Drive overload
AL079	Power+ alarm:29-uC safety fault
AL080	Power+ alarm:98-Unexpected restart
AL081	Power+ alarm:99-Unexpected stop
AL082	Power+ safety alarm:01-Current meas.fault
AL083	Power+ safety alarm:02-Current unbalanced
AL084	Power+ safety alarm:03-Over current
AL085	Power+ safety alarm:04-STO alarm
AL086	Power+ safety alarm:05-STO hardware alarm
AL087	Power+ safety alarm:06-PowerSupply missing
AL088	Power+ safety alarm:07-HW fault cmd.buffer
AL089	Power+ safety alarm:08-HW fault heater c.
AL090	Power+ safety alarm:09-Data comm. Fault
AL091	Power+ safety alarm:10-Compr. stall detect
AL092	Power+ safety alarm:11-DCbus over current
AL093	Power+ safety alarm:12-HWF DCbus current
AL094	Power+ safety alarm:13-DCbus voltage
AL095	Power+ safety alarm:14-HWF DCbus voltage
AL096	Power+ safety alarm:15-Input voltage
AL097	Power+ safety alarm:16-HWF input voltage
AL098	Power+ safety alarm:17-DCbus power alarm
AL099	Power+ safety alarm:18-HWF power mismatch
AL100	Power+ safety alarm:19-NTC over temp.
AL101	Power+ safety alarm:20-NTC under temp.
AL102	Power+ safety alarm:21-NTC fault

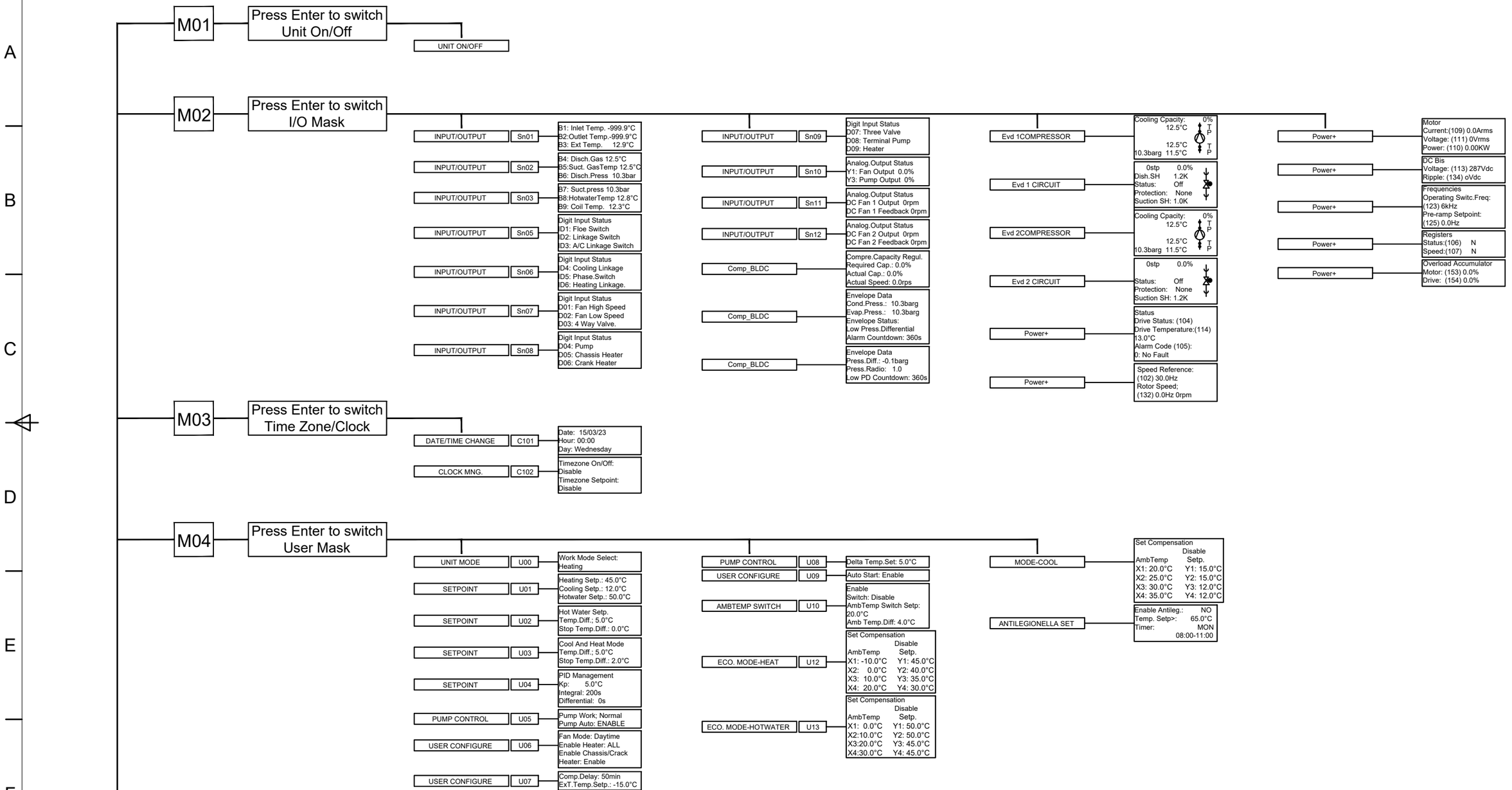
Error Code	Description
AL103	Power+ safety alarm:22-HWF sync fault
AL104	Power+ safety alarm:23-Invalid parameter
AL105	Power+ safety alarm:24-FW fault
AL106	Power+ safety alarm:25-HW fault
AL107	Power+ safety alarm:26-reseved
AL108	Power+ safety alarm:27-reseved
AL109	Power+ safety alarm:28-reseved
AL110	Power+ safety alarm:29-reseved
AL111	Power+ safety alarm:30-reseved
AL112	Power+ safety alarm:31-reseved
AL113	Power+ safety alarm:32-reseved
AL114	Power+ alarm:Power+ offline
AL115	EEV alarm:Low superheat
AL116	EEV alarm:LOP
AL117	EEV alarm:MOP
AL118	EEV alarm:High condens.temp.
AL119	EEV alarm:Low suction temp.
AL120	EEV alarm:Motor error
AL121	EEV alarm:Self Tuning
AL122	EEV alarm:Emergency closing
AL123	EEV alarm:Temperature delta
AL124	EEV alarm:Pressure delta
AL125	EEV alarm:Param.range error
AL126	EEV alarm:ServicePosit% err
AL127	EEV alarm:ValveID pin error
AL128	Low press alarm
AL129	High press alarm
AL130	Disc.temp.probe error
AL131	Suct.temp.probe error
AL132	Disc.press.probe error
AL133	Suct.press.probe error
AL134	Tank temp.probe error
AL135	EVI SuctT.probe error
AL136	EVI SuctP.probe error

