




Hydro Solar Innovative Energy DC Inverter Monoblock Air to Water Heat Pumps Technical Manual



OUTDOOR OPERATING
TEMPERATURE RANGE

-20°C +45°C
-4°F +113°F





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2 INTRODUCTION

2.1 WHAT IS AIR TO WATER HEAT PUMP?

Air to Water Heat Pump is a closed loop thermal device that draws heat from one place (called heat source) and reject the drawn heat to another place (called heat sink). Unlike conventional air to air heat pump, where generated thermal energy is used to cool/heat air fluid, Air to Water Heat Pumps use generated thermal energy to cool/heat water or water/glycol fluid mixture.

2.2 WHY AIR TO WATER HEAT PUMPS ARE BECOMING SO POPULAR?

Canadian/US Building Code is 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 (mainly 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. Despite the fact renewable energies prices are going down and efficiency is going up, they are still not affordable for a normal middle-class Canadian 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 renewable energy sources (such as solar, geothermal, etc....).

Before the emergence of Air to Water Heat Pumps, Canadian home 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.

Conventional Geothermal Heat Pump for a 2000 ft² Canadian home, has an annual COP (Coefficient of Performance) of around 3 for a cost of 25K\$ (Heat Pump + Storage Tank + Geothermal Ground Heat Exchanger) while a similar 3-3.5 Tons capacity Air to Water Heat pump has an annual COP of 2.2-2.4 for a cost of 8-10K\$ (Heat Pump + Storage Tank). Air to Water Heat pump are 20-30% less efficient than their geothermal peers but they are 60% cheaper.



3 FEATURES

3.1 CONTROL PROTOCOL

Our air to water heat pumps have **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.

3.3 COMPRESSORS:

Compressors are **Panasonic** 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 AVAILABLE MODELS

Model Number	HSS030V2			
Properties	SI	Unit	IP	Unit
	Outdoor 86°F (30°) DB / 73°F (23°C) WB - Fluid Supply/Return Temperatures 44.6°F (7°C)/54.32°F (12°C)			
Nominal Cooling Capacity	7.4	KW	25248	BTU/HR
COP / EER	3.28	KW Out /KW In	11.2	MBH Out /KW In
Min/Max Cooling Capacity	3.39/7.37	KW	11566/25248	BTU/HR
Min/Max Power Input	0.715/2.347	KW	0.715/2.347	KW
Min/Max COP / EER	3.14/4.74	KW Out /KW In	10.71/16.17	MBH Out /KW In
	Outdoor 95°F (35°) DB / 75°F (24°C) WB - Fluid Supply/Return Temperatures 44.6°F (7°C)/54.32°F (12°C)			
Nominal Cooling Capacity	6.7	KW	22860	BTU/HR
COP / EER	2.62	KW Out /KW In	8.94	MBH Out /KW In
Min/Max Cooling Capacity	3.08/6.7	KW	10507 / 22860	BTU/HR
Min/Max Power Input	0.845/2.667	KW	0.845/2.667	KW
Min/Max COP / EER	2.51/3.65	KW Out /KW In	8.56/12.45	MBH Out /KW In
	Outdoor 44.6°F (7°) DB / 42.8°F (6°C) WB - Fluid Supply/Return Temperatures 95°F (35°C)/86°F (30°C)			
Nominal Heating Capacity	9.5	KW	32413	BTU/HR
COP	4.45	KW Out /KW In	4.45	KW Out /KW In
Min/Max Heating Capacity	4.37/9.5	KW	14910/32413	BTU/HR
Min/Max Power Input	0.786/2.135	KW	0.786/2.135	KW
Min/Max COP	4.45/5.56	KW Out /KW In	4.45/5.56	KW Out /KW In
	Outdoor 44.6°F (7°) DB / 42.8°F (6°C) WB - Fluid Supply/Return Temperatures 113°F (45°C)/104°F (40°C)			
Nominal Heating Capacity	8.9	KW	30366	BTU/HR
COP	3.6	KW Out /KW In	3.6	KW Out /KW In
Min/Max Heating Capacity	4.11/8.93	KW	14022/30366	BTU/HR
Min/Max Power Input	0.972/2.508	KW	0.972/2.508	KW
Min/Max COP	3.56/4.23	KW Out /KW In	3.56/4.23	KW Out /KW In
Power Supply (V/Ph/Hz)	220-240/1/60			
Rated Current (Amp)	10.2			
Maximum Current (Amp)	14.81			
Refrigerant Type	R410A			
Compressor	Panasonic			
Condenser Fan Quantity	1			
Condenser Fan Airflow	3000	m³/hr	1765	ft³/min
Condenser Fan Rated Power	100	Watt	100	Watt
Fluid Side Heat Exchanger Type	Plate Heat Exchanger			
Fluid Side Pressure Drop	20	Kpa	6.692	ft of Water
Piping Connection Size	1"			
Allowable Water Flow (Min / Rated / Max)	0.28/0.45/0.76	L/s	4.44/7.13/12.05	US gpm
Noise Level	59			
Net Dimensions (LxDxH)	1110x475x810	mm x mm x mm	44x19x32	in x in x in
Packaging Dimensions (LxDxH)	1220x540x970	mm x mm x mm	48x22x39	in x in x in
Net Weight	88	Kg	194	Lb
Gross Weight	116	Kg	256	Lb
Notes				
DB: Outdoor Dry Bulb Temperature				
WB: Outdoor Wet Bulb Temperature				
COP: Coefficient of Performance = Heat Output in KW / Power Input in KW				
EER: Energy Efficiency Ratio = Heat Output in MBH (1000 x Btu/hr) / Power Input in KW				



Model Number	HSS040V2			
Properties	SI	Unit	IP	Unit
	Outdoor 86°F (30°) DB / 73°F (23°C) WB - Fluid Supply/Return Temperatures 44.6°F (7°C)/54.32°F (12°C)			
Nominal Cooling Capacity	9.7	KW	33095	BTU/HR
COP / EER	3.28	KW Out /KW In	11.2	MBH Out /KW In
Min/Max Cooling Capacity	4.46/9.69	KW	15217/33095	BTU/HR
Min/Max Power Input	0.941/3.088	KW	0.941/3.088	KW
Min/Max COP / EER	3.14/4.74	KW Out /KW In	1.71/16.17	MBH Out /KW In
	Outdoor 95°F (35°) DB / 75°F (24°C) WB - Fluid Supply/Return Temperatures 44.6°F (7°C)/54.32°F (12°C)			
Nominal Cooling Capacity	8.81	KW	30058	BTU/HR
COP / EER	2.62	KW Out /KW In	8.94	MBH Out /KW In
Min/Max Cooling Capacity	4.05/8.81	KW	13818/30058	KW
Min/Max Power Input	1.112/3.509	KW	1.112/3.509	KW
Min/Max COP / EER	2.51 / 3.65	KW Out /KW In	8.56 / 12.45	MBH Out /KW In
	Outdoor 44.6°F (7°) DB / 42.8°F (6°C) WB - Fluid Supply/Return Temperatures 95°F (35°C)/86°F (30°C)			
Nominal Heating Capacity	12.5	KW	42648	BTU/HR
COP	4.45	KW Out /KW In	4.45	KW Out /KW In
Min/Max Heating Capacity	5.75/12.5	KW	19618/42648	BTU/HR
Min/Max Power Input	1.034/2.809	KW	1.034/2.809	KW
Min/Max COP	4.45/5.56	KW Out /KW In	4.45/5.56	KW Out /KW In
	Outdoor 44.6°F (7°) DB / 42.8°F (6°C) WB - Fluid Supply/Return Temperatures 113°F (45°C)/104°F (40°C)			
Nominal Heating Capacity	11.8	KW	40260	BTU/HR
COP	3.6	KW Out /KW In	3.6	KW Out /KW In
Min/Max Heating Capacity	5.41/11.75	KW	18456/40260	BTU/HR
Min/Max Power Input	1.279/3.301	KW	1.279/3.301	KW
Min/Max COP	3.56/4.23	KW Out /KW In	3.56/4.23	KW Out /KW In
Power Supply (V/Ph/Hz)	220-240/1/60			
Rated Current (Amp)	13.4			
Maximum Current (Amp)	19.49			
Refrigerant Type	R410A			
Compressor	Panasonic			
Condenser Fan Quantity	1			
Condenser Fan Airflow	3500	m³/hr	2059	ft³/min
Condenser Fan Rated Power	110	Watt	110	Watt
Fluid Side Heat Exchanger Type	Plate Heat Exchanger			
Fluid Side Pressure Drop	22	Kpa	7.3612	ft of Water
Piping Connection Size	1"			
Allowable Water Flow (Min / Rated / Max)	0.37/0.6/1	L/s	5.86/9.51/15.85	US gpm
Noise Level	59			
Net Dimensions (LxDxH)	1110x475x910	mm x mm x mm	44x19x36	in x in x in
Packaging Dimensions (LxDxH)	1220x540x1070	mm x mm x mm	48x22x42	in x in x in
Net Weight	98	Kg	216	Lb
Gross Weight	126	Kg	278	Lb
Notes				
DB: Outdoor Dry Bulb Temperature				
WB: Outdoor Wet Bulb Temperature				
COP: Coefficient of Performance = Heat Output in KW / Power Input in KW				
EER: Energy Efficiency Ratio = Heat Output in MBH (1000 x Btu/hr) / Power Input in KW				



