Hydro Solar
Innovative Energy

AIR TO WATER DC INVERTER HEAT PUMPS WITH EVI TECHNOLOGY. 3 PHASES 20 & 40 TONS CAPACITIES WITH 32 REFRIGERANT

Multi-Functions Commercial Heat Pumps

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

HSS 250 & 500
V3LS SERIES

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2267 46th Avenue, Lachine (QC)
Canada H8T 3C9

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2 INTRODUCTION

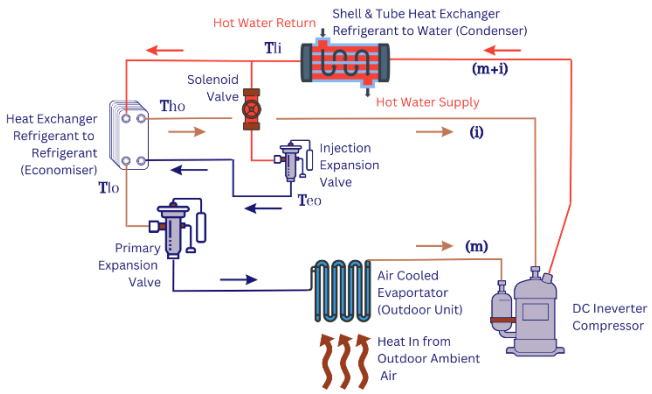
2.1 WHAT IS AIR TO WATER HEAT PUMP?

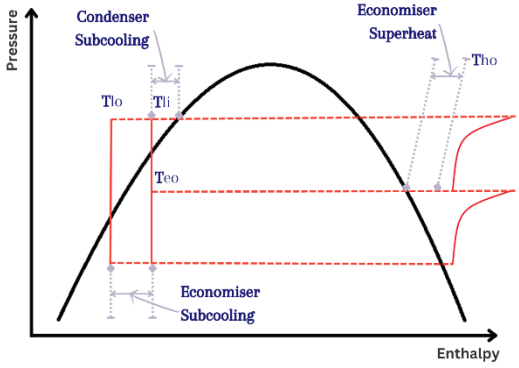
Air to Water Heat Pump is a machine that draws heat from one place (called heat source) and rejects the drawn heat to another place (called heat sink). Unlike conventional air to air heat pumps, where generated thermal energy is used to cool/heat air, Air to Water Heat Pumps use generated thermal energy 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 deliver 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 frequently cycle ON and OFF, they run most of the time at lower speed.

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.

Gradually getting 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 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 of 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 uses proprietary control card, designed and programmed specifically of Aqua Solanor Inc.

Interface will be available in multiple languages, mainly English and French. Language settings can be set up during the startup and commissioning process.

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

4.1 NOMENCLATURE

Air Source Heat Pumps are available in multiple options and capacities **HSSxxxxVyLz-t**

xxx: **250** for 20 Tons Nominal Capacity and **500** for 40 Tons Nominal Capacity.

y: Design Version **3**.

z: **S** for Split and **M** for Monobloc.

t for Heat Exchanger type: **T** for titanium shell and tube heat exchanger, **D** for double wall heat exchanger and **omitted** for plate heat exchanger.

4.2 RATINGS LIST

Model No.	Power Supply	Electrical Power Input (KW)				Running Current (A) Max Load	Noise Level (dBA)
		Cooling Mode @ Ambient Dry Bulb: 40°C (104°F), Water inlet 12°C (53.6°F)	Heating Mode @ Ambient Dry Bulb: 21.1°C (69.98°F), Water inlet 50°C (122°F)	Cooling Load Max	Heating Load Max		
HSS250V3LM	380-415VAC/3Ph/60Hz	22	22	24	24	65	67
HSS500V3LM	380-415VAC/3Ph/60Hz	40	47	43	50	134	69
HSS250V3LS	380-415VAC/3Ph/60Hz	18	19	20	21	55	67
HSS500V3LS	380-415VAC/3Ph/60Hz	40	40	43	43	113	69

Model No.	Water Flow (US GPM) – Nominal	Water Pressure Drop		Liquid Pipe Connection	Refrigerant Type	Refrigerant Charge (Lb) – Up to 3m for Split	Design Refrigerant Pressure (PSI)		MOP (A)	MCA (A)	Maximum Inlet Water Temperature (°C) / (°F)
		kPa	Feet				Low	High			
HSS250V3LM	79	38	12.71	Ø3" - Flanged	R32	28.66	305	609	148	85	55°C / 131°F
HSS500V3LM	158	38	12.71	Ø4" - Flanged	R32	57.32	305	609	305	170	55°C / 131°F
HSS250V3LS	79	38	12.71	Ø3" - Flanged	R32	28.66	305	609	125	70	55°C / 131°F
HSS500V3LS	158	38	12.71	Ø4" - Flanged	R32	57.32	305	609	256	143	55°C / 131°F

4.3 COOLING PERFORMANCES:

4.3.1 HSS250V3LS / LM

HSS250V3LS / LM					
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	88	300,239	26.8	3.28
26	78.8	86	293,415	27.5	3.13
29	84.2	84	286,592	28.2	2.98
32	89.6	82	279,768	28.9	2.84
35	95	80	272,944	29.6	2.70

4.3.2 HSS500V3LS / LM

HSS500V3LS / LM					
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	176	600,477	53.6	3.28
26	78.8	172	586,830	55	3.13
29	84.2	168	573,183	56.4	2.98
32	89.6	164	559,536	57.8	2.84
35	95	160	545,888	59.2	2.70

4.4 HEATING PERFORMANCES

4.4.1 HSS250V3LS / LM

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	43.00	146,708	22.40	1.92	41.00	139,884	22.90	1.79	39.00	133,061	23.40	1.67
-25	-13	49.00	167,179	23.20	2.11	47.00	160,355	23.70	1.98	45.00	153,531	24.20	1.86
-20	-4	57.00	194,473	23.90	2.38	55.00	187,649	24.40	2.25	53.00	180,826	24.90	2.13
-15	5	65.00	221,767	24.40	2.66	63.00	214,944	24.90	2.53	61.00	208,120	25.40	2.40
-7	19.4	74.00	252,474	25.20	2.94	72.00	245,650	25.70	2.80	70.00	238,826	26.20	2.67
2	35.6	84.00	286,592	26.70	3.15	82.00	279,768	27.20	3.01	80.00	272,944	27.70	2.89
7	44.6	92.00	313,886	27.50	3.35	90.00	307,062	28.00	3.21	88.00	300,239	28.50	3.09
8.33	47.0	94.67	322,979	27.74	1.71	92.67	316,155	27.25	3.40	90.67	309,331	26.78	3.39
12	53.6	102.00	348,004	28.40	3.59	100.00	341,180	28.90	3.46	98.00	334,357	29.40	3.33

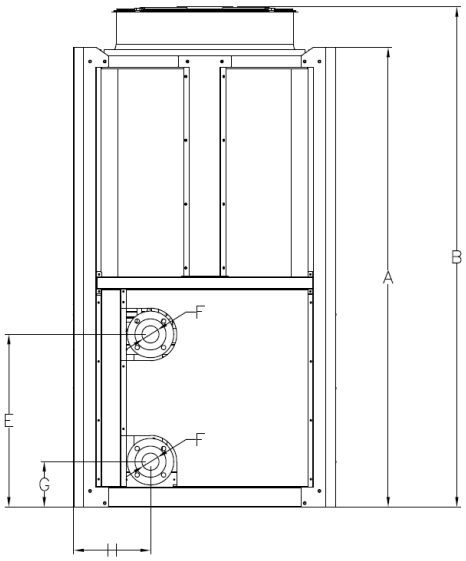
4.4.2 HSS500V3LS / LM

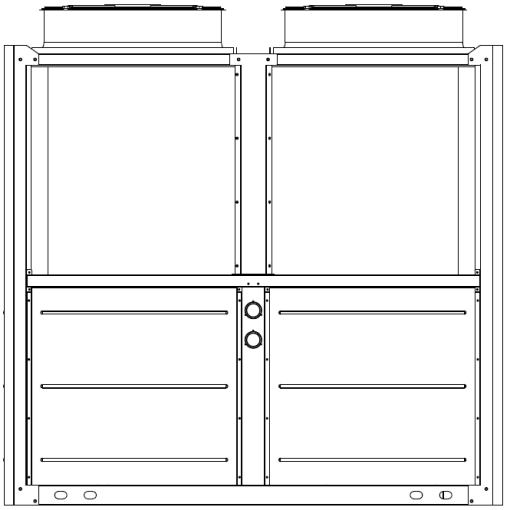
Outdoor Air DB Temperature (°C)	Outdoor Air DB Temperature (°F)	Supply Water Temperature 95°F (35°C) / Return Water Temperature 86°F (30°C)				Supply Water Temperature 113°F (45°C) / Return Water Temperature 104°F (40°C)				Supply Water Temperature 131°F (55°C) / Return Water Temperature 122°F (50°C)			
		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	86.00	293,415	44.80	1.92	82.00	279,768	43.80	1.87	78.00	266,121	42.80	1.82
-25	-13	98.00	334,357	46.40	2.11	94.00	320,710	45.40	2.07	90.00	307,062	44.40	2.03
-20	-4	114.00	388,946	47.80	2.38	110.00	375,298	46.80	2.35	106.00	361,651	45.80	2.31
-15	5	130.00	443,534	48.80	2.66	126.00	429,887	57.80	2.18	122.00	416,240	56.80	2.15
-7	19.4	148.00	504,947	50.40	2.94	144.00	491,300	49.40	2.91	140.00	477,652	48.40	2.89
2	35.6	168.00	573,183	53.40	3.15	164.00	559,536	52.40	3.13	160.00	545,888	51.40	3.11
7	44.6	184.00	627,772	55.00	3.35	180.00	614,124	54.00	3.33	176.00	600,477	53.00	3.32
8.33	47.0	189.33	645,957	55.48	3.41	185.33	632,309	54.50	3.40	181.33	618,662	53.56	3.39
12	53.6	204.00	696,008	56.80	3.59	200.00	682,360	55.90	3.58	196.00	668,713	55.10	3.56