Error Code	Description
AL137	Flow switch alarm
AL138	High temp. alarm
AL139	Low temp. alarm
AL140	Temp.delta alarm
AL141	EVI alarm:Param.range error
AL142	EVI alarm:Low superheat
AL143	EVI alarm:LOP
AL144	EVI alarm:MOP
AL145	EVI alarm:High condens.temp.
AL146	EVI alarm:Low suction temp.
AL147	EVI alarm:Motor error
AL148	EVI alarm:Self Tuning
AL149	EVI alarm:Emergency closing
AL150	EVI alarm:ServicePosit% err
AL151	EVI alarm:ValveID pin error

Fault code	Panel description	Detail description	Possible cause	Diagnostics method	What to do?
AL001	AL001 Too many mem writings	Storage type variables are excessively and frequently written/modifed	parameters modified frequently	Frequently modify parameters	Stop operating the controller for 3 minutes or power off for 3 minutes
AL002	AL002 Retain mem write error	Frequent alarms for writing errors in storage variables	parameters modified frequently	Frequently modify parameters	Stop operating the controller for 3 minutes or power off for 3 minutes
AL003	AL003 Inlet probe error	Space heating temperature sensor failure	1. Loose wire / broken wire / faulty probe	Visual inspection	Tighten the wire/reconnect the wire/replace the sensor probe
AL004	AL004 Outlet probe error	Outlet probe failure	1. Loose wire / broken wire / faulty probe	Visual inspection	Tighten the wire/reconnect the wire/replace the probe
AL005	AL005 Ambient probe erro	Ambient temp. probe failure	1. Loose wire / broken wire / broken probe	Visual inspection	Tighten the wire/reconnect the wire/replace the probe
AL006	AL006 Condenser coil temp.	Coil pipe probe failure	1. Loose wire / broken wire / broken probe	Visual inspection	Tighten the wire/reconnect the wire/replace the probe
AL007	AL007 Water flow switch	Water flow switch alarm	1. Strainer is blocked, resulting in increased friction loss and a smaller water flow	Smaller water flow	Clean the strainer
			2. Circulation pump is undersized	Smaller water flow	Replace the water pump with a larger water head and water flow one
			3. The water pump has air pockets (either in the impeller or in the piping around it	Smaller water flow	Purge the air.
			4. The valve of the water system is closed or not fully opened	Smaller water flow	Open the valve
			5. There is air in either supply or return pipe, which leads to poor water flow	Smaller water flow	Install an automatic air vent valve at the highest point of the piping system
			6. The water flow switch is broken	If all the above are excluded, pls short-circuit the water flow switch and force heat pump to start. If the outlet water temperature is more than 8 degrees above the water tank temperature, then pls continue the above operation. If the temperature difference is within 5 degrees and there are no errors showed, then the water flow switch is broken.	Replace the water flow switch
AL008	AL008 Phase sequ.prot.alarm	Phase sequence protection switch alarm	Abnormal parameter setting	Three phase device reports failure	Set DI5 of Ot6 page in M09 to normally open NO
AL013	AL013 Low superheat - Vlv.A	EEV valve A low superheat alarm	The unit has heavy frost	Visually check for frost	Lower the coil temperature difference on the Df05 sub-menu in M10
			The unit has been operating at low frequency for a long time	Check unit's running frequency	Operate within the allowable frequency range
AL028	AL028 Battery discharge	EEV battery failure	The unit has strong electric interference	Report fault	Power off for 3 minutes and restart
AL037	AL037 BLDC-alarm:Out of Envelope	BLDC-Out of operating range	The water temperature is too high or the ambient temperature is too low	The ambient temperature or water temperature exceeds the allowable range	Operate within the allowable range
AL038	AL038 BLDC-	BLDC-compressor failed to	Program error	Check whether the program version is the latest	Update the latest program
AL039	AL039 BLDC-	BLDC-compressor failed to	Program error	Check whether the program version is the latest	Update the latest program
AL041/AL05 0	AL041 BLDC-alarm:High discarge gas temp	Discharge gas temp. too high protection	1. Low refrigerant charge	Low pressure is very low	Check and fix the leaks, then vacuum and charge the refrigerant according to the
			2. Inaccurate sensing of discharge gas temp.	The discharge gas temp. probe still shows	Replace discharge gas temp. probe
AL051/AL05 7/AL082	AL051 Power+ alarm:01-Overcurrent	Compressor 1/2 over current protection	1. The power supply voltage is low	Use a multimeter to measure the voltage during standby, and it is 10% lower than the nominal	Increase the voltage stabilizer to keep the voltage stable, or provide a stable voltage, or
			2. The wire diameter is too small or the wiring is loose, resulting in low voltage	Measure the voltage with a multimeter at the moment when the compressor contactor is closed, until there is current protection. If the lowest voltage displayed by the multimeter is 10% lower than the rated voltage	Replace the appropriate wire diameter, or tighten loose wiring
			3. The AC contactor of compressor is broken and not closed	Visually check whether the AC contactor is closed or not	Replace AC contactor
			4. Short circuit of compressor coil	Excluded above, measure the resistance between the three coils of the compressor. If the resistance is too small or too large, it means that the compressor is burnt	Replace compressor
AL053	AL053 Power+ alarm:03-DCbus overvoltage	Power+03-DCbus overvoltage	Voltage is too high	The actual voltage exceeds 20% of the rated voltage	Provide stable power supply voltage