Model Number	HSS060V2			
Properties	SI	Unit	IP	Unit
	Outdoor 86°F (30°) DB / 73°F (23°C) WB - Fluid Supply/Return Temperatures 44.6°F (7°C)/54.32°F (12°C)			
Nominal Cooling Capacity	14.3	KW	48789	BTU/HR
COP / EER	3.09	KW Out /KW In		MBH Out /KW In
Min/Max Cooling Capacity	6.6/14.35	KW	22518/48789	BTU/HR
Min/Max Power Input	1.411/4.632	KW	1.411/4.632	KW
Min/Max COP / EER	3.1/4.68	KW Out /KW In	10.6/16	MBH Out /KW In
	Outdoor 95°F (35°) DB / 75°F (24°C) WB - Fluid Supply/Return Temperatures 44.6°F (7°C)/54.32°F (12°C)			
Nominal Cooling Capacity	13.04	KW	44490	BTU/HR
COP / EER	2.48	KW Out /KW In	8.47	MBH Out /KW In
Min/Max Cooling Capacity	6.00/13.04	KW	20470/44490	KW
Min/Max Power Input	1.668/5.264	KW	1.668/5.264	KW
Min/Max COP / EER	2.48/3.6	KW Out /KW In	8.46/12.28	MBH Out /KW In
	Outdoor 44.6°F (7°) DB / 42.8°F (6°C) WB - Fluid Supply/Return Temperatures 95°F (35°C)/86°F (30°C)			
Nominal Heating Capacity	18.5	KW	63119	BTU/HR
COP	4.39	KW Out /KW In	4.39	KW Out /KW In
Min/Max Heating Capacity	8.51/18.5	KW	29035/63119	BTU/HR
Min/Max Power Input	1.551/4.214	KW	1.551/4.214	KW
Min/Max COP	4.39/5.49	KW Out /KW In	4.39/5.49	KW Out /KW In
	Outdoor 44.6°F (7°) DB / 42.8°F (6°C) WB - Fluid Supply/Return Temperatures 113°F (45°C)/104°F (40°C)			
Nominal Heating Capacity	17.4	KW	59366	BTU/HR
COP	3.4	KW Out /KW In	3.4	KW Out /KW In
Min/Max Heating Capacity	8.00/17.39	KW	27295/59366	BTU/HR
Min/Max Power Input	1.918/4.952	KW	1.918/4.952	KW
Min/Max COP	3.51/4.17	KW Out /KW In	3.51/4.17	KW Out /KW In
Power Supply (V/Ph/Hz)	220-240/1/60			
Rated Current (Amp)	20.2			
Maximum Current (Amp)	29.24			
Refrigerant Type	R410A			
Compressor	Panasonic			
Condenser Fan Quantity	2			
Condenser Fan Airflow	5500	m³/hr	3235	ft³/min
Condenser Fan Rated Power	210	Watt	210	Watt
Fluid Side Heat Exchanger Type	Plate Heat Exchanger			
Fluid Side Pressure Drop	25	Kpa	8.365	ft of Water
Piping Connection Size	1"			
Allowable Water Flow (Min / Rated / Max)	0.55/0.88/1.47	L/s	8.72/13.95/23.3	US gpm
Noise Level	63			
Net Dimensions (LxDxH)	1110x475x1355	mm x mm x mm	44x19x54	in x in x in
Packaging Dimensions (LxDxH)	1220x540x1400	mm x mm x mm	48x22x55	in x in x in
Net Weight	124	Kg	273	Lb
Gross Weight	161	Kg	355	Lb
Notes				
DB: Outdoor Dry Bulb Temperature				
WB: Outdoor Wet Bulb Temperature				
COP: Coefficient of Performance = Heat Output in KW / Power Input in KW				
EER: Energy Efficiency Ratio = Heat Output in MBH (1000 x Btu/hr) / Power Input in KW				

5 HEATING PERFORMANCE

HSS030V2													
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 in (KW)	COP	Heating Capacity (KW)	Heating Capacity (BTU/HR)	Power in (KW)	COP	Heating Capacity (KW)	Heating Capacity (BTU/HR)	Power in (KW)	COP
-20	-4	4.39	14,978	1.77	2.48	3.72	12,692	1.99	1.87	1.12	3,822	0.83	1.35
-15	5	5.85	19,960	2.00	2.92	4.96	16,923	2.33	2.13	2.97	10,134	1.94	1.53
-7	19.4	7.19	24,531	2.09	3.44	6.98	23,815	2.39	2.92	6.35	21,665	3.02	2.10
2	35.6	8.46	28,864	2.26	3.74	8.22	28,045	2.48	3.32	7.97	27,193	2.93	2.72
7	44.6	9.50	32,413	2.13	4.45	8.93	30,468	2.48	3.60	8.48	28,933	2.86	2.96
12	53.6	9.98	34,050	2.06	4.85	9.38	32,003	2.35	4.00	8.91	30,400	2.72	3.28
20	68	10.47	35,722	1.93	5.43	9.85	33,607	2.14	4.60	9.35	31,901	2.48	3.77

HSS040V2													
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 in (KW)	COP	Heating Capacity (KW)	Heating Capacity (BTU/HR)	Power in (KW)	COP	Heating Capacity (KW)	Heating Capacity (BTU/HR)	Power in (KW)	COP
-20	-4	5.77	19,687	2.33	2.48	4.89	16,684	2.61	1.87	1.47	5,016	1.09	1.35
-15	5	7.70	26,271	2.64	2.92	6.52	22,245	3.06	2.13	3.91	13,341	2.56	1.53
-7	19.4	9.46	32,276	2.75	3.44	9.19	31,355	3.15	2.92	8.36	28,523	3.98	2.10
2	35.6	11.13	37,974	2.98	3.74	10.81	36,882	3.26	3.32	10.49	35,790	3.86	2.72
7	44.6	12.50	42,648	2.81	4.45	11.75	40,089	3.26	3.60	11.16	38,076	3.77	2.96
12	53.6	13.13	44,797	2.71	4.85	12.34	42,102	3.09	4.00	11.72	39,987	3.57	3.28
20	68	13.78	47,015	2.54	5.43	12.95	44,183	2.82	4.60	12.31	42,000	3.27	3.77

HSS060V2													
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 in (KW)	COP	Heating Capacity (KW)	Heating Capacity (BTU/HR)	Power in (KW)	COP	Heating Capacity (KW)	Heating Capacity (BTU/HR)	Power in (KW)	COP
-20	-4	8.54	29,137	3.44	2.48	7.24	24,702	3.87	1.87	2.17	7,404	1.61	1.35
-15	5	11.39	38,861	3.90	2.92	9.66	32,958	4.54	2.13	5.79	19,755	3.78	1.53
-7	19.4	14.01	47,800	4.07	3.44	13.60	46,401	4.66	2.92	12.38	42,239	5.90	2.10
2	35.6	16.48	56,227	4.41	3.74	16.00	54,589	4.82	3.32	15.52	52,952	5.71	2.72
7	44.6	18.50	63,119	4.16	4.45	17.39	59,332	4.83	3.60	16.52	56,363	5.58	2.96
12	53.6	19.43	66,292	4.01	4.85	18.26	62,300	4.57	4.00	17.35	59,195	5.29	3.28
20	68	20.40	69,601	3.76	5.43	19.17	65,405	4.17	4.60	18.21	62,129	4.83	3.77



6 DEFROST MODE SEQUENCE OF CONTROL

When the air-cooled unit is in heating mode, the outdoor coil is the evaporator (draws heat to the indoor space). If the outdoor temperature is too low, frost may form on the 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 sent to the outdoor coil for melting the formed ice.

6.1 DEFROST MODE SEQUENCE OF CONTROL:

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

- (1) Time between two defrosting cycles \geq defrosting interval, unit: min, default value: 45 min;
- (2) Ambient temperature \leq 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 \geq 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 \leq defrosting set point, lasting for 2s, default value is -1°C;

Defrost mode set point: according to the compensation of ambient temperature, the lower the ambient temperature is, the lower the set point will be. Implementing the manual forced defrost command will ignore the above entry conditions.

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

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

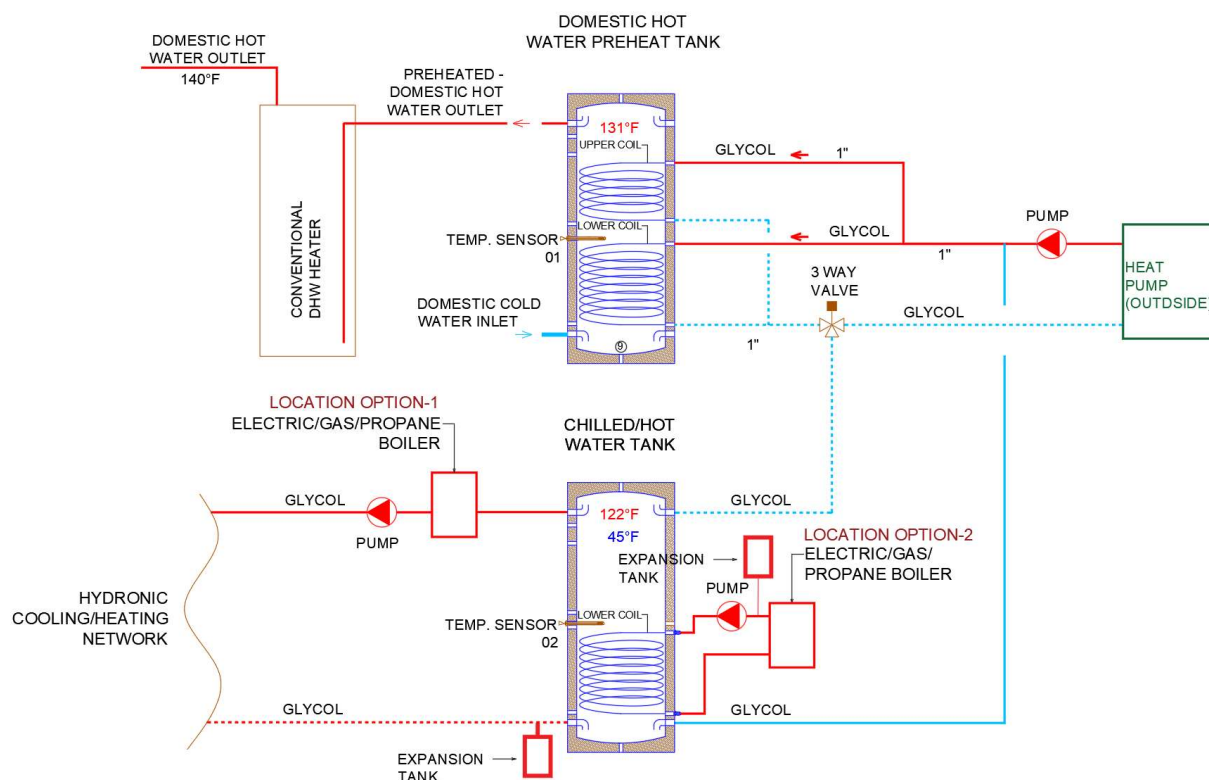
7 PIPING DIAGRAMS

When installing a Monoblock Air to Water Heat pump, the following prerequisites must be met:

- 1- A hot water thermal storage tank must be purchased and installed with the Heat Pump. In extreme cold winter temperatures, heat pump goes into defrost mode

- (by simply switching into cooling mode) and draws heat from the tank to defrost its condenser.
- 2- Use appropriate heat transfer fluid for the lowest winter temperature in your area. A Propylene Glycol mixture is mostly used in Canada and the coldest regions of the US.
 - 3- Install a strainer at the inlet of the heat pump. That strainer must be cleaned on regular basis to prevent any debris from accumulating on the Heat Pump Plate Heat Exchanger.