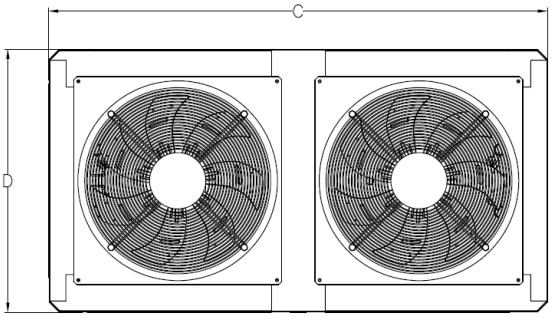
5 DIMENSIONS & WEIGHTS

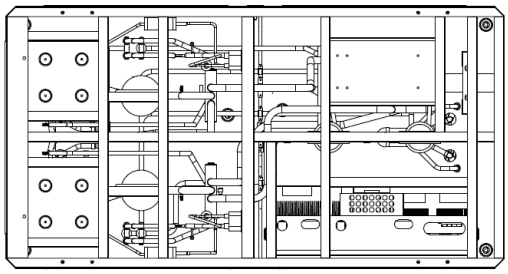
5.1 OUTDOOR UNITS' DIMENSIONS

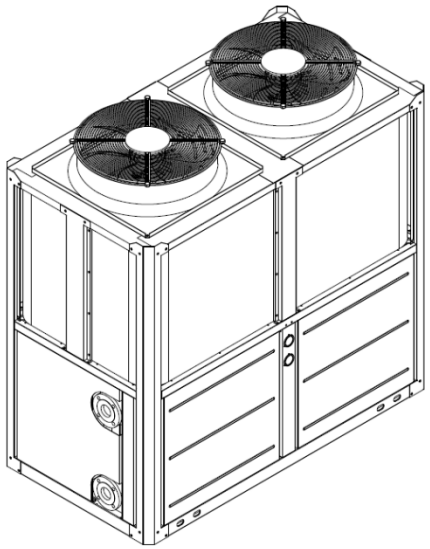
5.1.1 HSS250V3LM





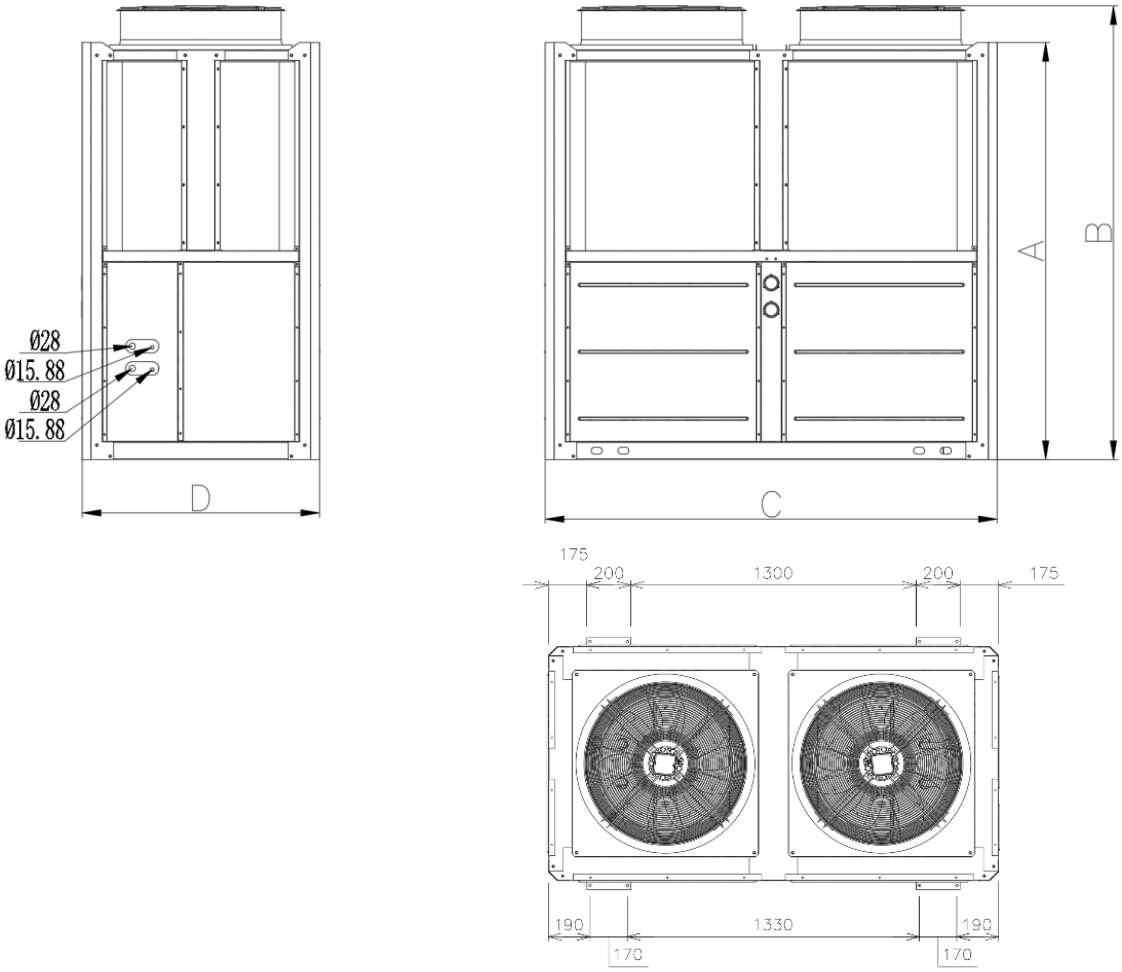






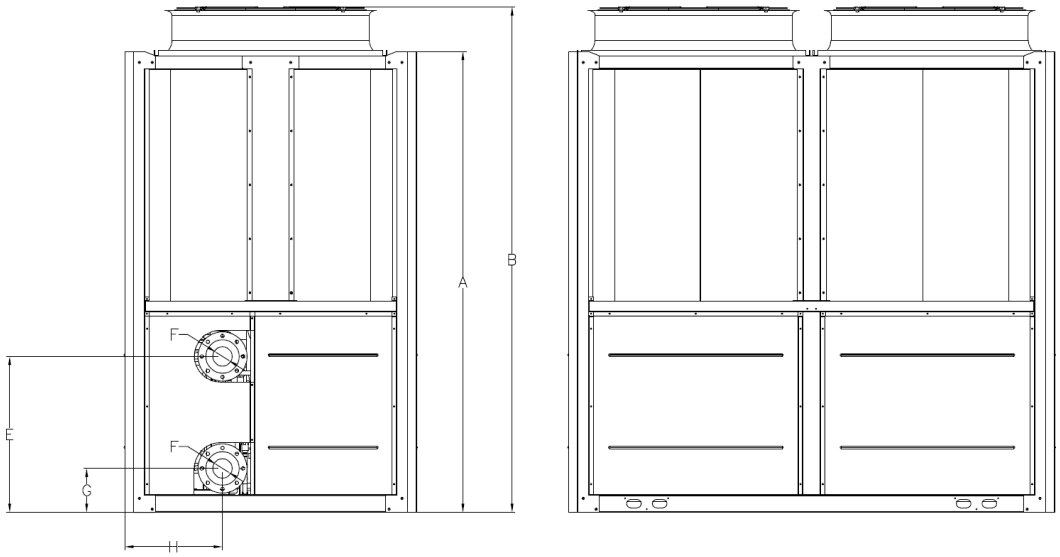
Dimension	HSS250V3LM -mm	HSS250V3LM - inches
A	1872	73.70
B	2037	80.20
C	2035.5	80.14
D	1073	42.24
E	703	27.68
F	3" Flanged	3" Flanged
G	184	7.24
H	312.5	12.30