Fault code	Panel description	Detail description	Possible cause	Diagnostics method	What to do?
AL054	AL054 Power+ alarm:04-DCbus undervoltage	Power+04-DCbus undervoltag	Voltage is too low	The actual voltage is lower than the rated voltage by more than 25%	Provide stable power supply voltage
AL114	AL114 Power+ alarm:Power+ offline	Inverter offline alarm	1. The interval between power-off and power-on of the host is too short	Power cycle time is less than 30 seconds	Power off again, and power on after 3 minutes, if it still doesn't work, power off for 10 minutes
			2. The inverter cable is loose	Check is screw is tight, if not	Re-tighten
			3. The position of the inverter dial switch is wrong	The directions of the four DIP switches of the inverter are inconsistent	Redial to match
AL115	AL115 EEV alarm:Low superheat	EEV low superheat alarm	The unit has heavy frost	Visually check for frost	Lower the coil temperature difference on the Df05 page in M10
			The unit has been operating at low	Check unit's running frequency	Operate within the allowable operating range
AL128	AL128 Low press alarm	Low pressure alarm	1. Heavy frost on the evaporator	The evaporator are covered with thick frost	Force defrost, keep the ambient temp. probe as far away as possible from the evaporator to prevent it from being covered by snow, and check whether the parameters are abnormal
			2. The fan motor or fan blades are broken or the speed is slow, resulting in insufficient air	The fan rotates very slowly or stops rotating	If the fan motor or fan blade is broken, replace the motor or fan blade, if the speed is slow, replace the fan capacitor
			3. System leakage of refrigerant	The low pressure is very low, and traces of oil leakage can be seen in the pipeline	Check and fix the leaks, then vacuum and fill with refrigerant according to the nameplate
			4. The low pressure switch is broken	If the low pressure meter exceeds 1kg, this fault is still reported	Replace low voltage switch
			5. Reverse connection of high and low voltage switches	Low pressure gauge pressure is higher than 1kg, but high pressure gauge is very high	Change the wiring of the high and low voltage switch and check according to the high voltage protection
AL129	AL129 High press alarm	High voltage alarm	1. The filter is blocked, resulting in a small water flow	The temperature difference between the inlet and outlet water is more than 8 degrees	Cleaning the filter
			2. Water head and water flow of the waterpump are too small, resulting in insufficient water flow	The temperature difference between the inlet and outlet water is more than 8 degrees	Replace the water pump with a larger water head and water flow
			3. The water pump has air pockets, resulting in a small water flow	The temperature difference between the inlet and outlet water is more than 8 degrees	Emptying and water pump
			4. There is air in the pipeline, which leads to poor water flow	The temperature difference between the inlet and outlet water is more than 8 degrees	Install an automatic air vent at the highest point of the piping system
			5. Not Properly Vacuumed Refrigerant Lines, which leads to air and humidity mixed with refrigerant.	Abnormal Refrigerant Pressure, and Higher current draw.	Re-Vacuum Refrigerant Lines and Re-charge system with refrigerant
			6. The electronic expansion valve is broken, resulting too high pressure	Low pressure is low and high pressure is high	Replace electronic expansion valve
			7. Fouling of the water side heat exchanger causes high pressure	Small temperature difference between inlet and outlet water, high pressure	Clean the water side heat exchanger and add water for treatment
			8. The high pressure switch is broken	If the pressure of the pressure gauge does	Replace the high pressure switch
			9. The hot water probe or space heating/cooling probes are not placed in their corresponding thermal wells	The outlet water temperature is very high, above 60 degrees Celcius	Place each probe in its thermal well
AL130	AL130 Disc.temp.probe error	Discharge gas temp. probe failure	1. Loose wire / broken wire / broken probe	Visual inspection	Tighten the wire/reconnect the wire/replace the probe
AL131	AL131 Suct.temp.probe error	Suction gas temp. probe failure	1. Loose wire / broken wire / broken probe	Visual inspection	Tighten the wire/reconnect the wire/replace the probe
AL134	AL134 Tank temp.probe error	Water tank probe failure	1. Loose wire / broken wire / broken probe	Visual inspection	Tighten the wire/reconnect the wire/replace the probe
AL138	AL138 High temp. alarm	Too high outlet water temperature protection	1. Strainer is blocked, resulting in a small water flow	The outlet water temperature is higher than 62 degrees Celcius	Clean the Strainer
			2. The water pump is too small, resulting in low water flow	The outlet water temperature is higher than 62 degrees Celcius	Replace the water pump with a larger water head and water flow
			3. The water pump is not empty, resulting in a small water flow	The outlet water temperature is higher than 62 degrees Celcius	Purge Water Pump
			4. There is air in the pipeline, which leads to poor water flow	The outlet water temperature is higher than 62 degrees	Install an automatic air vent at the highest point of the piping system
			5. The setting temperature is too high and the water flow is too small	The outlet water temperature is higher than 62 degrees	Decrease temperature setpoint
			1. Strainer is blocked, resulting in increased friction loss and a smaller water flow	The outlet water temperature is below 5 degrees Celcius	Clean the Strainer

Fault code	Panel description	Detail description	Possible cause	Diagnostics method	What to do?
AL139	AL139 Low temp. alarm	Too low outlet water temperature protection	2. The water pump is too small, resulting in low water flow	The outlet water temperature is below 5 degrees Celcius	Replace the water pump with a larger water head and water flow
			3. The water pump has air pockets (either in the impeller or in the piping around it	The outlet water temperature is below 5 degrees Celcius	Purge water pump
			4. There is air in the pipeline, which leads to poor water flow	The outlet water temperature is below 5 degrees Ceclius	Install an automatic air vent at the highest point of the piping system
AL153	AL153 Fan1 fault	Speed control fan 1 failure	1. The fan driver dial switch is abnormal	Visual inspection	Fan dial switch top-left-below-right
AL154	AL154 Fan2 fault	Speed control fan 2 failure	2. The fan inverter board is broken	Visually check that the power light is not on	Replace the fan inverter board
AL155	AL155 Fans Offline	Speed control fan	3. The fan motor is broken	Manual rotation of fan motor, still stuck	Replace the fan motor



Ref. #	P/N				
Designed by IAN	Checked by ROGER	Approved by - date 2023-03-17	File name HSS306080CTRL	Date 2022-09-23	Scale NTS

AQUA SOLANOR
2305 46th AVENUE, LACHINE (QC) H8T3C9

ANNEX_"C"_01

DWG.NO.:HSS306080CTRL	Revision 0	Sheet 1

PROGRAM

PASSWORD

M05 — Press Enter to switch BLDC Compressor

- COMPRESSOR REG. Co01 — Compr.Timing
  Minimum ON: 180s
  Minimum OFF: 180s
  Min.Time Between
  2 Starts: 360s
- COMPRESSOR REG. Co02 — High Press.Alarm
  Dis.Press.Limit: 42.0bar
  Dis.Press.Recover:40.0bar
- COMPRESSOR REG. Co03 — Low Press.Alarm
  Suc.Press.Cool.Limit:4.0bar
  Suc.Press.Heat.Limit:0.5bar
  Suc.Press.Heat.Limit:1.5bar
- COMPRESSOR REG. Co04 — Low Press.Alarm
  Start Delay: 180s
  Run Delay: 30s
- COMP_BLDC — Start-Up Pressure Diferential
  Control Max Presure Differ.
  Admitted: 3.0barg
- COMP_BLDC — Start-Up Pressure Diferential
  Control
  Equalization Mode:
  EEV PRE-OPENING
  Max.Equaliz.Time:60s
  EEV Opening: 80%