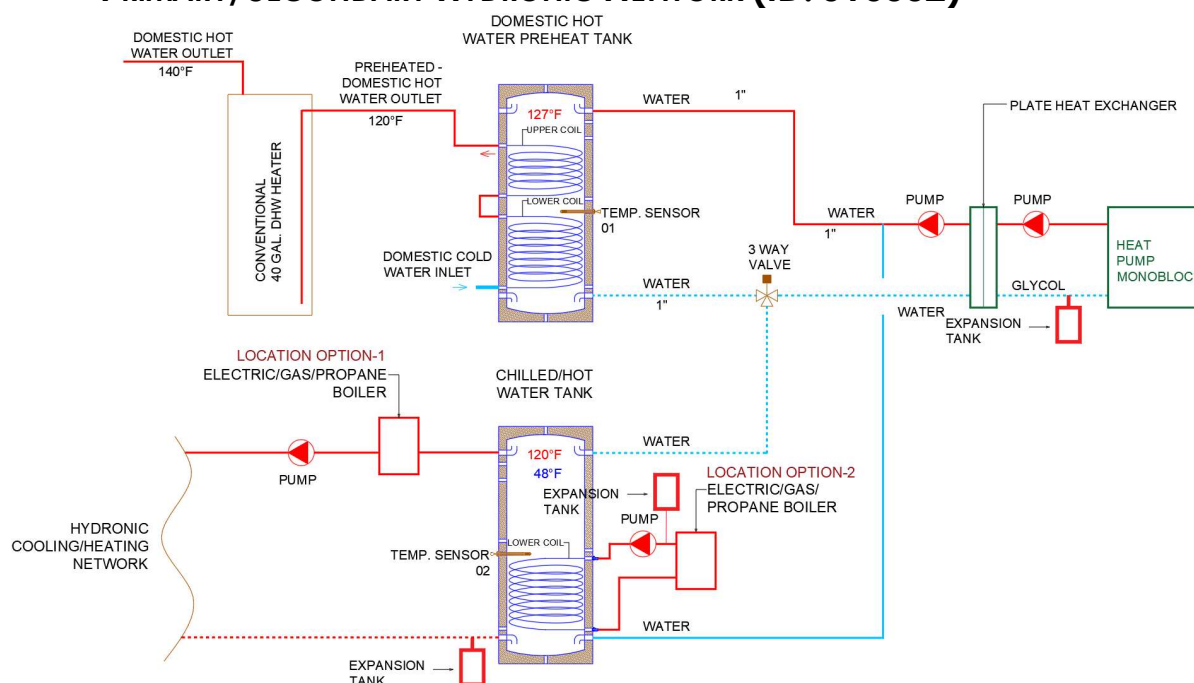
7.1 ALL GLYCOL SYSTEM – DHW HEATING & SPACE HEATING/COOLING – PRIMARY/SECONDARY HYDRONIC NETWORK (ID: SYS001)



This is the simplest and most reliable system for Monoblock Air to Water Heat pump since it requires no Plate Heat Exchanger (between Water and Glycol), requires less pumping power and is mainly used in Nordic Climates where outdoor temperatures in winter is below 0°C (32°F).

The only disadvantage of this system is that it requires a large volume of heat transfer fluid (Water/Glycol Mix) which significantly increases project cost when using large volume solar thermal storage tank.

7.2 HYBRID WATER/GLYCOL SYSTEM – DHW HEATING & SPACE HEATING/COOLING – PRIMARY/SECONDARY HYDRONIC NETWORK (ID: SYS002)

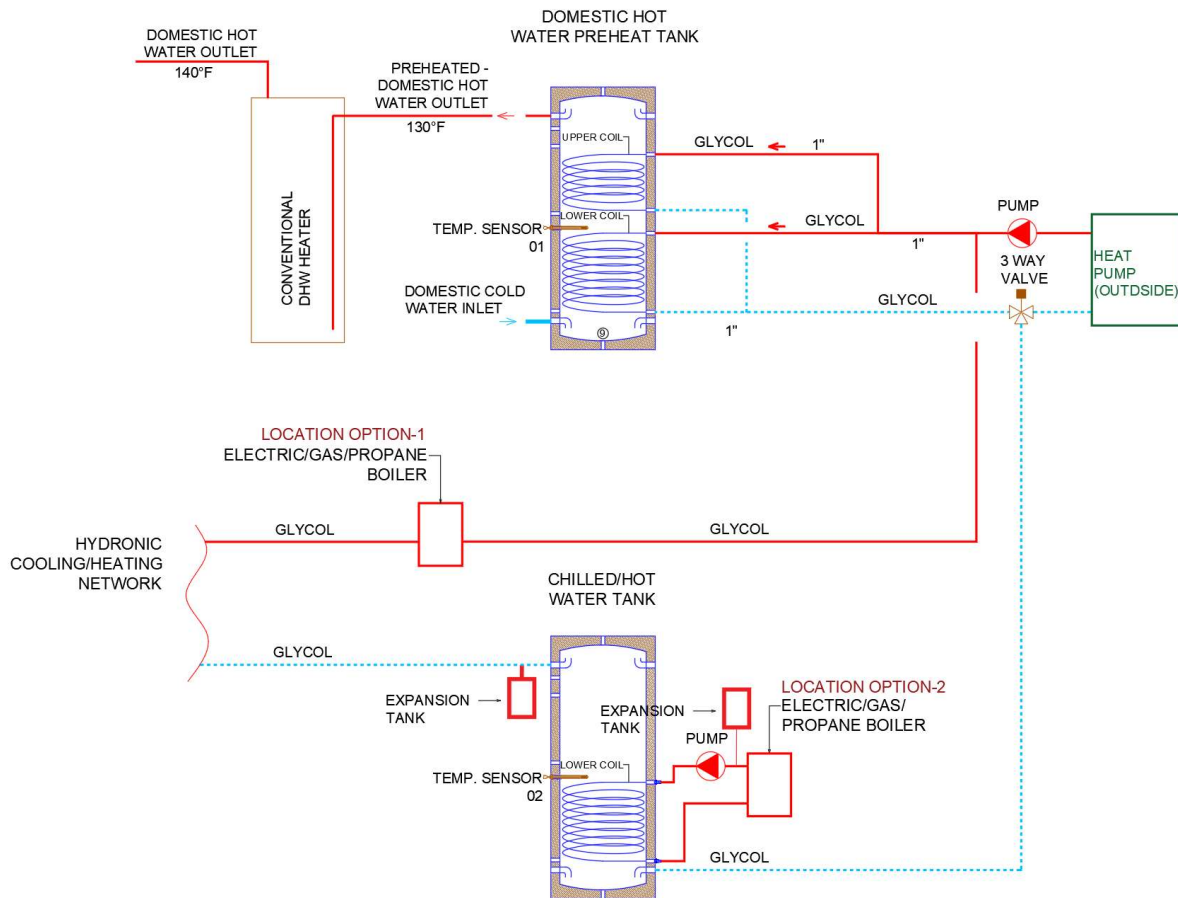


This system limits glycol presence between plate heat exchanger and heat pump and keeps glycol away for hydronic heating and cooling distribution network. Also, this system costs less for installations with large thermal storage tanks applications since thermal storage tanks are filled with water and not glycol.

The disadvantage of this system is that plate heat exchanger increases friction loss, requires an additional pump downstream the exchanger (which increases pumping power) and fluid supply temperatures is lower in heating mode and higher in cooling mode (depending on the sizing of the plate heat exchanger, we usually lose 2 or 3 degree Fahrenheit at the heat exchanger level).

7.3 ALL GLYCOL SYSTEM – DHW HEATING & SPACE HEATING TANK – BUFFER TANK ON THE RETURN LINE OF PRIMARY HYDRONIC NETWORK (ID: SYS003)

Since Heat Pump is designed to modulate its capacity based on either return chilled/hot water temperature or tank's temperature, Buffer tank is installed on the main return line of the hydronic heating/cooling loop.

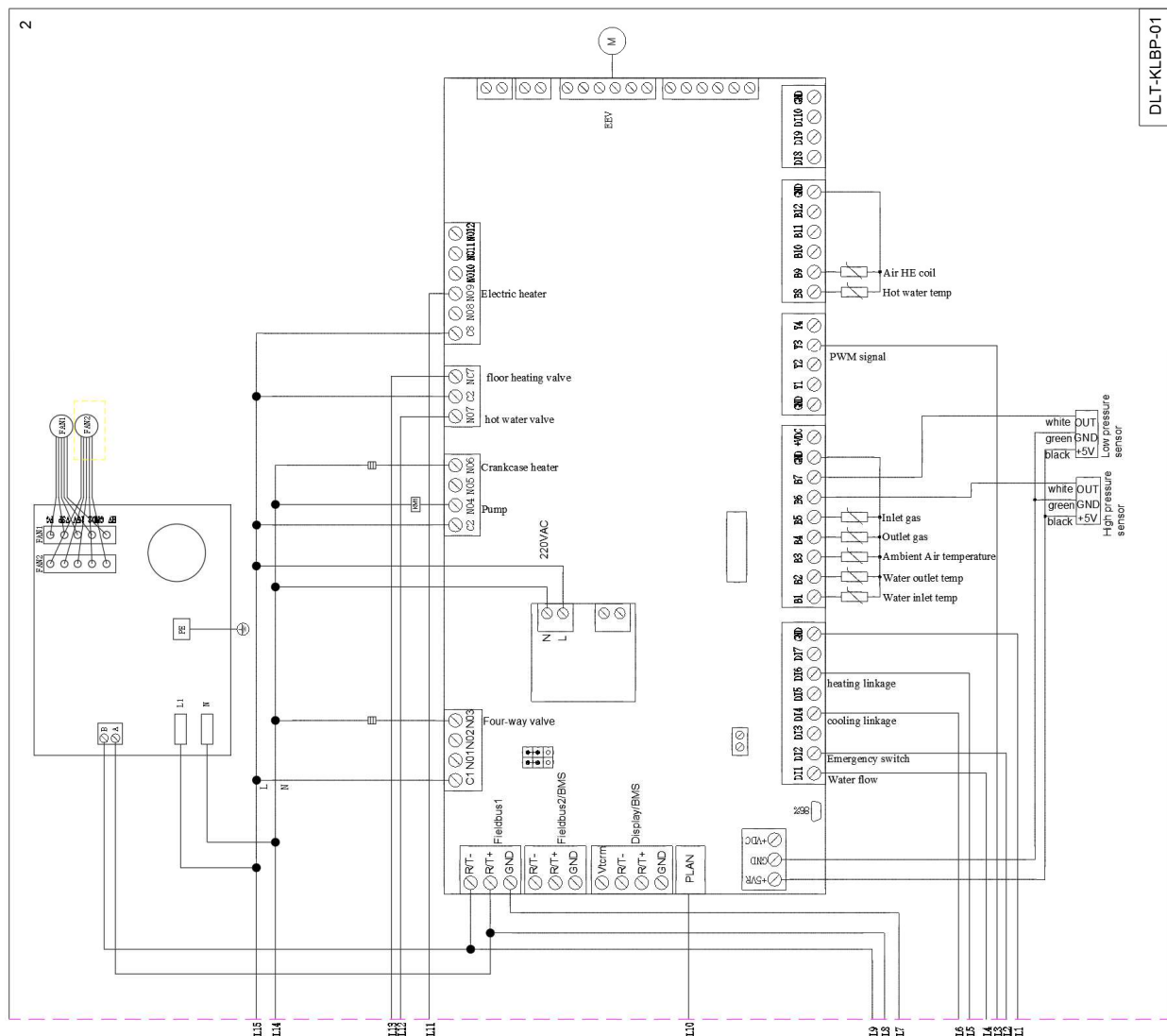


The advantage of this option is that only one pump is needed (since no primary and secondary loops are present) and a smaller buffer tank is required on the return line compared to the other design schematics where tank is used as a hydraulic separator too.