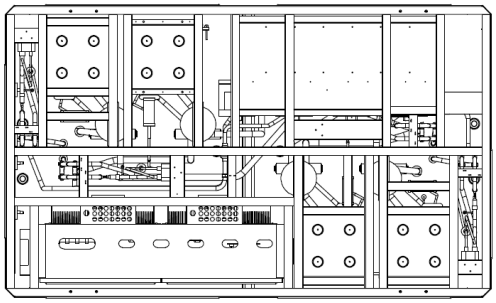
5.1.2 HSS250V3LS

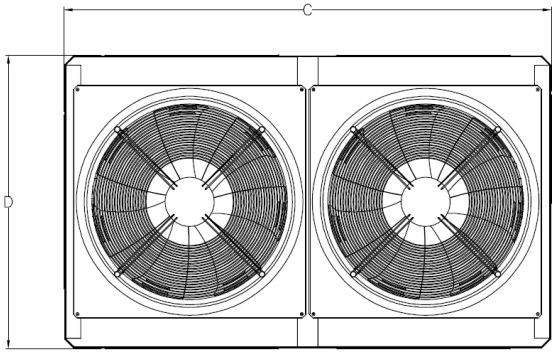


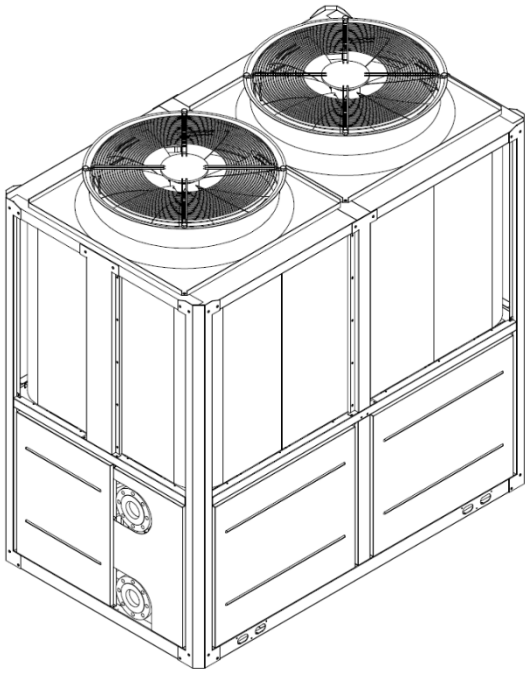
Dimension	HSS250V3LS - mm	HSS250V3LS - inches
A	1866.5	73.49
B	2037	80.20
C	2050	80.71
D	1065	41.93

5.1.3 HSS500V3LM



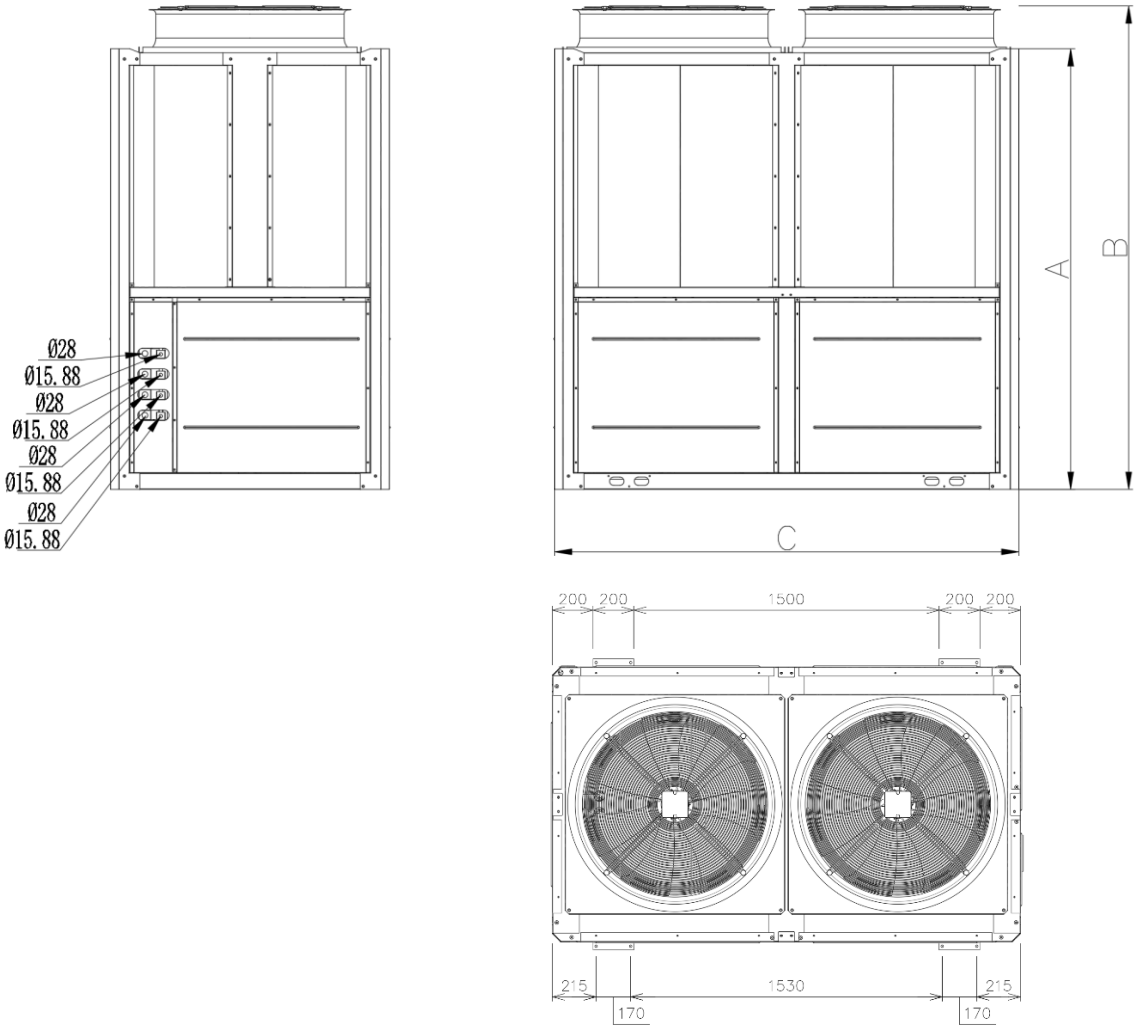






Dimension	HSS500V3LM - mm	HSS500V3LM - inches
A	2136	84.09
B	2343.4	92.26
C	2263	89.09
D	1363	53.66
E	723	28.46
F	4" Flanged	4" Flanged
G	204	8.03
H	453	17.84

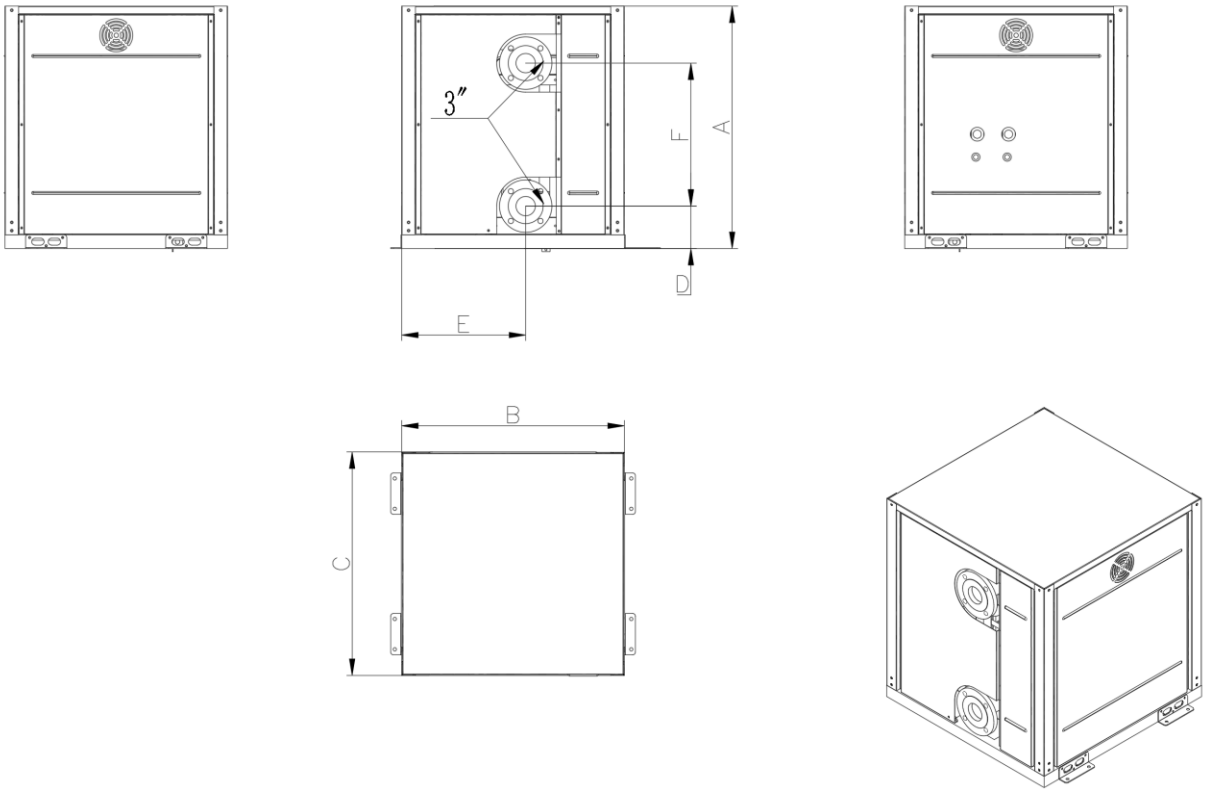
5.1.4 HSS500V3LS



Dimension	HSS500V3LS - mm	HSS500V3LS - inches
A	2314.3	91.11
B	2126.5	83.72
C	2300	90.55