M06 — Press Enter to switch Power + Inverter

- POWER+ — Defaut Settings
  Motor Type :
  PARASONIC H240D5KZAAJ2
  R410A 230V
  Drive Type: PS2**252**
  Write Defaults: NO
- POWER+ — Drive Type
  Connected: 230V 25A
  Suggested: 230V 25A
- POWER+ — Configuration
  Data Comunic.Timeout:
  (090) 30s
  AutoInstall Param.: NO
- POWER+ — Output Frequency
  Minimum: (007) 30.0Hz
  Maximum: (006) 220.0Hz
- POWER+ — Skip Frequency 1
  Setpoint: (010) 0.0Hz
  Band: (011) 0.0Hz
- POWER+ — Skip Frequency 2
  Setpoint: (067) 0.0Hz
  Band: (068) 0.0Hz
- POWER+ — Skip Frequency 3
  Setpoint: (069) 0.0Hz
  Band: (070) 0.0Hz
- POWER+ — Skip Frequency
  Nominal: (024) 6.0Hz
  Derating: (025) DISABLED
- POWER+ — PTC Alarm
  Enabling: (027) NO
  Delay: (028) 0s
- POWER+ — Reverse Speed:
  (008) DISABLED
  Speed Derating Mode:
  (009) NONE
- POWER+ — Stop Mode:
  (033) ---
  Flying Restart::
  (034) DISABLED
- POWER+ — Relay Configuratio:
  (026) ALARM
- POWER+ — Poles Numbers: 4
  Motor Control Mode:
  (000) PM MOTOR

- COMP_BLDC — Start-Up Failure Control
  Pressure Difference
  Min.Variation: 0.2barg
  Control Period: 45s
- COMP_BLDC — Start-Up Failure Control
  Restart Delay: 30s
  Max Retry Number: 5
- COMP_BLDC — Speed Mnagemetn
  Start-UP Forced Speed:
  Cool/Het: 50.0rps
  Hotwater: 40.0rps
  Max Speed: 80.0rps
  Min Speed: 30.0rps
- COMP_BLDC — Speed Mnagemetn. rps/s
  Deceleration Rate: 1.0
  Acceleration Rate: 1.0
  Switch-OFF Rate: 1.0
- COMP_BLDC — Evelope Control
  Speed Reduction Rate:
  0.5rps/s
  Min Speed Admitted:
  40.0rps

- POWER+ — Motor Base Frequency:
  (001) 200.0Hz
  Motor Base Voltage:
  (002) 242Vrms
- POWER+ — Motor Rated Current:
  (003) 25.0Arms
  Motor Power Factor:
  (004) 100
  Out Current Maximum:
  (005) 100.0%
- POWER+ — Speed Profile
  Freq.1 (012): 18.0Hz
  Freq.2 (013): ------Hz
  Freq.3 (014): ------Hz
- POWER+ — Speed Profile
  Acc.1 (015): 18.0Hz/s
  Acc.2 (016): 2.0Hz/s
  Acc.3 (017): 2.0Hz/s
  Acc.4 (018): 2.0Hz/s
- POWER+ — Speed Profile
  Delay (019): -s
  Delay (020): -s
  Delay (021): -s
- POWER+ — Speed Profile
  Delay Execution:
  (022.0) ------
  Force Freq. 2:
  (022.1) ------
- POWER+ — Speed Profile
  Deceleration Ramp:
  (023) 2.0Hz/s
- POWER+ — V/F Boost Voltage:
  (035) 0.0%
  V/F Freq.Adjustment:
  (036) 0.0%
  V/F Volt.Adjustment:
  (037) 0.0%
- POWER+ — Motor Magn.Current:
  (045) 0.0A
  Stator Resistance:
  (046) 830mohm
  Roto Resistance:
  (047) 0mohm

- COMP_BLDC — Evelope Control
  Out Of Envelope Alarm
  Timeout: 360s
  Low Pressure Diff. Alarm
  Timeout: 360s
- COMP_BLDC — Evelope Control
  Low Ratio Management
  By Compre.Speed Up: YES
- COMP_BLDC — Discharge Gas Control
  Hogh Discharge Temp.
  Limit: 110.0°C
  Alarm: 115.0°C
- COMP_BLDC — Speed Control Due To
  Discharge Gas
  Action Distance 20.0°C
  Action Pause: 90s
  Compressor Speed
  Reduction: 3.0%
- LDC RETRY SETTINGS — Restries Number: 3
  Control Time Retries: 60m

- POWER+ — Stator/LD Inductance:
  (048) 3.5mH
  Leakage Factor:
  (049) 0
  Lq Inductance:
  (050) 6.4mH
- POWER+ — Speed Loop Kp:
  (055) 75.0%
  Speed Loop Ti:
  (056) 100msec
- POWER+ — Magnetizing Time:
  (051) 100msec
  Starting Current:
  (057) 40.0% 10.0A
  Freq.For Start Curr.:
  (058) 20.0%
- POWER+ — Crankcase Heater Mode:
  (100.2) AUTO
  Crankcase Current:
  (065) 0.0% 0.0A
  STO Alarm Management.:
  (066) MAN.RESET
- POWER+ — Phase Loss Detection:
  (076.0) ENABLE
- POWER+ — Overload At Power-On:
  (076.3) RESET
- POWER+ — Inductance Saturation
  Reduction:
  (077) 10.0% 2.5A
- POWER+ — Save Custom Data
  Save To CUSTOM: NO
  Inverter Online
- POWER+ — Retries Setting
  Retries Number: 3
  Control Time Retries: 60m

- LDC RETRY SETTINGS — Envelope Alarms: [A]
  [M]:Manual [A]:Semiaut
- COMP_BLDC — Information
  FB Version: 2.0. 62
- Unit Mode: User
  User Mode: Multiple
  Test Mode EVI Opening
  Condition Able
  TEST SENSOR Able

- POWER+ — Motor Control Alarms
  Alarms 01-08:
  [A][A][A][A][A][A][A][A]
  Alarms 09-16:
  [A][A][A][A][A][A][A][A]
  [M]:Manual [A]:Semiaut
- POWER+ — Motor Control Alarms
  Alarms 17-24:
  [A][A][A][A][A][A][A][A]
  Alarms 25-28 98 99 :
  [A][A][A][A] [A] [A]
  M :Manual [A]:Semiaut
- POWER+ — USafety Control Alarms
  Alarms 01-08:
  [A][A][A][A][A][A][A][A]
  Alarms 09-16:
  [A][A][A][A][A][A][A][A]
  [M]:Manual [A]:Semiaut
- POWER+ — USafety Control Alarms
  Alarms 17-24:
  [A][A][A][A][A][A][A][A]
  Alarms 25-32:
  [A][A][A][A][A][A][A][A]
  [M]:Manual [A]:Semiaut
- POWER+ — Information
  Fb Version: 2.0. 62
  Boot Release: 192
  FW Release: 151
  FW Checksum: 832
  MC Release: 0
  Hardware ID: 2025