In this design option, Hydronic heating/cooling loop flow should be maintained within the min/max allowable flows of the heat pump. This design is mainly used when hydronic distribution devices are controlled by 3 Way Valves or 2 Way Valves with a Mechanical or Motorized by-pass that maintains constant flow or minimizes flow fluctuations.



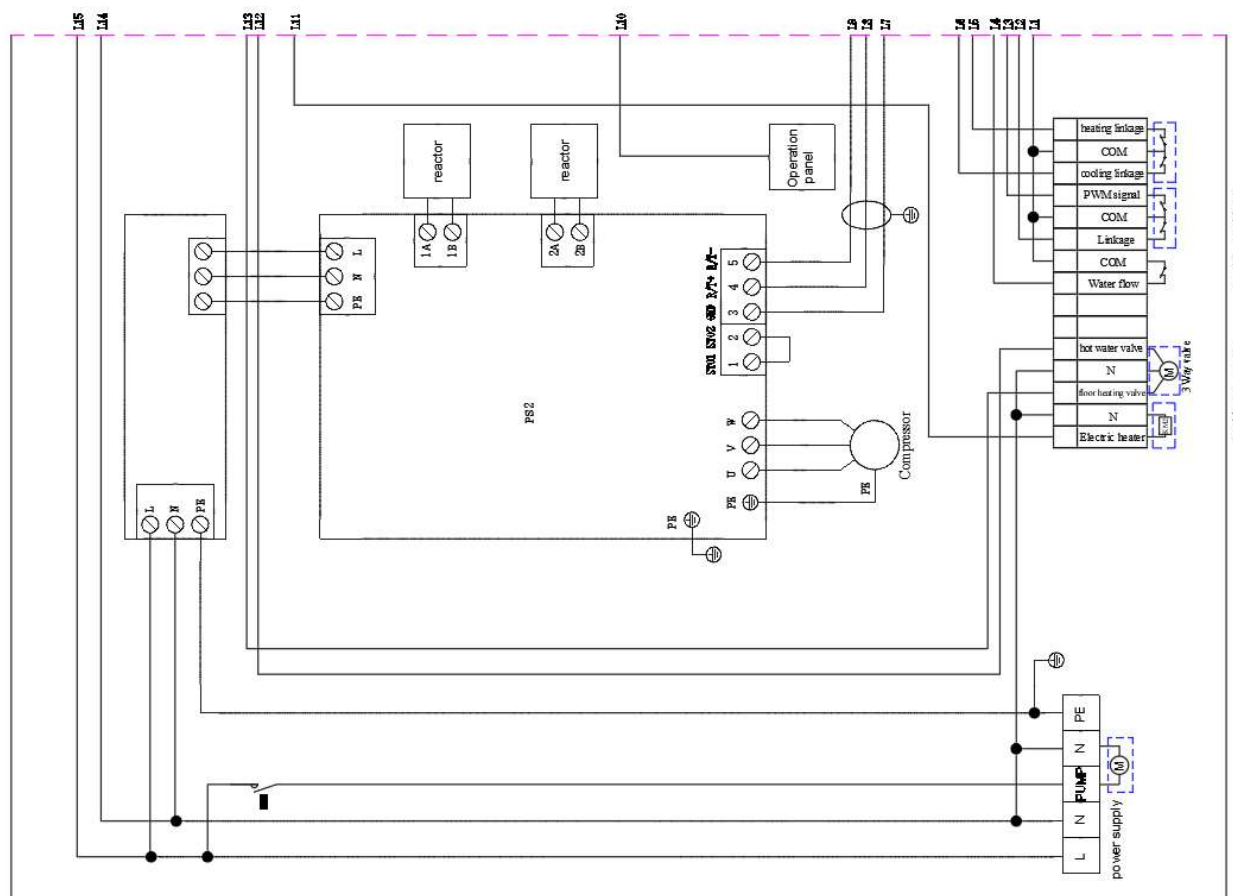
8 CONTROL CARD AND WIRING DIAGRAMS



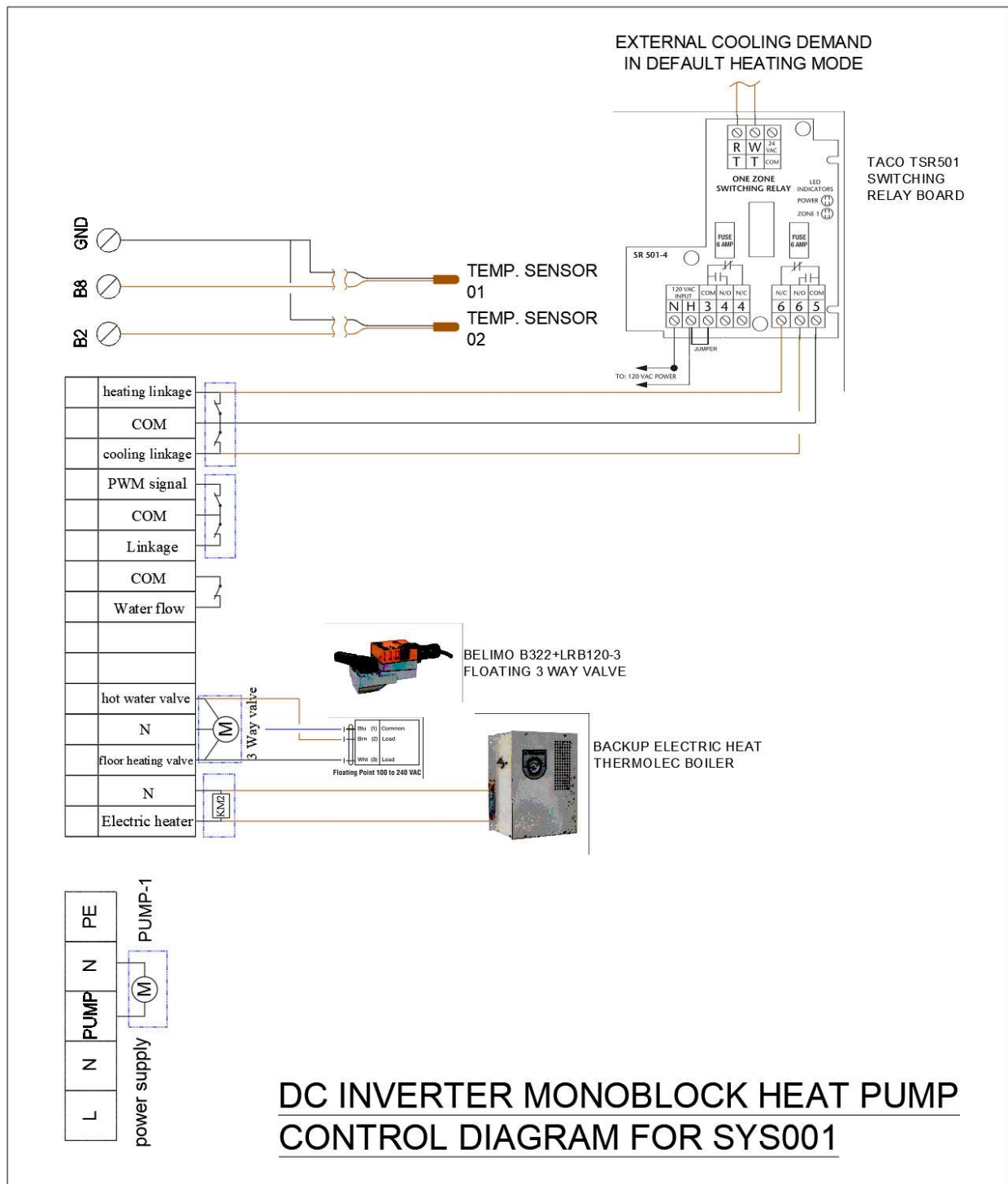
Terminals Description

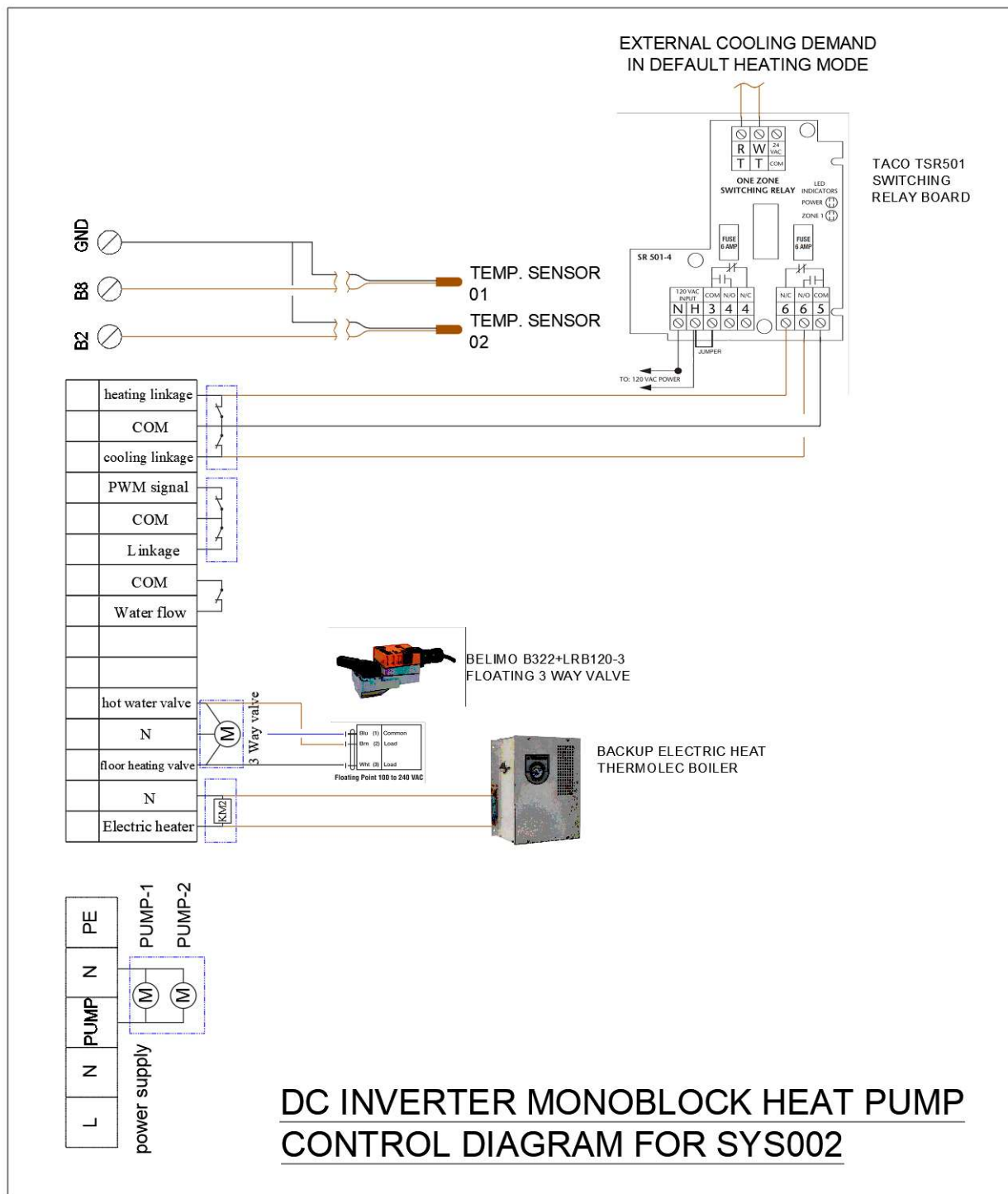
Terminal	Function	Type
Heating Linkage	Activates Heating Mode	Dry Contact – Normally Open
Cooling Linkage	Activates Cooling Mode	Dry Contact – Normally Open
PWM Signal	Pulse Width Modulation Signal for Pump Speed Modulation	PWM
Linkage	Emergency Switch	Dry Contact – Normally Open
Water Flow	Flow Switch Connection	Dry Contact – Normally Open
Hot Water Valve	Power to DHW tank Valve	220-230V/1Ph/60Hz