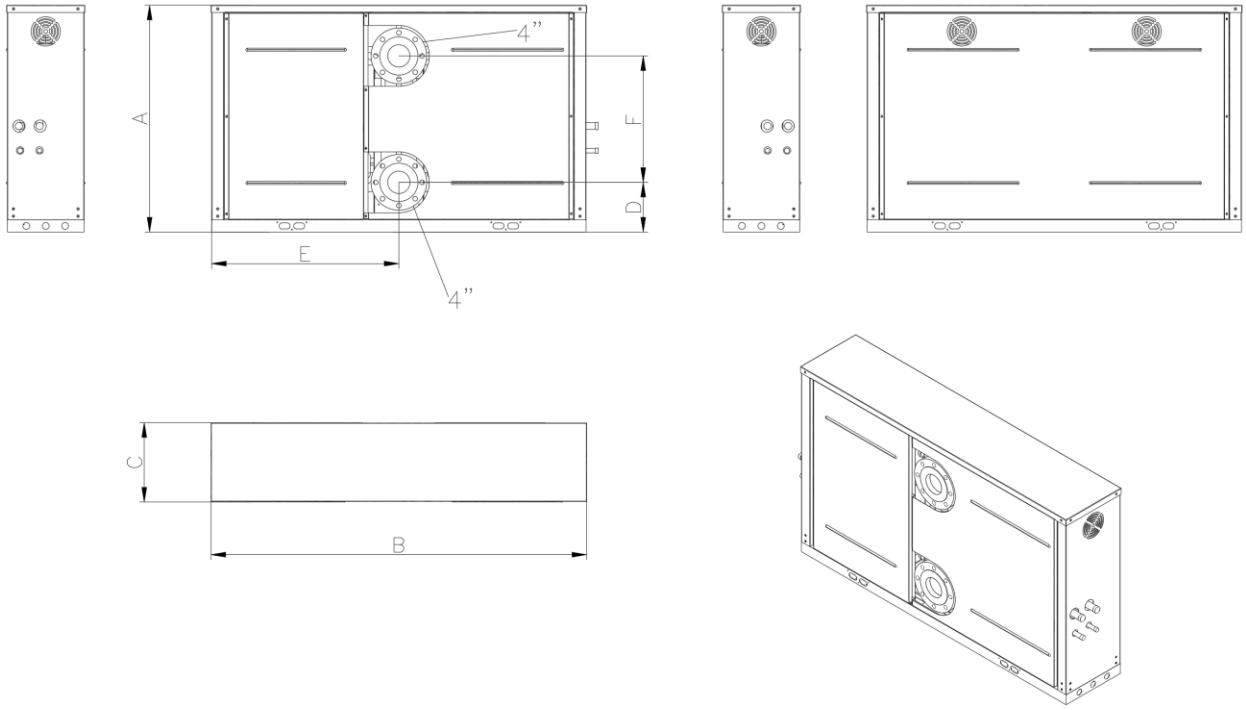
5.2 INDOOR UNITS' DIMENSIONS

5.2.1 HSS250V3LS



Dimension	HSS250V3LS - mm	HSS250V3LS - inches
A	880	34.65
B	810	31.89
C	811.2	31.94
D	154	6.06
E	451	17.76
F	519	20.43

5.2.2 HSS500V3LS



Dimension	HSS500V3LS - mm	HSS500V3LS - inches
A	931	36.65
B	1545	60.83
C	325.4	12.81
D	204	8.03
E	770	30.32
F	519	20.43

5.3 SHIPPING DIMENSIONS AND WEIGHTS

5.3.1 HSS250V3LM/S

Model Number	Shipping Dimensions – mm	Shipping Dimensions – inches	Weight (lb)
Indoor Unit	960x865x1020	37.80x34.06x40.16	240
Outdoor Unit	2150x1040x2200	84.65x40.94x86.61	1628

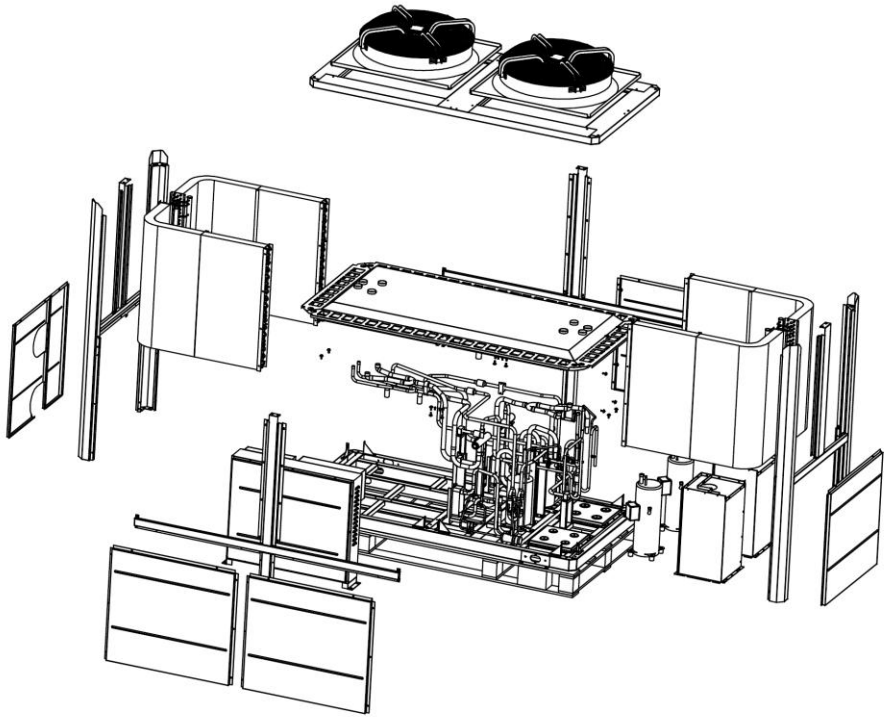
5.3.2 HSS500V3LM/S

Model Number	Shipping Dimensions – mm	Shipping Dimensions – inches	Weight (lb)
Indoor Unit	1300x945x1020	51.18x37.20x40.16	425
Outdoor Unit	2320x1400x2560	91.34x55.12x100.79	2200