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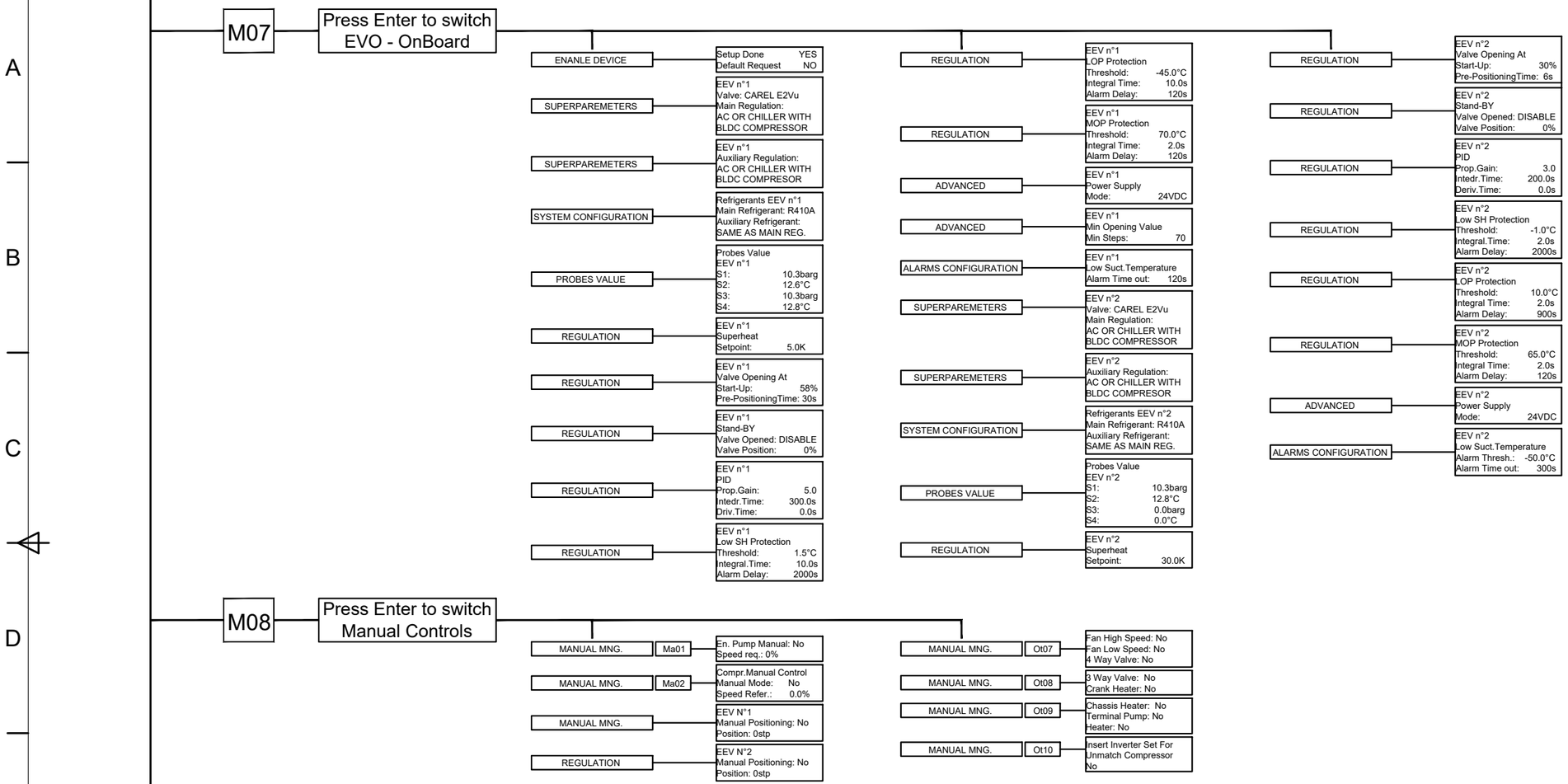
AQUA SOLANOR
2305 46th AVENUE, LACHINE (QC) H8T3C9

ANNEX_"C"_02

DWG.NO.:HSS306080CTRL | Revision 0 | Sheet 2



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AQUA SOLANOR
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ANNEX_"C"_03