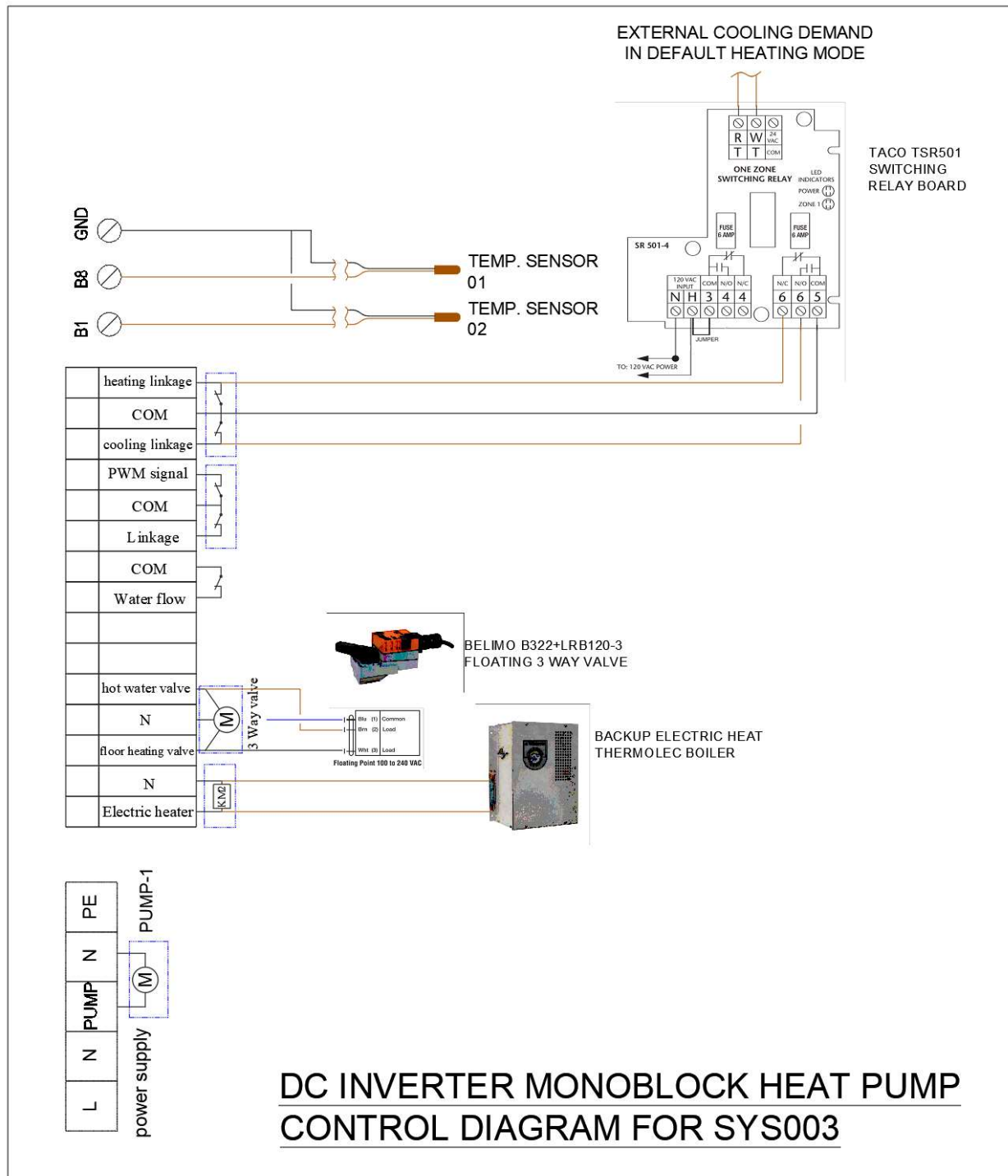
Floor Heating Valve	Power to Hydronic Heating/Cooling tank Valve	220-230V/1Ph/60Hz
Electric Heater	Authorizes Makeup heat	Dry Contact – Normally Open
Pump	Power to Circulation Pump	220-230V/1Ph/60Hz



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 responsibility to comply with such regulatory requirements.



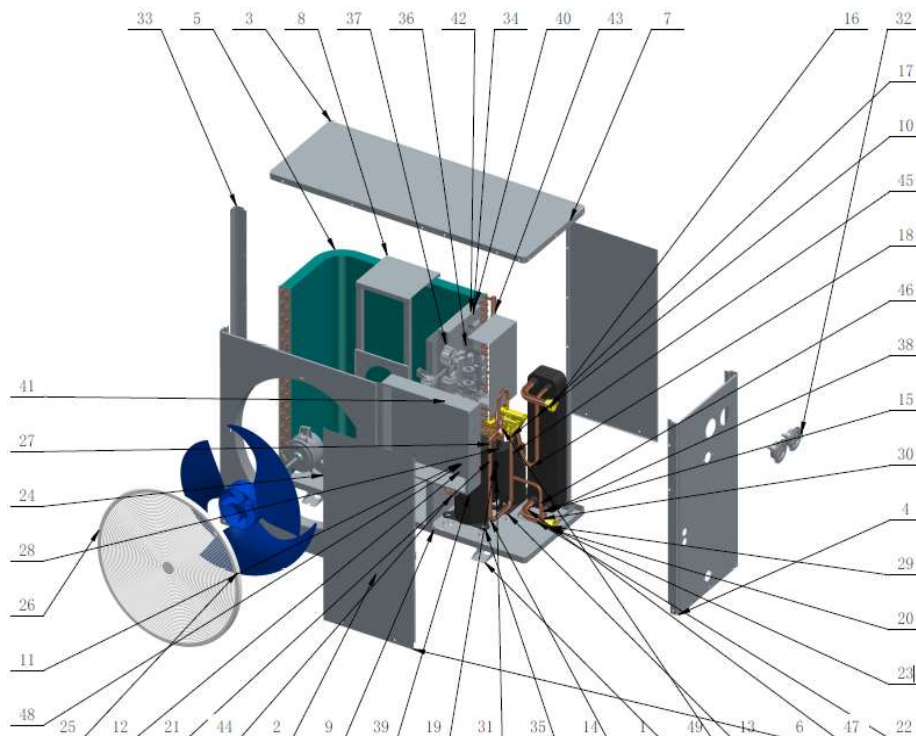






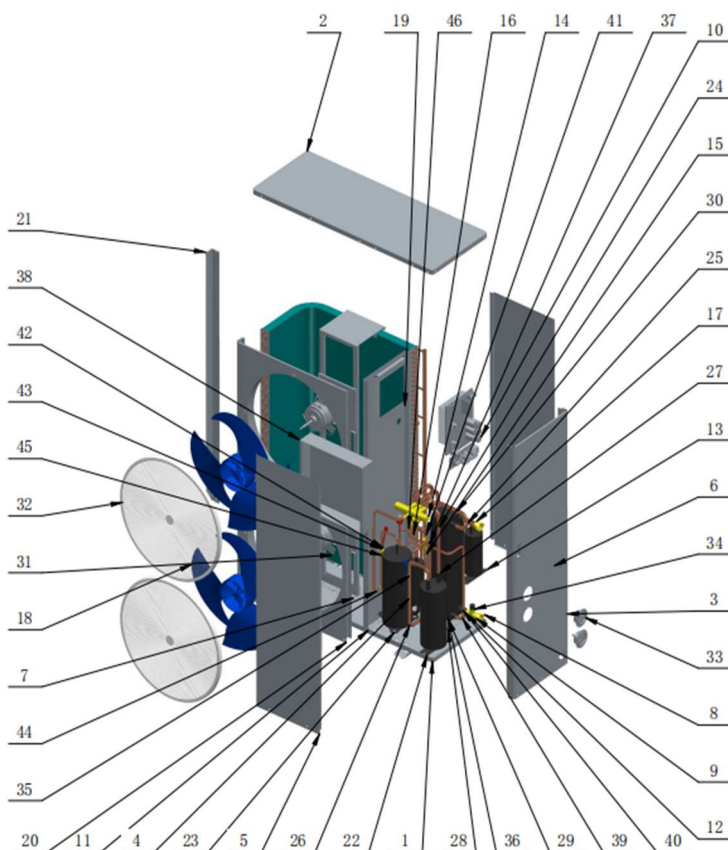
9 EXPLODED VIEWS AND COMPONENTS

9.1 HSS030V2 & HSS040V2



NO.	Part Name	Quantity (PC)	NO.	Part Name	Quantity (PC)
1	Bottom plate	1	23	Plate exchanger bracket	1
2	Wind board	1	24	Motor	1
3	Top cover	1	25	Fan	1
4	Right side panel	1	26	Fan cover	1
5	Fin components	1	27	Expansion valve inlet pipe	1
6	Front maintenance board	1	28	Expansion valve outlet pipe	1
7	Back maintenance board	1	29	T type three way cross	1
8	Motor Bracket	1	30	Water flow switch	1
9	Middle partition	1	31	Pressure switch	1
10	four-way valve	1	32	Pressure Gauge	2
11	exhaust pipe	1	33	Left back Upright column	1
12	Trouser type Four way cross	1	39	electric box	1
13	Reservoir	1	40	electric box	1
14	Air Inlet pipe	1	41	electric box	1
15	Plate exchanger outlet pipe	1	42	Driver mounting plate	1
16	Water outlet pipe	1	43	Drive cover	1
17	Plate exchanger inlet pipe	1	44	exhaust pipe	1
18	Plate exchanger inlet pipe	1	45	pipe	1
19	Reservoir outlet pipe	1	46	Reservoir outlet pipe	1
20	Brass water connector	2	47	Plate exchanger water inlet pipe	1
21	Copper filter	2	48	High pressure sensor	1
22	Return Water pipe	1	49	CARELA electric expansion valve	1