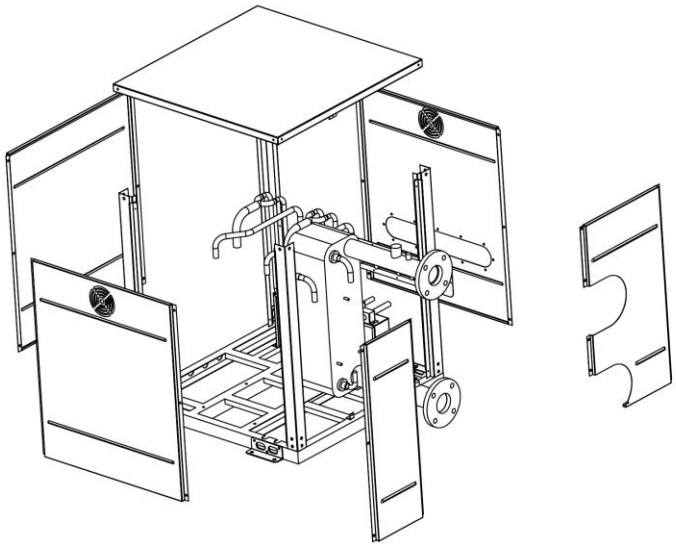
6 EXPLODED DIAGRAMS

6.1 HSS250V3LS/M

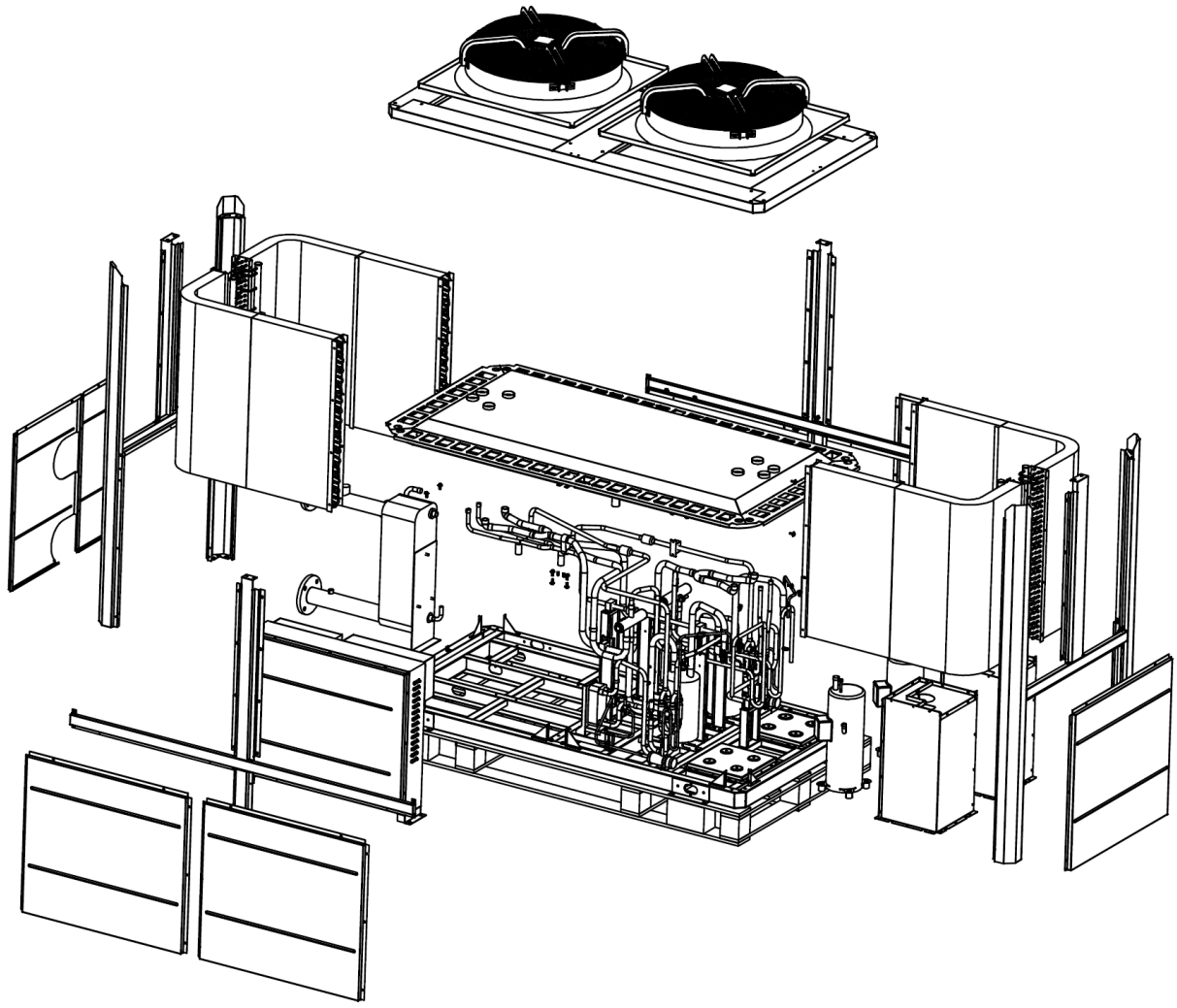
6.1.1 HSS250V3LS Outdoor Unit



6.1.2 HSS250V3LS Indoor Unit

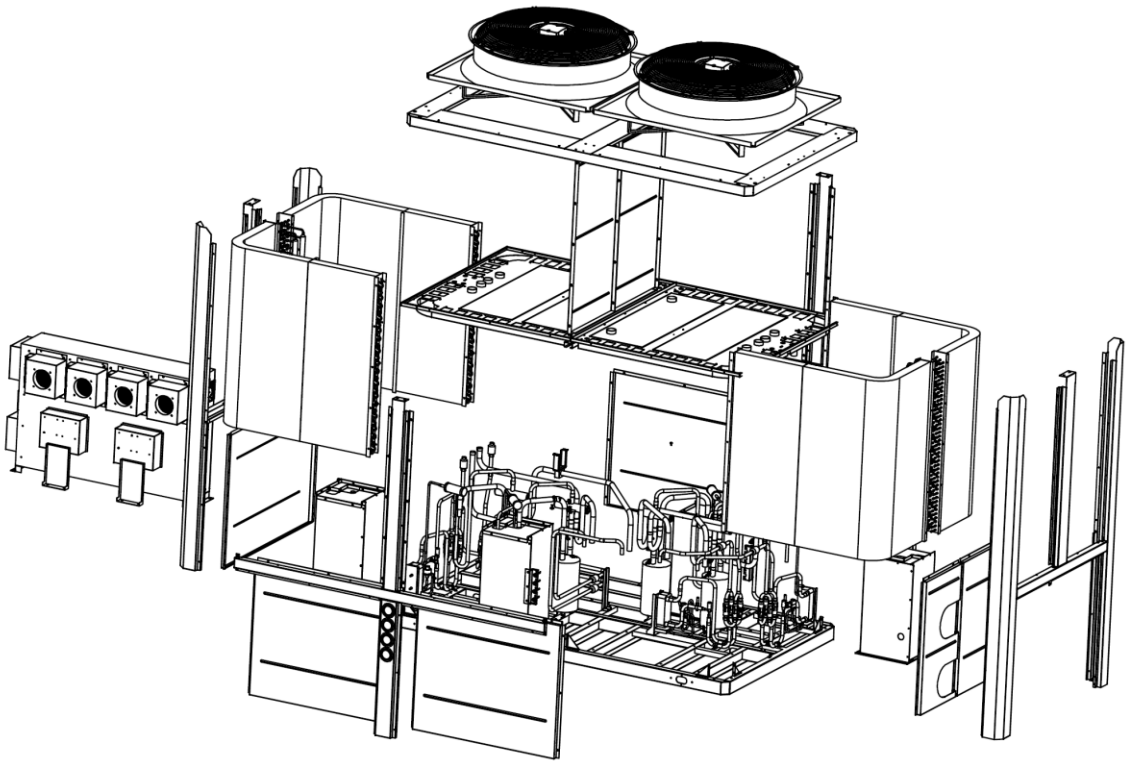


6.1.3 HSS250V3LM

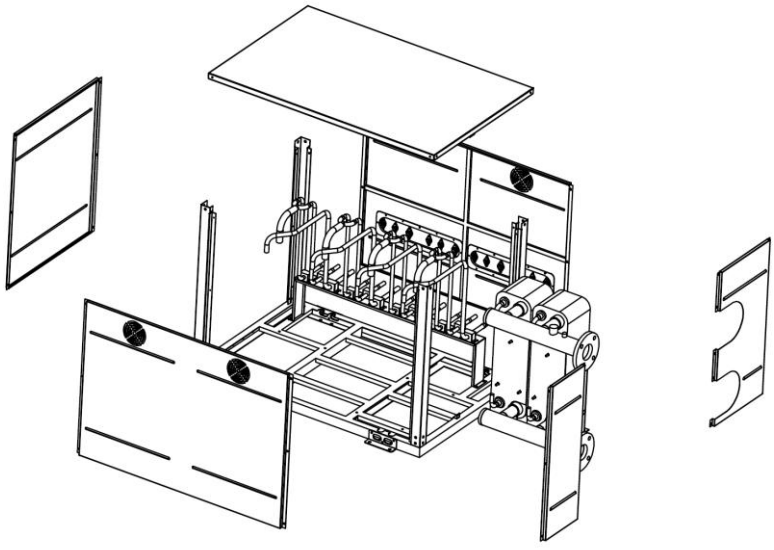


6.2 HSS500V3LM/S

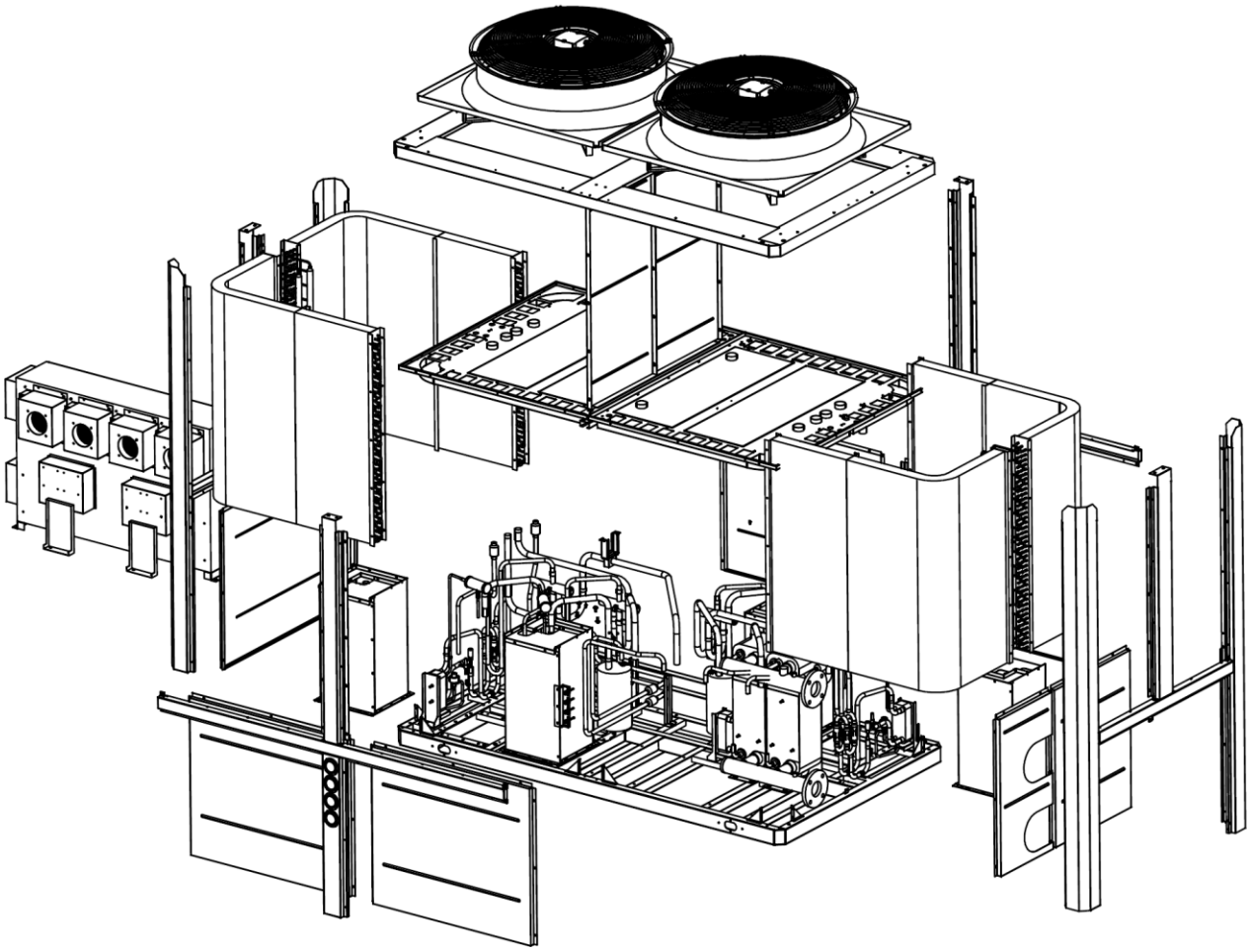
6.2.1 HSS500V3LS Outdoor Unit



6.2.2 HSS500V3LS Indoor Unit



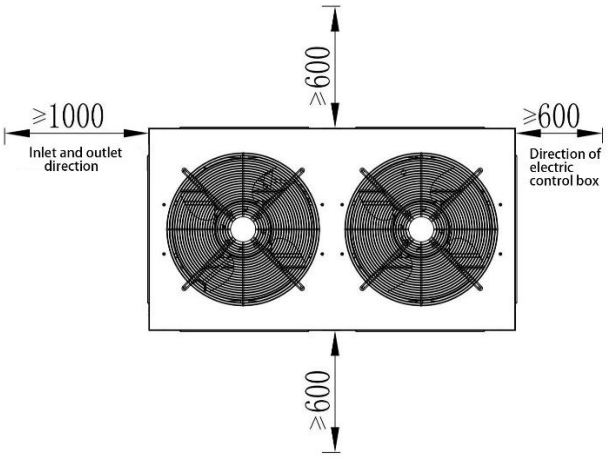
6.2.3 HSS500V3LM

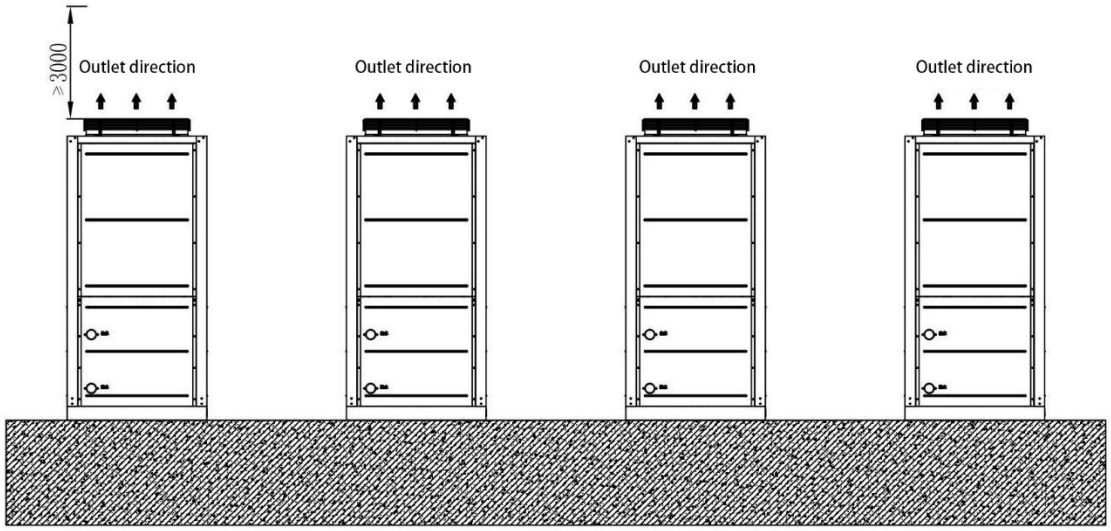


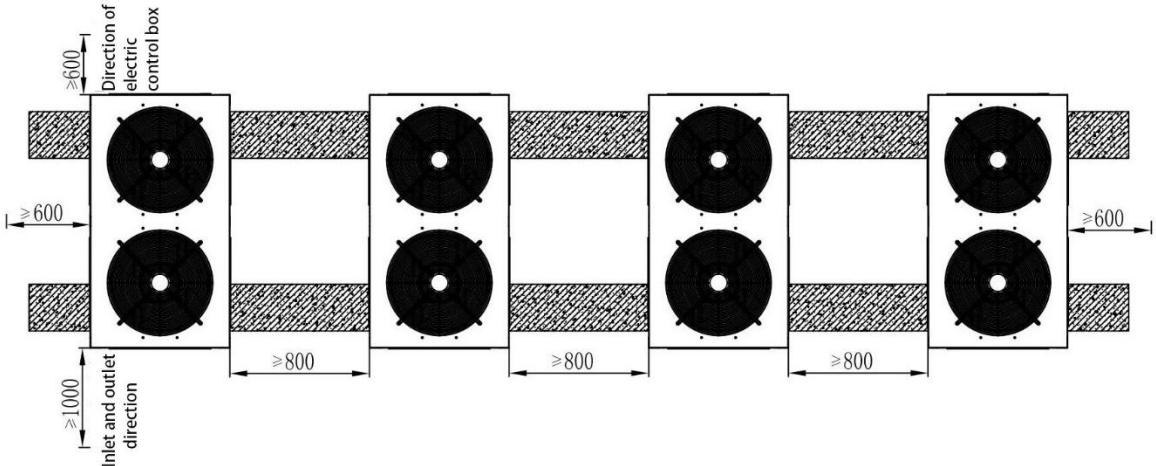
7 CLEARANCE REQUIREMENTS

The unit can be installed individually or in combination. When multiple units are installed, pay attention to their arrangement to ensure that the space around the unit does not affect the installation of return air, outlet air, system pipeline direction, and other equipment. The following arrangement is for reference only, the specific situation depends on the site. All dimensions are in mm.

For split units' installation distance between indoor and outdoor shall not exceed 15m (50ft). This includes the whole linear length of the refrigerant piping, failure to comply with this requirement will void the warranty. For Monobloc and Split Unit configuration, Circulation pump shall be sized for the actual friction loss between HP and buffer tank. Pump sizing is the installer / designer's responsibility.