DWG.NO.:HSS306080CTRL	Revision 0	Sheet 3

M09 — Press Enter to switch Other Paramaters

- UNIT MODE | Ot00 — Control Temp.select: Inlet Temp.; Unit mode: Three Function.
- OTHER PARAMETERS — BMS Settings; BMS Network:***Disable***
- OTHER PARAMETERS | Ot02 — Delta Temp.Set: 15°C; Low Temp.Set: 4°C; High Temp.Set: 64°C
- OTHER PARAMETERS | Ot02 — Delta Temp.Deloading Setp Diff: 4.0°C; Delta Temp.Keeping Setp. Diff: 5.0°C; Quit Deloading Setp Diff: 4.0°C
- OTHER PARAMETERS | Ot02 — Low Oulet Temp.Deload Setp Diff: 1.0°C; Low Outlet Temp.Keep Setp. Diff: 2.0°C; Quit Deloading Setp Diff: 3.0°C
- OTHER PARAMETERS | Ot02 — High Oulet Temp.Deload Setp Diff: 6.0°C; High Outlet Temp.Keep Setp. Diff: 7.0°C; Quit Deloading Setp Diff: 8.0°C
- OTHER PARAMETERS | Ot02 — Limited Deloading Interval Time: 2s; Limited Time Limited Deloading Rate: 1.0%; Deloading Delay: 3s
- OTHER PARAMETERS | Ot03 — Three vale; Start Dealy: 15s; Stop Delay: 5s
- OTHER PARAMETERS | Ot03 — Pump; Start Speed: 100%; Start Delay: 5min; Start Internal: 3min
- OTHER PARAMETERS | Ot04 — Pump; Max.Speed: 100%; Min.Speed: 50%
- OTHER PARAMETERS | Ot05 — EVI Management. Enabke Vapor Inj: Enable
- OTHER PARAMETERS | Ot05 — EEV2_Control_Mode: Discharge Sperheart
- OTHER PARAMETERS | Ot06 — Dig.Input cfg; Sel. NO/NC Contact; 1 Flow Switch NC; 2 Linkage Switch NC; 3 A/C Linkage Switch NC; 5 Phase. Switch NO
- OTHER PARAMETERS | Ot06 — Dig.Input cfg; Sel.NO/NC Contact; 4 Cool Switch NC; 6 Heat Switch NC
- OTHER PARAMETERS | Ot07 — Dig.Input cfg; Sel. NO/NC Contact; 1 Fan High Speed: NC; 2 Fan Low Speed: NC; 3 4 Way Valves: NO
- OTHER PARAMETERS | Ot08 — Dig.Input cfg; Sel. NO/NC Contact; 4 Pump: NC; 5 Three Vlave: NC; 6 Crank Heater: NC
- OTHER PARAMETERS | Ot09 — Dig.Input cfg; Sel. NO/NC Contact; 7 Chassis Heater: NC; 8 Terminal Pump: NC; 6 Heater: NC
- OTHER PARAMETERS | Ot10 — B1 Probe Offset: 0.0; B2 Probe Offset: 0.0; B3 Probe Offset: 0.0
- OTHER PARAMETERS | Ot11 — B4 Probe Offset: 0.0; B5 Probe Offset: 0.0; B6 Probe Offset: 0.0
- OTHER PARAMETERS | Ot12 — B7 Probe Offset: 0.0; B8 Probe Offset: 2.0; B9 Probe Offset: 0.0
- OTHER PARAMETERS | Ot13 — B10Probe Offset: 0.0; B12 Probe Offset: 0.0
- OTHER PARAMETERS — Press, Probe Filter; Filter thr. 0.02bar; Filter Time: 3000ms
- OTHER PARAMETERS | Ot14 — EEV Evap.Press.Probe; S1 Alarm Delay: 60S; Min.: 0.0bar; Max.: 34.5bar
- OTHER PARAMETERS | Ot14 — Pump Direction Signal; 0%=10V, 100%=0V
- OTHER PARAMETERS | Ot15 — EEV Evap.Press.Probe; Min.: 0.0bar; Max.: 45.0bar
- OTHER PARAMETERS | Ot16 — EVI Evap.Press.Probe; Min.: 0.0bar; Max.: 34.5bar
- OTHER PARAMETERS | Ot17 — EVI Management; Vap Inj Rot Speed Set: 45.0rps
- OTHER PARAMETERS | Ot18 — EVI Management; Vap Inj Disch SH Set: 28.0°C; Vap Inj Disch SH Diff: 5.0°C
- OTHER PARAMETERS | Ot19 — EVI Management; Vap Inj T External ICH Set point: 70.0°C; Diff: 1.0°C
- OTHER PARAMETERS | Ot20 — EVI Management; Vap Inj T External HP Set point: 13.0°C; Diff: 1.0°C
- OTHER PARAMETERS | Ot22 — Fan Delay; Delay Off: 5s
- OTHER PARAMETERS | Ot23 — Antifreeze Prevent; Interval Time: 30min; Antifreeze2 Compresser Request: 50.0%
- OTHER PARAMETERS | Ot23 — The Unit Strandby For 60min Start Running The Pump 3mins
- OTHER PARAMETERS | Ot23 — Comp. Alarm Unit Can Not Run, Delay 60min Start Running The Pump 3 Mins
- OTHER PARAMETERS | Ot23 — Comp.Alarm Unit Can Not Run,Delay 60min Start Running the Pump 3mins
- OTHER PARAMETERS | Ot23 — Low Ambient Temp; Alarm Setpoint. -25.0°C; Low Ambient Temp Alarm Diff. 2.0°C
- COMPRESS OIL MNG | Ot24 — En.Function: Enable; Min.Req.Thrs.: 35.0%; Speed Thrs.: 40.0rps
- COMPRESS OIL MNG | Ot25 — Act.Delay: 60min; Speed Force: 60.0rps; Force Time: 3min
- COMPRESS OIL MNG | Ot25 — Oilrecover And Defrost; Max Speed Set 70.0rps
- Ot25 — Heat Fan Day Mode: Low Fan Ambient Set: 25.0°C; High Fan Ambient Diff: 2.0°C
- Ot25 — Cool: Fan Press Mode; Discharge Press Set 23.0bar; Open Press Diff 4.0bar; Close Press Diff 3.0bar
- Ot25 — Heat: Fan Press Mode; Discharge Press Set 9.0bar; Open Press Diff 4.0bar; Close Press Diff 3.0bar
- Ot25 — Fan Type Classification
- Ot25 — Fan Address 55; Fan Drive Type Carel
- Ot25 — Minimum Speed 200rpm; Maxinum Speed 800rpm
- FAN | Ot25 — Speed FAN Able; Alarm Diff 200rpm; Alarm Delay 60s; Offline Alarm Delay 180s
- Ot25 — Fan Commum Alarm Stop NO; Fan Min Speed 20.0%; Fan Max Speed 100.0%
- Ot25 — Cool Minimum Set 12.0°C; Heat Maximun Set 55.0°C
- OTHER PARAMETERS | Ot26 — NET Settings NO; Address: 1; Unit Catagory: Slave; Enable Hotwater Mode (Slave): NO
- OTHER PARAMETERS | Ot26 — Remote/BMS Cards; Address 1 Baud19200; BMS Card Address 1 Baud 19200
- LENGUAGE — Language: ENGLISH; ENTER to Change; ESC To Confirm; Show Mak Time 23
- CHANGE PASSWORD — Insert New; PasswoManufact: 1234
- INITIALIZATION — Alarm Initialization; Delete Alarm Logs? NO; Clear AutoReset Counters? NO; Enable Buzzer? NO
- INITIALIZATION — DEFAULT INSTALLATION; Defaut Value: NO
- INFORMATION | Ot30 — Code: 1 2 2; Ver.: HEATPUMPBLDC; Date: 2022_02_09; OS: 4.8.002