9.2 HSS060V2



NO.	Part Name	Quantity (PC)	NO.	Part Name	Quantity (PC)
1	Bottom plate	1	24	Fin outlet pipe	1
2	Top cover	1	25	Plate heat exchanger inlet pipe	1
3	Right board	1	26	Air Inlet pipe	1
4	Fin components	1	27	Gas-liquid separator inlet pipe	1
5	Front maintenance board	1	28	Plate heat exchanger frame	1
6	Back maintenance board	1	30	Plate Heat exchanger inlet pipe	1
7	Motor Bracket	1	31	Motor	2
9	T-type three way cross	1	32	Fan cover	2
11	Middle partition	1	33	Pressure gauge	2
12	Return Water pipe	1	34	Water flow switch	1
13	Reservoir	1	35	Pressure switch	1
14	Four-way valve	1	37	Brass filter	2
15	Reservoir outlet	1	38	Electric box	1
16	Main valve outlet	1	39	Plate heat exchanger outlet pipe	1
17	Water outlet pipe	1	40	Reservoir inlet pipe	1
18	Fan	2	41	Expansion valve inlet pipe	1
19	Drive cover	1	42	High pressure sensor	1
20	Wind board	1	43	Exhaust pipe	1
21	Column	1	44	Exhaust pipe	1
22	Gas-liquid separator	1	45	Trousers type four way cross	1
			46	CAREL electric expansion valve	1



10 INSTALLATION/OPERATION PRE-REQUISITES

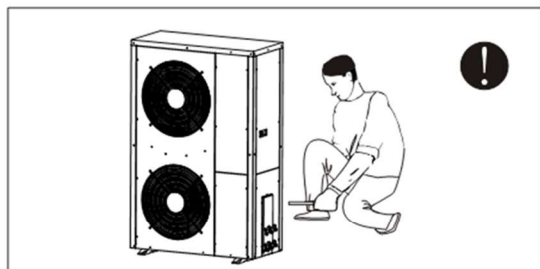
! Warning ⚠ Caution ⚡ Prohibition



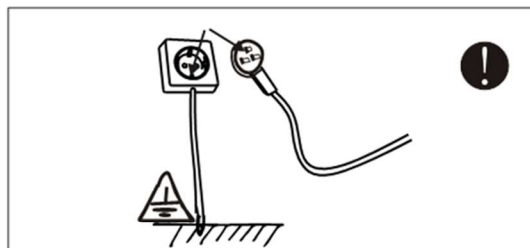
This appliance is not intended for use by person, such as children, with reduced physical, or mental capabilities, or lack of experience and knowledge, unless they have been given necessary instructions related to the usage of this appliance. Children should be supervised to ensure that they do not play with the appliance.



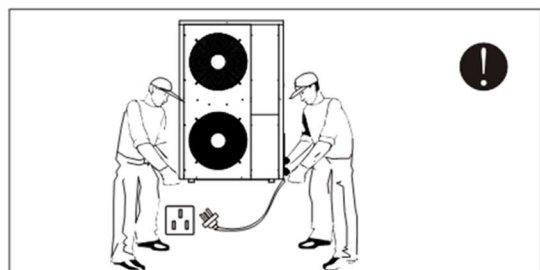
Be sure to read this manual before use.



Be sure to read this manual before use. The installation dismantling and maintenance of the unit must be performed by qualified personnel. It is forbidden to do any changes to the structure of the unit. Otherwise injury of person or unit damage



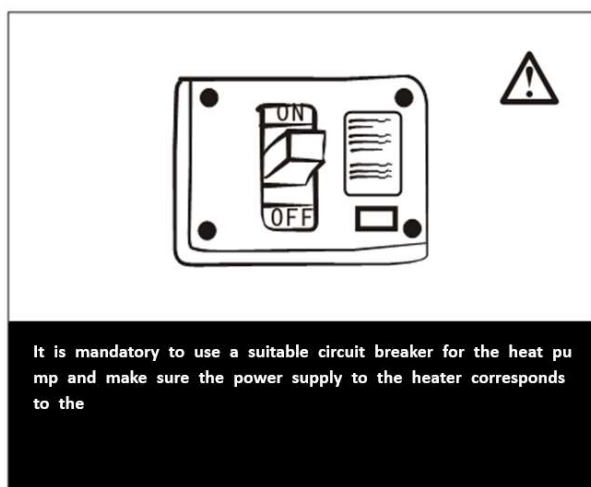
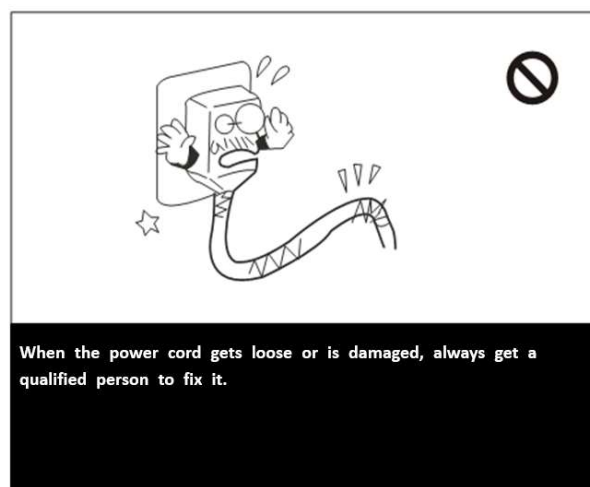
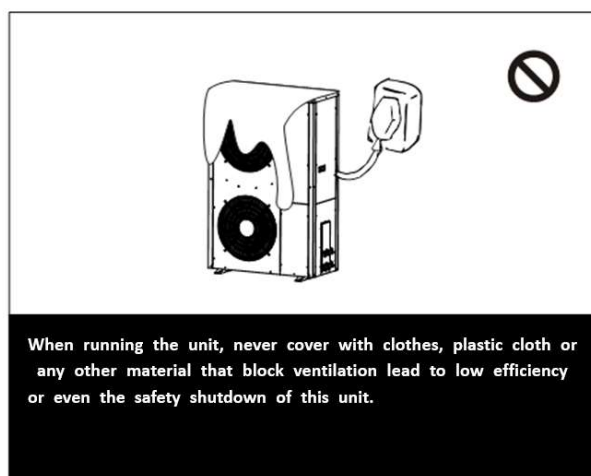
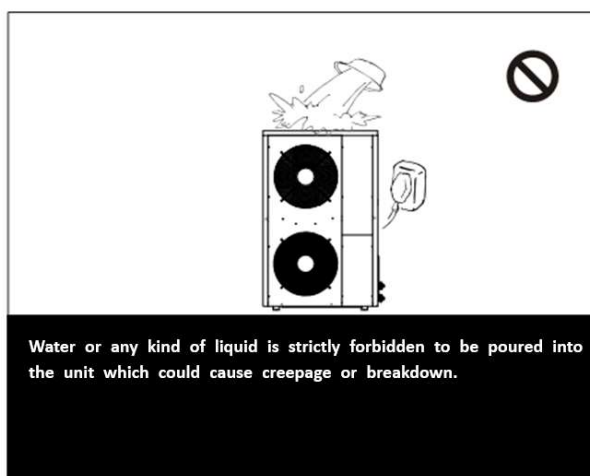
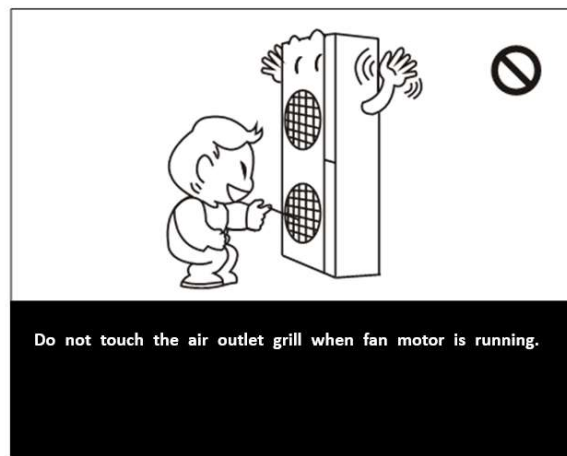
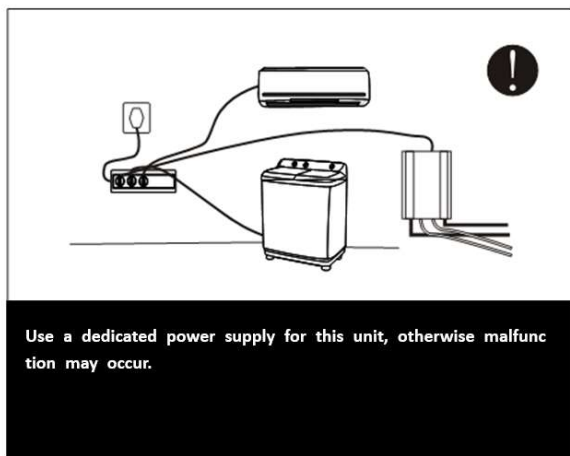
The power supply to the unit must be grounded.



Make sure the power supply to the heat pump is switched off before any operation is done on the unit. When the power cord gets loose or is damaged, always get a qualified person to fix it.

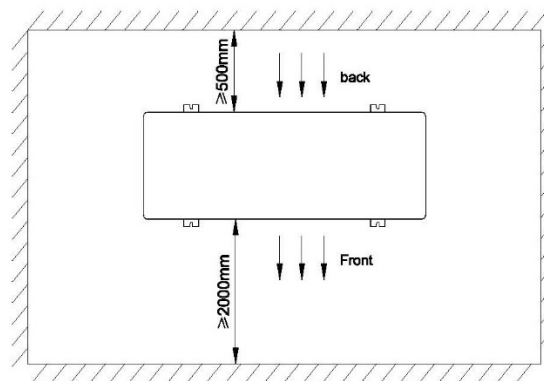
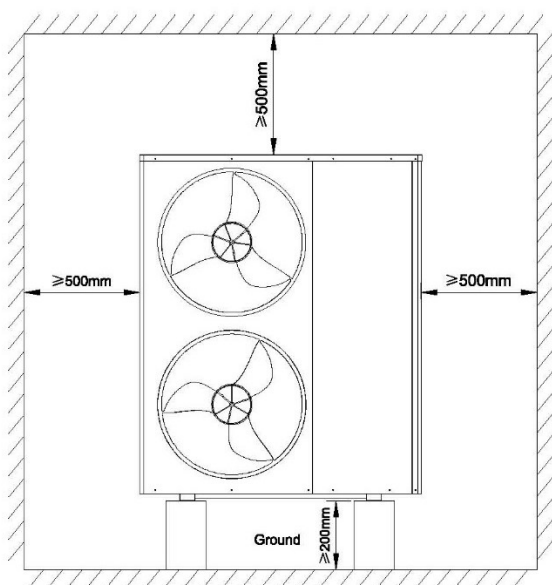


Keep the unit away from any combustible or corrosive environment.