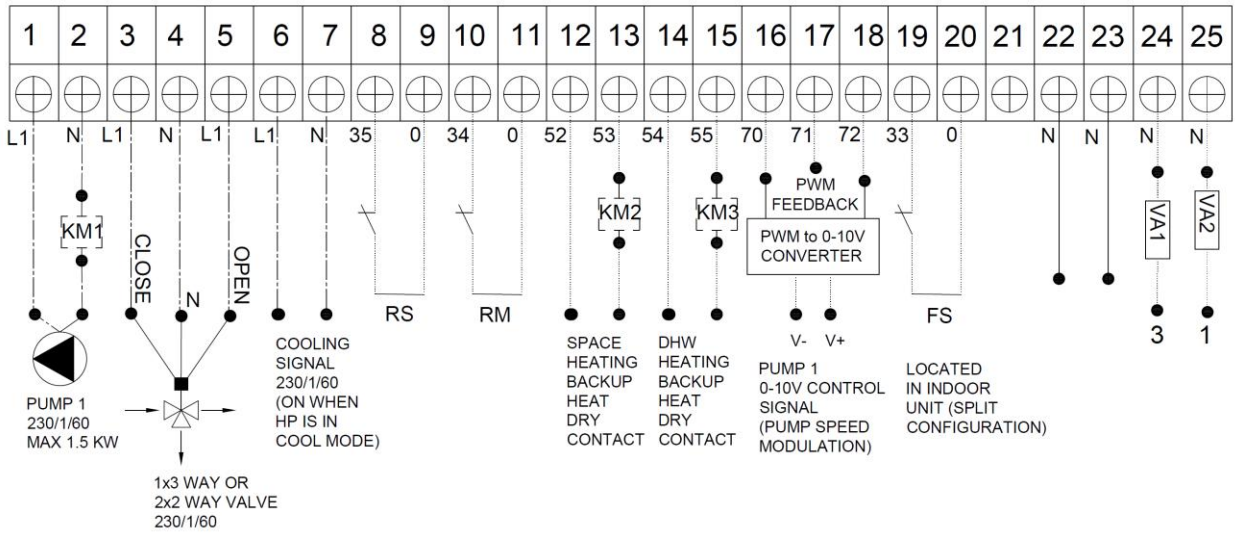

≥600
≥1000
Inlet and outlet direction
≥600
Direction of electric control box
≥600


≥3000
Outlet direction
Outlet direction
Outlet direction
Outlet direction


≥600
Direction of electric control box
≥600
≥600
≥800
≥800
≥800
≥1000
Inlet and outlet direction

8 CONTROL CARD AND WIRING DIAGRAM

8.1 TERMINALS DESCRIPTION



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 OR 2X TWO WAY VALVE	Floating Type Three Way Valve **OR** 2x Two Way Valve, Switches between DHW tank and Space Heating/Cooling Tank	220-240V/1Ph/60Hz
6-7: COOLING MODE VALVE	ON/OFF Type Three 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
8-9: ON/OFF REMOTE SWITCH	Remotely Switches Heat Pump ON or OFF.	Dry Contact (can be configured NO or NC from Controller)
10-11: HEAT PUMP HEAT/COOL MODE REMOTE SWITCH	Remotely Switches Heat Pump to Heating (ON) or Cooling (OFF)	Dry Contact (can be configured NO or NC from Controller)
12-13: AUXILIARY HEATER CONTROL SWITCH FOR SPACE HEATING	Enables the operation of the backup heater dedicated for space heating	Dry Contact (NO)
14-15: AUXILIARY HEATER CONTROL SWITCH FOR DOMESTIC HOT WATER HEATING (DHW)	Enables the operation of the backup heater dedicated for DHW heating	Dry Contact (NO)
16-17-18: CIRCULATION PUMP SPEED CONTROL	Modulates the speed of circulation Pump (optional)	0-10V
19-20: 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)
21: RESERVED		