M10 — Press Enter to switch Defrost

- DEFROST | Df01 — Defrost function: Enable
- DEFROST PARAM. | Df02 — Min.speed to reverse cycle changeover: 30.0rps; EVD Forcing during defrost: 480stp
- DEFROST PARAM. | Df02 — EVD Forcing when defrost quit: 300stp; EVD Forcing time: 40s
- DEFROST PARAM. | Df03 — Compressor speed for defrost: 65.0rps; Pump speed for defrost: 100%
- DEFROST PARAM. | Df04 — Def. Start setpoint: -1.0°C; Def. End setpoint: 15.0°C
- DEFROST PARAM. | Df05 — Ext. Def. Temp.: 15.0°C; Delta Temp.Between Ext.T and Con.Coil .T 5.0°C
- DEFROST PARAM. | Df06 — Def. Min. Time: 1min; Max. Duration: 8min; Def.Inter.Time: 45min
- DEFROST PARAM. | Df07 — Condenser coil Temp. probe error or offline Automatic dfrost every: 60min
- DEFROST PARAM. | Df08 — 4-way valve changeover timing; Start defrost: 10s; Stop defrost: 10s
- DEFROST PARAM. | Df09 — Dripping time: s; Dripping time: 10s
- DEFROST PARAM. | Df10 — Condenser fan froce on discharge Press.SetP 35.0bar; Diff. 2.0bar
- DEFROST PARAM. | Df11 — Defrost switch press compensation. Yes; Exhaust pressure 25.0bar; Suction presure 7.0bar
- DEFROST PARAM. | Df12 — Defrost manual: Disable
- DEFROST PARAM. | Df13 — AmbTemp<=-10.0; Start delta Temp.: 5.0°C; Interval time: 75min
- DEFROST PARAM. | Df14 — -10.0<AmbTemp<=-2.0; Start delta Temp.: 6.0°C; Interval time: 65min
- DEFROST PARAM. | Df15 — AmbTemp<=-2.0; Start delta Temp.: 7.0° C; Interval time: 50 min
- DEFROST PARAM. | Df15 — Set without defrosting for a long time: Low temp.run exceeds 240min Comp.run exceeds 10min

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ANNEX_"C"_04

DWG.NO.:HSS306080CTRL | Revision 0 | Sheet 4

M11 Press Enter to switch User Mode

- USER MODE--HEATING 10<AmbTemp<=14 — EVD SH Setp. 5.0K; EVI SH Setp. 35.0K; EVD Startup Pos. 58%; Defrost End Pos. 280stp; Comp.Speed Max 70.0rps — 01
- USER MODE--HEATING 5<AmbTemp<=9 — EVD SH Setp. 5.0K; EVI SH Setp. 35.0K; EVD Startup Pos. 53%; Defrost End Pos. 250stp; Comp.Speed Max 78.0rps — 02
- USER MODE--HEATING 0<AmbTemp<=4 — EVD SH Setp. 5.0K; EVI SH Setp. 35.0K; EVD Startup Pos. 42%; Defrost End Pos. 200stp; Comp.Speed Max 78.0rps — 03
- USER MODE--HEATING -5<AmbTemp<=-1 — EVD SH Setp. 5.0K; EVI SH Setp. 35.0K; EVD Startup Pos. 33%; Defrost End Pos. 160stp; Comp.Speed Max 80.0rps — 04
- USER MODE--HEATING -10<AmbTemp<=-6 — EVD SH Setp. 5.0K; EVI SH Setp. 40.0K; EVD Startup Pos. 27%; Defrost End Pos. 130stp; Comp.Speed Max 82.0rps — 05
- USER MODE--HEATING -15<AmbTemp<=-11 — EVD SH Setp. 5.0K; EVI SH Setp. 40.0K; EVD Startup Pos. 18%; Defrost End Pos. 100stp; Comp.Speed Max 86.0rps — 06
- USER MODE--HEATING -20<AmbTemp<=-16 — EVD SH Setp. 4.0K; EVI SH Setp. 40.0K; EVD Startup Pos. 15%; Defrost End Pos. 72stp; Comp.Speed Max 82.0rps — 07
- USER MODE--HEATING AmbTemp<=-21 — EVD SH Setp. 2.0K; EVI SH Setp. 20.0K; EVD Startup Pos. 13%; Defrost End Pos. 65stp; Comp.Speed Max 70.0rps — 08
- USER MODE--HEATING 15<AmbTemp<=24 — EVD SH Setp. 5.0K; EVI SH Setp. 35.0K; EVD Startup Pos. 75%; Defrost End Pos. 380stp; Comp.Speed Max 60.0rps — 09
- USER MODE--HEATING AmbTemp>24 — EVD SH Setp. 1.0K; EVI SH Setp. 35.0K; EVD Startup Pos. 75%; Defrost End Pos. 380stp; Comp.Speed Max 60.0rps — 10
- USER MODE--HEATING Inlet Water Temp> 45.0°C; Inlet Water Temp Diff 1.0°C; Comp. Speed Max 65.0rps
- USER MODE--COOLING 33<AmbTemp<=37 — EVD SH Setp. 5.0K; EVI SH Setp. 35.0K; EVD Startup Pos. 95%; Comp.Speed Max 70.0rps — 01
- USER MODE--COOLING 30<AmbTemp<=32 — EVD SH Setp. 5.0K; EVI SH Setp. 35.0K; EVD Startup Pos. 95%; Comp.Speed Max 70.0rps — 02
- USER MODE--COOLING 26<AmbTemp<=29 — EVD SH Setp. 5.0K; EVI SH Setp. 35.0K; EVD Startup Pos. 95%; Comp.Speed Max 75.0rps — 03
- USER MODE--COOLING AmbTemp<=25 — EVD SH Setp. 3.0K; EVI SH Setp. 35.0K; EVD Startup Pos. 95%; Comp.Speed Max 60.0rps — 04
- USER MODE--COOLING AmbTemp<=38 — EVD SH Setp. 1.0K; EVI SH Setp. 35.0K; EVD Startup Pos. 95%; Comp.Speed Max 50.0rps — 05

M12 Press Enter to switch Fan Confirutation

- FAN CONFIG F00 — Fan Delay Off: 5s; Fan Digital Output Type: CLASSIFICATION
- FAN HEAT DRY MODE F00 — Fan Low Speed AmbTemp.set: 25.0°C; Fan High Speed AmbTemp.Diff: 2.0°C
- FAN NIGHT MODE F00 — Compressor Max Speed: 60.0rps
- FAN PRESS MODE F00 — Fan Min Speed: 30.0%; Fan Max Speed: 100.0%
- COOI: FAN PRESS MODE F00 — Discharge Press Set:23.0bar; Open Press Diff: 4.0bar; Close Press Diff: 3.0bar
- HEAT: PRESS MODE F00 — Suction Press Set: 9.0bar; Open Press Diff: 4.0bar; Close Press Diff: 3.0bar
- SPEED FAN CONFIG F00 — Enable Speed Fan: YES
- SPEED FAN OFFLINE F00 — Fan Speed Mode:Other FAN; Fan Address: 55
- OTHER FAN CONFIG F00 — Offline Alarm Delay: 180s; Offline Alarm Stop Compressor: NO
- FAN HEAT DRY MODE F00 — Minimum Speed: 200rpm; Maximum Speed: 800rpm; Night Mode Max Speed: 600rpm
- OTHER FAN CONFIG F00 — Speed Alarm Diff: 200rpm; Speed Alarm Delay: 60s