11 INSTALLATION & CLEARANCE REQUIREMENTS



- Heat pump shall not be installed in locations where combustible gas may leak.
- Heat pump shall not be installed in locations where oil or corrosion are present.
- Heat pump should be installed in an open and naturally ventilated space.
- Clearances around Heat Pump shall be as per above sketch.
- Heat pump should be installed on concrete base or steel bracket, and on antivibration pads.
- Install an automatic air vent at the highest point of each water circulations network for releasing air from water system.
- Install a Strainer at the inlet of heat pump.
- For Multiple Heat Pump Installation, never install heat pumps in series. Only parallel installation is allowed.

12 PRE-STARTUP CHECK LIST

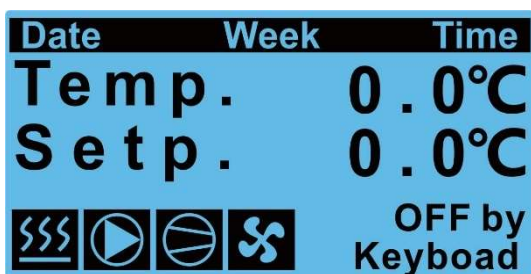
Before starting up heat pump, make sure that:

- Heat Transfer Fluid pipes are connected and are leak free.
- Air has been properly evacuated.
- Make sure fluid flow is enough and meet the requirement of selected heat pump water flow.
- Power cable is connected and properly grounded.












- Fan blade is not blocked by the fixing plate of fan blade and/or fan blade protecting grill.
- Tank has been filled with Heat Transfer Fluid.

13 OPERATION






13.1 MAIN INTERFACE

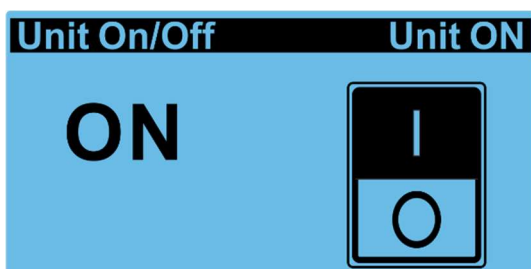


The icon :




1. Heating mode 
2. Pump 
3. Compressor 
4. Fan 
5. Defrost 
6. Cooling mode 
7. Alarm 
8. Exit 
9. Menu & Confirm 
10. 10, Select 
11. 11, Factory parameters 



13.2 TURN ON/OFF

Press  to access menu, press  button to select Unit On/Off, then press  to confirm. Press  Button to turn on/off, and press  to confirm :

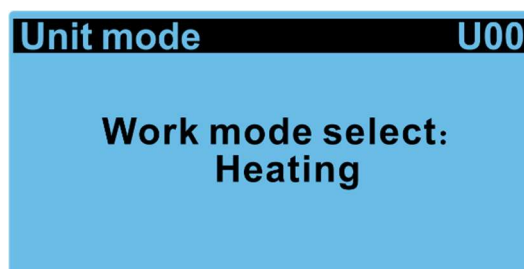


13.3 MODE SWITCHING (HEATING, COOLING, HOT WATER, HOT WATER+COOLING, HOT WATER+HEAT)

Press  to access menu, press  button to select User Mask, then press  to confirm.

Press  Button to switch mode, and press  to confirm, Eg. Mode switching & Temperature setting.

Attention : Only switch mode when the unit is turn off



Temperature Set Point interface is as follows:


Setpoint U01

Heating setp.:
 Cooling setp.:
 Hotwater setp.:

Setpoint U03

Cool water step.
 Temp. diff.: +RR.R°C
 Stop temp.diff.: +RR.R°C

PUMP control U05

Pump work: Demand
 Pump Auto: DISABLE

Heater control U07

Comp.delay: IIImin
 Ext.temp. step.: +RR.R°C

User configure U09

Auto start: Enable

Setpoint U02

Hot water step.
 Temp. diff.: +RR.R°C
 Stop temp.diff.: +RR.R°C

Setpoint U04

PID management
 Kp: +RRR.R°C
 Integral: IIIIs
 Differential: IIIIs

User configure U06

Fan mode: Low speed
 Enabla heater: Disable
 Enable chassis/crack heater:
 Disable






Pump control U08

Delta temp. set: +RR.R°C

AmbTemp Switch U10

Enable Switch : Disable
 AmbTemp Switch
 Setp: +RR.R°C
 Amb Tem.diff: +RR.R°C

13.4 TIMEZONE/CLOCK

Press  to access menu, press  to select TimeZone/CLOCK, then press  to confirm, Press  to change the setting, and press  to confirm.



M03

Press ENTER to
switch
TIMEZONE/CLOCK

Clock mng. C102

Timezone on off : Enable
Timezone setpoint : Enable

Clock mng. C104

 ON OFF

Fri.:
Sat.:
Sun.:

Clock mng. C106

Timezone2:
Cooling temp.: °C
Heating temp.: °C
Tank temp.: °C

Timezone4:
Cooling temp.: °C
Heating temp.: °C
Tank temp.: °C

Date/time change

Date:
Hour:
Day:

Clock mng. C103

 ON OFF

Mon.:
Tue.:
Wed.:
Thu.:





Clock mng. C105

Timezone1:
Cooling temp.: °C
Heating temp.: °C
Tank temp.: °C

Clock mng. C107

Timezone3:
Cooling temp.: °C
Heating temp.: °C
Tank temp.: °C

13.5 INPUT/OUTPUT

Press  to access menu, press  to select I/O mask, then press  to confirm, Press  to see the I/O, E.g.c Water temperature/ Pressure/Frequency and so on.



M02

Press ENTER to
switch
1/0 mask

Input/Output Sn01

B1: Inlet temp. +rrr.r°C
B2: Outlet temp. +rrr.r°C
B3: Ext temp. +rrr.r°C

Input/Output Sn02

B4: Disch. gas temp. +rrr.r°C
B5: Suct. gas temp. +rrr.r°C
B6: Disch. press +rr.r bar

Input/Out Sn03

B7: Suct. press. +rr.r bar
B8: Hotwater temp. +rrr.r°C
B9: Coil temp. +rrr.r°C

Input/Output Sn04

B10: EVI suct. temp. trrr.r
+rrr.r°C
B12: EVI evap. press.
=+rr.rbar

Input/Output Sn05

Digit input status
ID1: Flow switch
ID2: Remote switch
ID3: Termin Switch

Input/Output Sn06

Digit. input status
ID4: Cooling linkage
ID5: Phase. switch
ID6: Heating linkage

Input/Output Sn07

Digit. output status
D01: Fan high speed
D02: Fan low speed
D03: 4 way valve

Input/Output Sn08

Digit. output status
D04: Pump
D05: Three valve
D06: Crank heater

Input/Output Sn09

Digit. output status
D07: Chassis heater
D08: Terminal pump
D09: Heater

13.6 DEFAULT SETTINGS



Parameter Name		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



13.7 INSTALLATION OF WIFI ADAPTER

13.7.1 Hardware Installation & Connection:

The WIFI adapter kit is shipped inside the outdoor unit of the heat pump and has the following components:

Signal line



Power supply



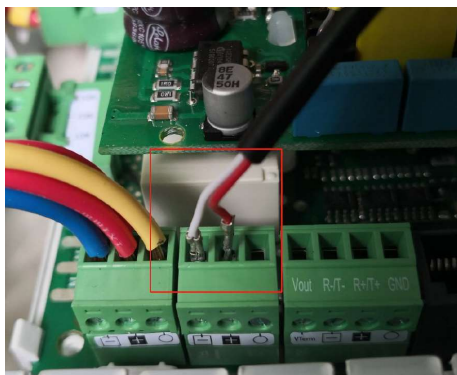
Cable



WIFI module



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



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

- 1- Connect the **white** wire of the signal line to the Minus (-) port .
- 2- Connect the **red** wire of the signal line to the Plus (+) port.



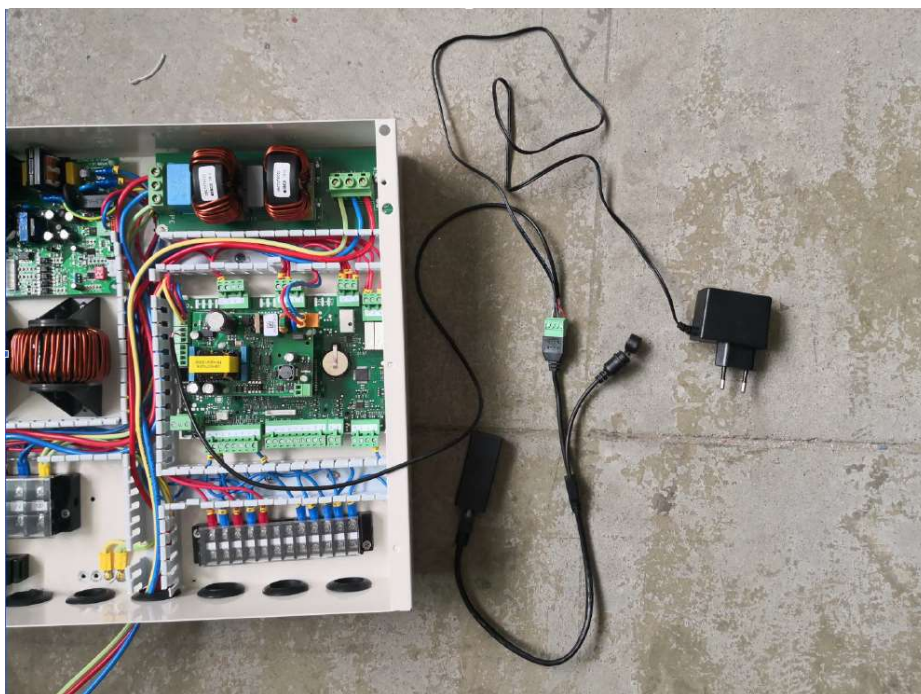
On the **Green Plug** of the WIFI Cable:

- 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 230V power supply plug.



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

When connected the WIFI module should look like in the below picture.



13.7.2 Application download and setup:

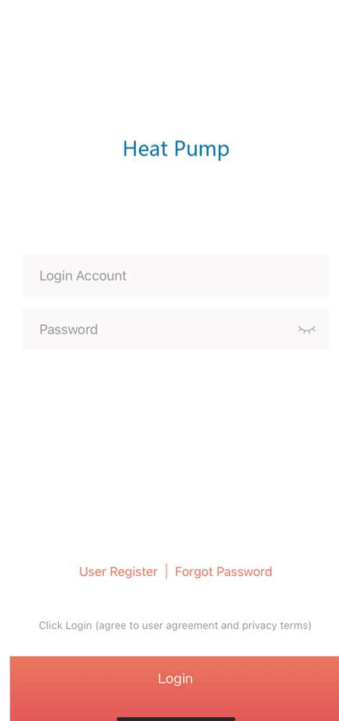


Heat Pump application is called Heat Pump Pro and is available for Apple and Android devices.