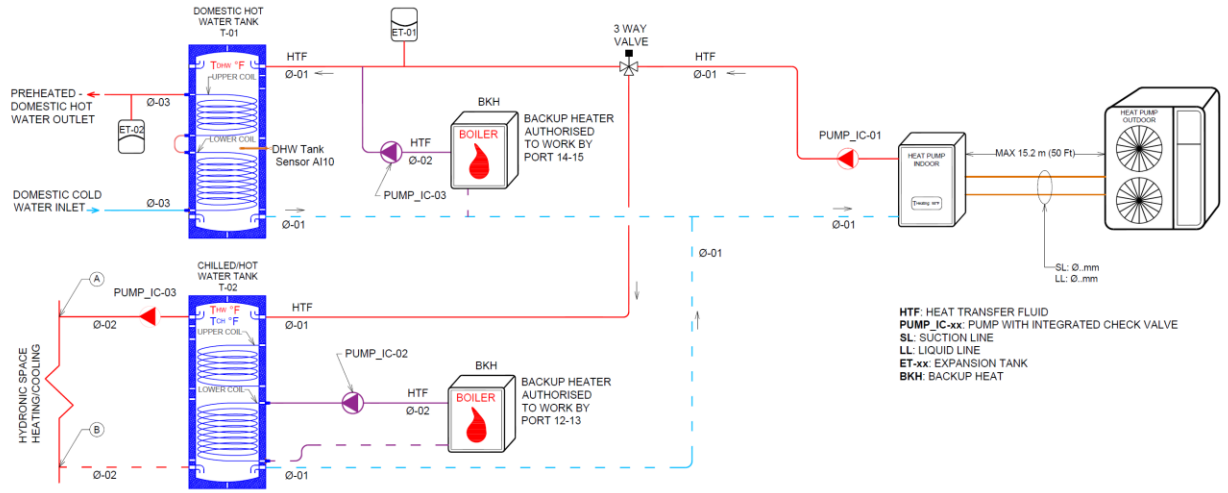
Power and control wiring shall be done by qualified personnel. Please check your Federal, Provincial and any local regulation requirements related to the purchase/installation and operation of this equipment. It is the buyer's responsibility to comply with such regulatory requirements.

The Wiring Diagram and Control Card can be seen in Annex A.

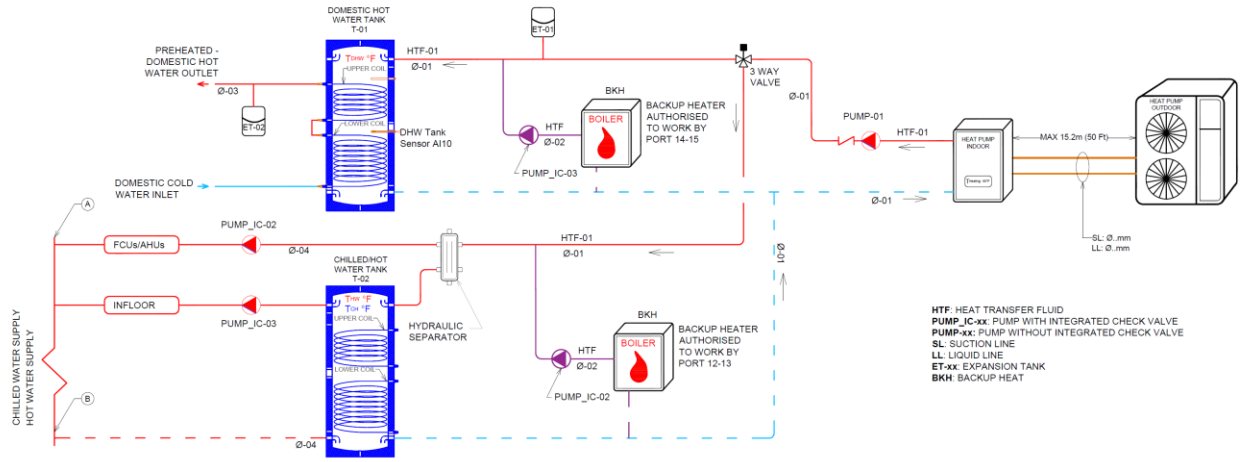
9 PIPING DIAGRAMS

9.1 DUAL TANK – THREE FUNCTIONS (ALL YEAR)

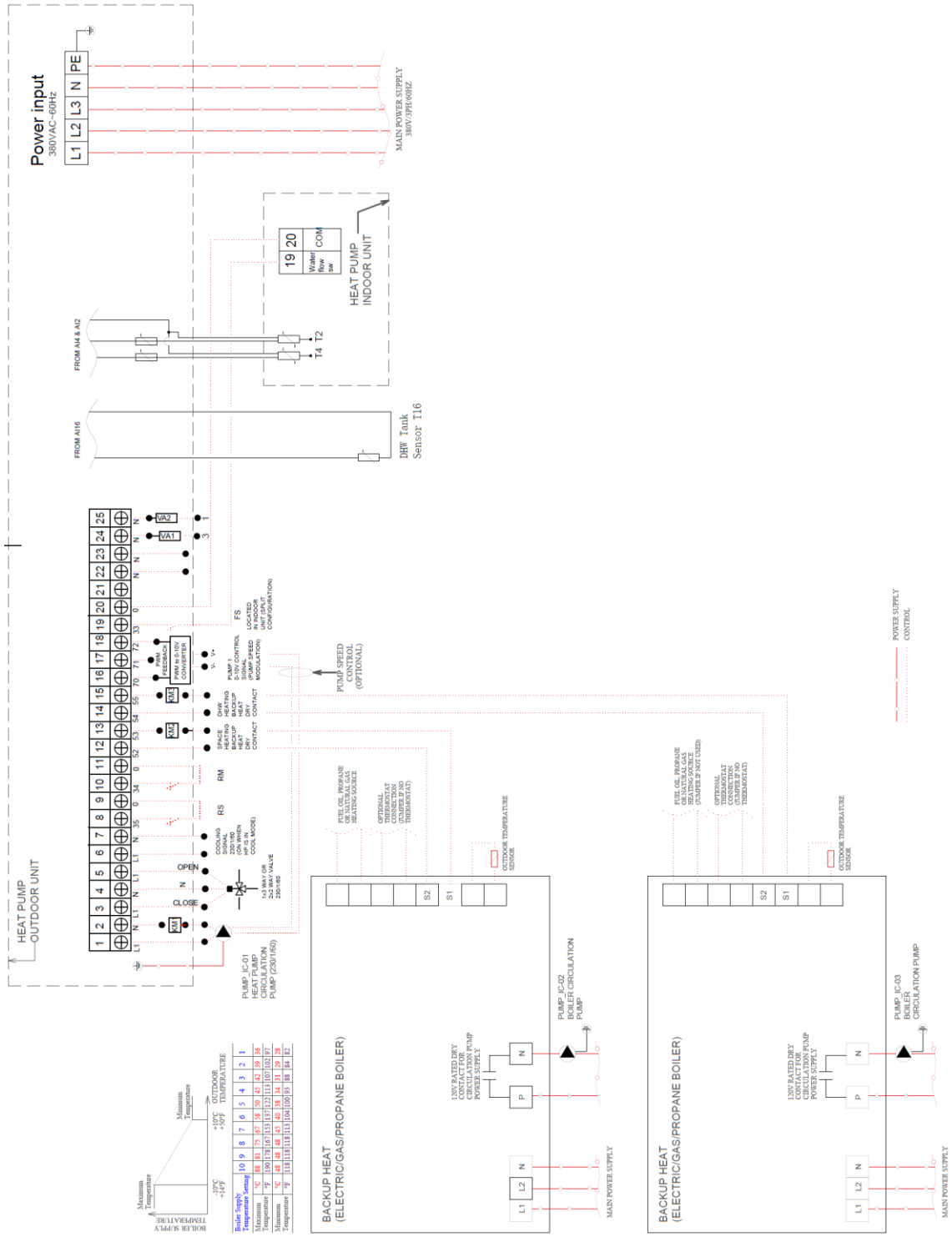
In this configuration, a tank is dedicated for the DHW heating, and another one is dedicated for either space heating or space cooling. This allows each tank to be maintained at a separate temperature.



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).