- FAN NIFHTMODE F01 — Fan Max Speed: 600rps; Comp Max Speed: 50.0rps
- FAN LOWSPEED MODE0 F02 — 9<AmbTemp; Comp Max Speed: Heating: 50.0rps; Hot Water: 50.0rps
- FAN LOWSPEED MODE1 F03 — 4<AmbTemp 9<; Comp Max Speed: Heating: 60.0rps; Hot Water: 60.0rps
- FAN LOWSPEED MODE2 F04 — -3<AmbTemp<=9; Comp Max Speed: Heating: 60.0rps; Hot Water: 60.0rps
- FAN LOWSPEED MODE3 F05 — -9<AmbTemp<=-3; Comp Max Speed: Heating: 65.0rps; Hot Water: 65.0rps
- FAN LOWSPEED MODE4 F06 — -15<AmbTemp<=-9; Comp Max Speed: Heating: 65.0rps; Hot Water: 65.0rps
- FAN LOWSPEED MODE5 F07 — AmbTemp<=-15; Comp Max Speed: Heating: 70.0rps; Hot Water: 70.0rps
- FAN LOWSPEED MODE6 F08 — 38<AmbTempComp; Max Speed: Cooling: 65.0rps

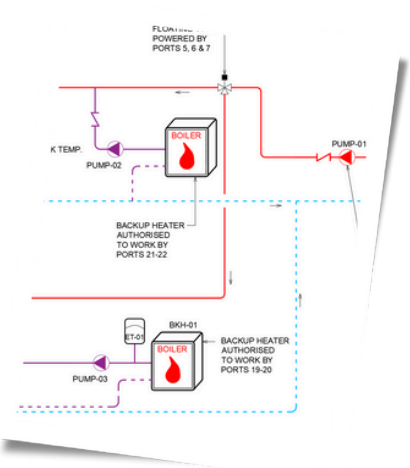
- FAN NIFHTMODE7 F09 — 33<AmbTemp<=38; Comp Max Speed: Cooling: 65.0rps
- FAN NIFHTMODE8 F10 — 30<AmbTemp<=33; Comp Max Speed: Cooling: 65.0rps
- FAN NIFHTMODE9 F11 — AmbTemp<=26; Comp Max Speed: Cooling: 55.0rps
- FAN NIFHTMODE10 F13 — 26<AmbTemp<=30; Comp Max Speed: Cooling: 60.0rps
- ECO MODEL-COOL F14 — AmbTemp Setp.; X1: 20.0°C Y1: 15.0°C; X2: 25.0°C Y2: 15.0°C; X3: 30.0°C Y3: 12.0°C; X4: 35.0°C Y4: 12.0°C
- ECO MODEL-HEAT F15 — AmbTemp Setp.; X1: -10.0°C Y1: 45.0°C; X2: 0.0°C Y2: 40.0°C; X3: 10.0°C Y3: 40.0°C; X4: 20.0°C Y4: 35.0°C
- ECO MODEL-HOTWATER F16 — AmbTemp Setp.; X1: 0.0°C Y1: 50.0°C; X2:10.0°C Y2: 50.0°C; X3:20.0°C Y3: 50.0°C; X4:30.0°C Y4: 45.0°C

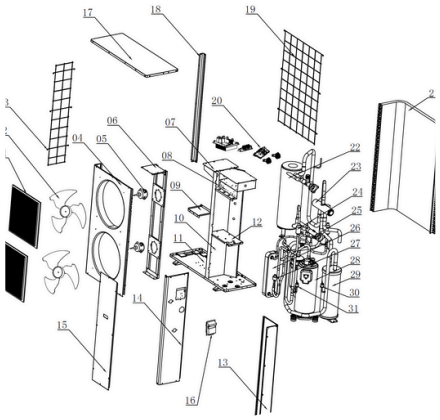
Ref. #	P/N				
Designed by IAN	Checked by ROGER	Approved by - date 2023-03-17	File name HSS306080CTRL	Date 2022-09-23	Scale NTS

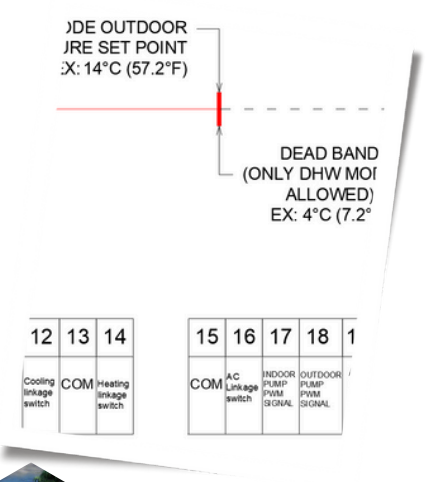
AQUA SOLANOR
2305 46th AVENUE, LACHINE (QC) H8T3C9

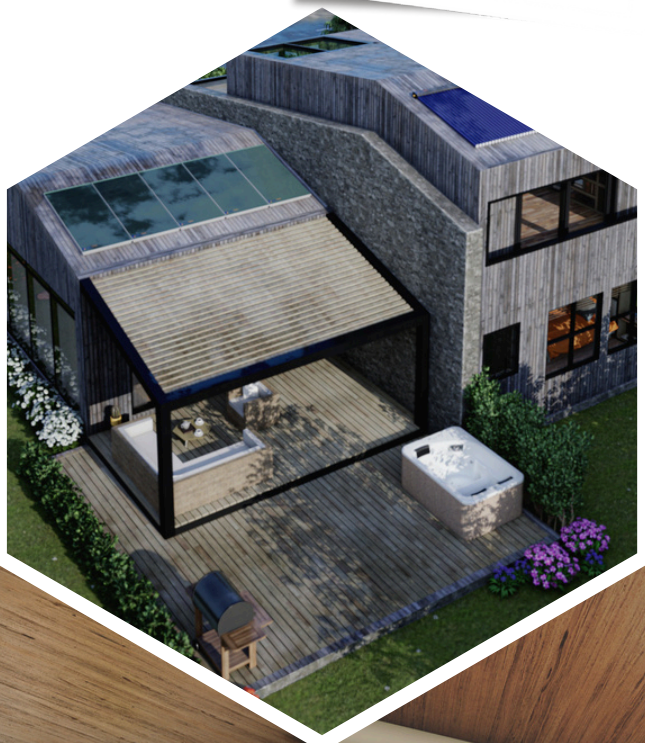
ANNEX_"C"_05

DWG.NO.:HSS306080CTRL | Revision 0 | Sheet 5









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