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.

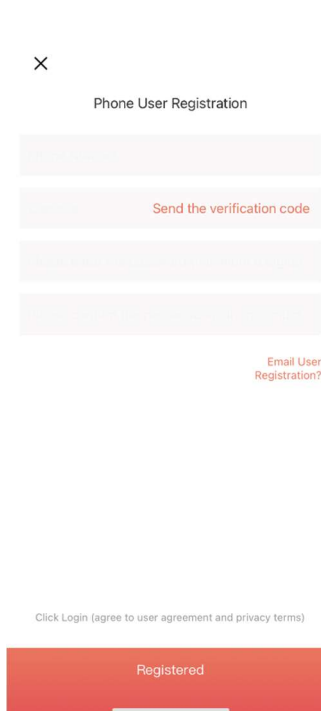
Register your device as shown below:



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.

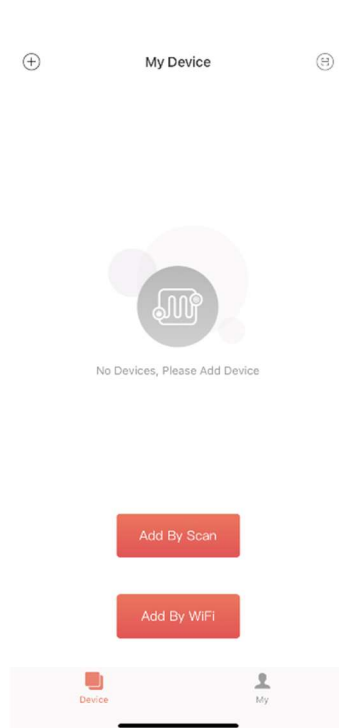
We do recommend email registration.



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?**

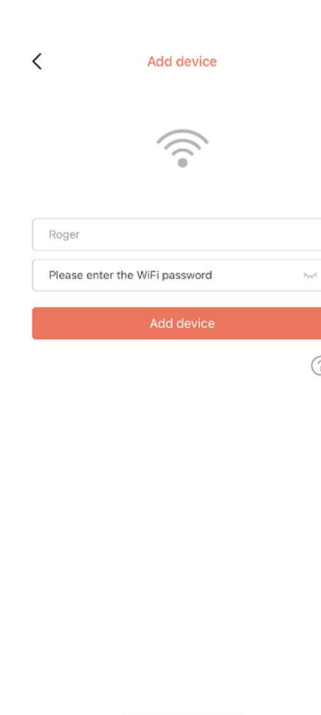
Once **Email User Registration?** is clicked, the below screen will appear



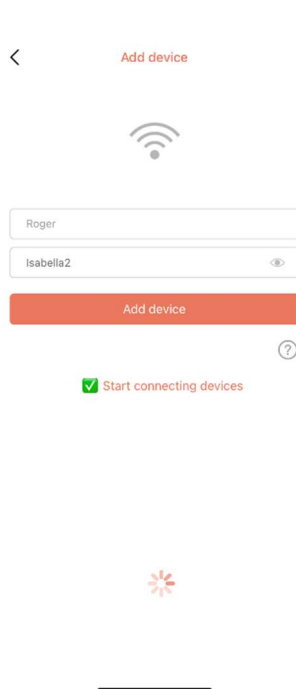
To add the heat pump, you could either click on **Add by WIFI** or **Add by Scan:**



Simply scan the barcode on your heat pump



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



How to add device?

Please connect this mobile device to home Wi-Fi first

1. Return to the home page on this mobile device
2. Open "Settings" and select "Wireless LAN"
3. Choose home Wi-Fi
4. Open the current application, return to the "Add Device" page, allow app to access your location, and enter the WiFi password

Then, make the device visible

1. Connect the Heat Pump WiFi adapter to plug and the green light will flash slowly
2. Open the button cap on the Wifi adaptor cable, Press button for less than 2 seconds
3. Wait for about 2 ~ 3 seconds, the green light on the WiFi adaptor starts to flash quickly, and Wifi adaptor enters the Pairing mode

Add device

1. Go to the "Add Device" page of the current application
2. Enter the home Wi-Fi password
3. When the WiFi adaptor green light flashes quickly, click the "Add Device" button
4. After the prompt "Pairing successful", the device will be automatically added to your device list

Note: The green light of Wifi adaptor flashes quickly to indicate that it has entered the pairing mode, and the flashing light changes to steady on to indicate that the device is connected to the home Wi-Fi network.

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

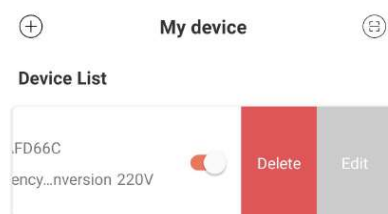
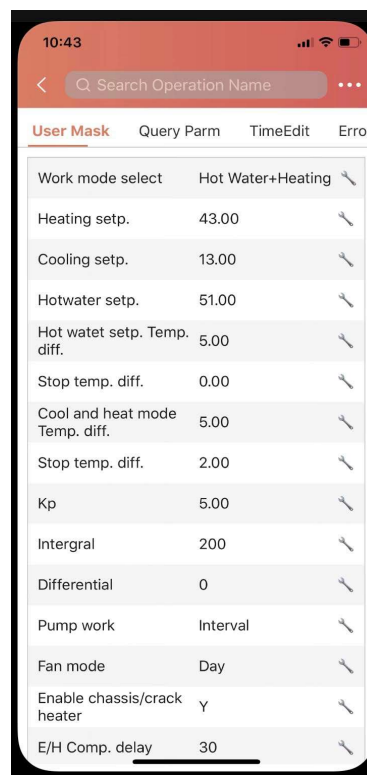
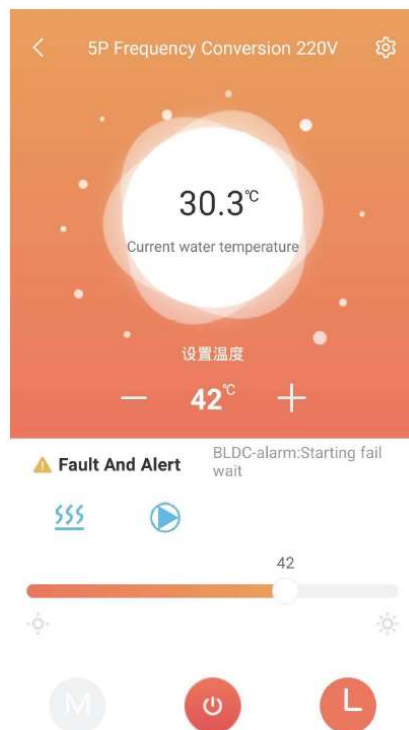
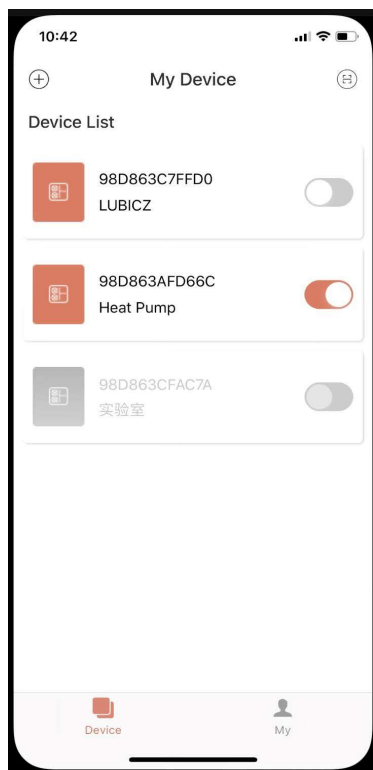


And gently press the button for 2-3 seconds as described on the left instructions.

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

13.7.3 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:



13.7.4 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.
- 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.

13.8 PREVENTIVE MAINTENANCE TIPS

Heat Pump shall be checked on regular basis. When unit is properly maintained its operational reliability and service life will be unexpectedly improved.

1. Users should pay attention to the use and maintenance of this unit: all safety protection devices in the unit are set before leaving the factory, do not adjust them by yourself.
2. Always check whether the power supply and electrical system wiring of the unit is firm, whether the electrical components are malfunctioning, and if necessary, repair and replace them in a timely manner.
3. Always check that heat transfer fluid, tank's safety valve, fluid level controller and automatic air vent device are working properly, to avoid the air circulation within the system.
4. The unit should be kept clean and dry and well ventilated. Regular cleaning (1-2 months) for air-side heat exchangers is recommended to maintain good heat transfer.
5. Always check the operation of each component of the unit, check the oil pipe at the pipe joint and refrigerant valve, and ensure the absence of refrigerant leakage.
6. Do not stack any debris around the unit to avoid blocking the air inlet and outlet. The unit should be clean and dry and well ventilated.
7. If unit fails and user cannot solve the problem, please notify your installer or place a maintenance call.



13.9 ERRORS CODE LIST AND 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
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 discharge 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
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
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
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



13.10TROUBLESHOOTING

No	Error	Possible reason	Method
1	Heat pump does not run	<ol style="list-style-type: none"> 1. Power supply cable is loose 2. The fuse of power supply is fused. 	<ol style="list-style-type: none"> 1. Cut off the power supply to check and repair. 2. Change the fuse.
2	Heating capacity is too small	<ol style="list-style-type: none"> 1. Refrigerant is not enough 2. Water Pipes Insulation is not Sufficient 3. Air cooled condenser is dirty 4. Water heat exchanger scaled 	<ol style="list-style-type: none"> 1. Check leakage and repair and refill gas 2. Improve the insulation Status 3. Clean Air-Cooled Condenser 4. Clean water heat exchanger
3	Compressor does not run	<ol style="list-style-type: none"> 1. Power supply has error 2. Cable connecting is loose 3. Compressor is overheated 	<ol style="list-style-type: none"> 1. Check reason and solve 2. Check loose cables and repair 3. Check reason for overheat and repair
4	Compressor noise is loud	<ol style="list-style-type: none"> 1. Expansion valve damaged lead to liquid entering compressor 2. The internal parts of compressor damaged 3. Compressor lack of oil 	<ol style="list-style-type: none"> 1. Change expansion valve 2. Change compressor 3. Add oil to compressor
5	Fan motor does not run	<ol style="list-style-type: none"> 1. Fan blade fixing screw is loose 2. Fan motor damaged 3. Fan motor capacitance damaged 	<ol style="list-style-type: none"> 1. Tight the screw 2. Change fan motor 3. Change the capacitance
6	Compressor run, but not heat	<ol style="list-style-type: none"> 1. There is not refrigerant at all 2. Compressor damaged 	<ol style="list-style-type: none"> 1. Check leakage and repair 2. Change compressor



14 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 (1) One YEAR after the date of installation or for a period of (1) One YEAR 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 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.
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 (by customer), 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.