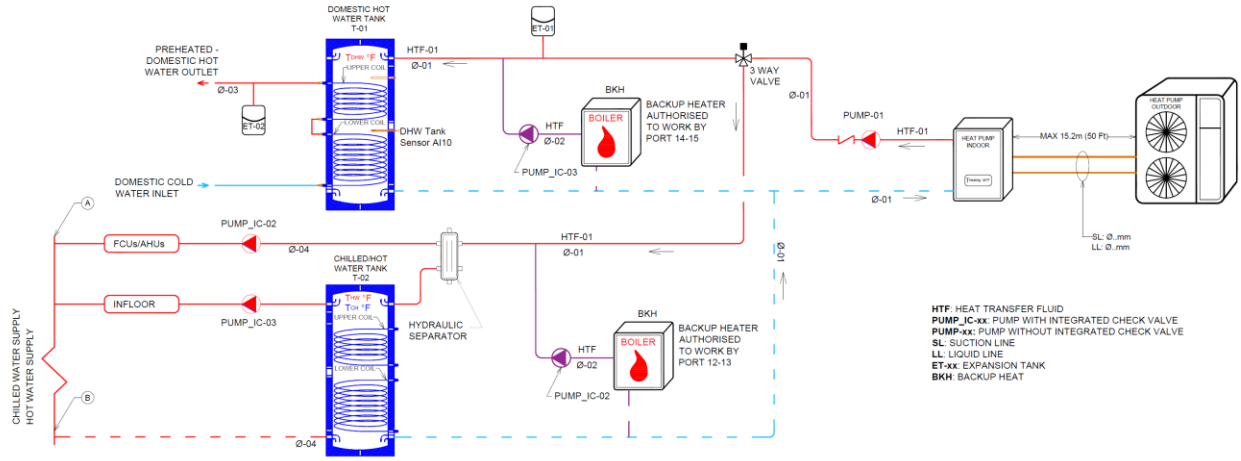


A sample wiring diagram for the heat pump with 2 tanks and their back-up boilers can be seen below:

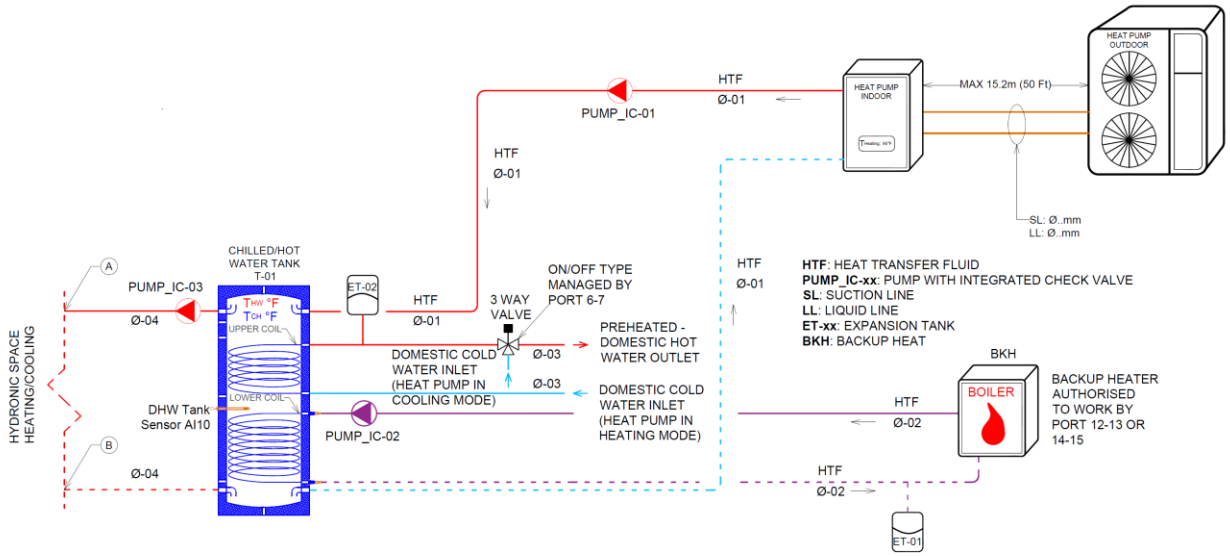


9.2 SINGLE TANK – THREE FUNCTIONS (ALL YEAR-EXCEPT SUMMER)

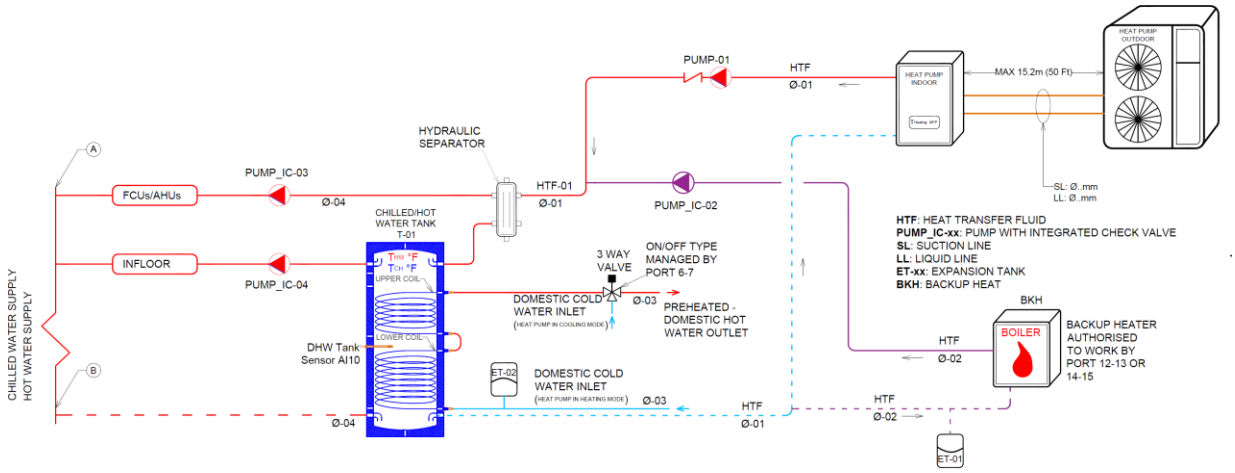
In this configuration, we only use one tank, either in cooling mode or heating mode. When Heat Pump is in heating mode, indirect coil can be used for pre-heating domestic hot water. To maximize the energy efficiency of the system and prevent DHW from being cooled when heat pump is in cooling mode, a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



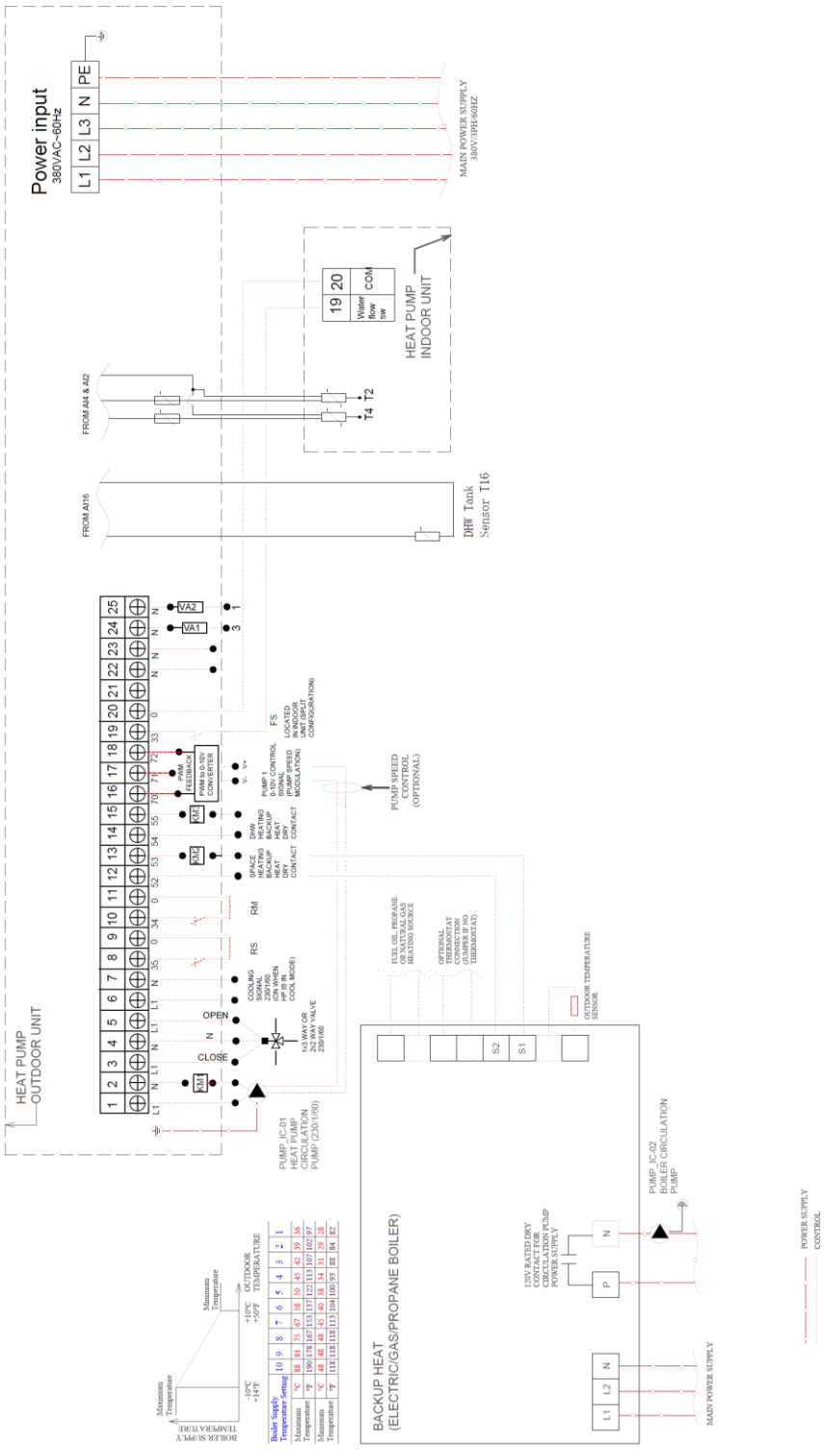
Or backup heat can be connected to the indirect coil.



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).

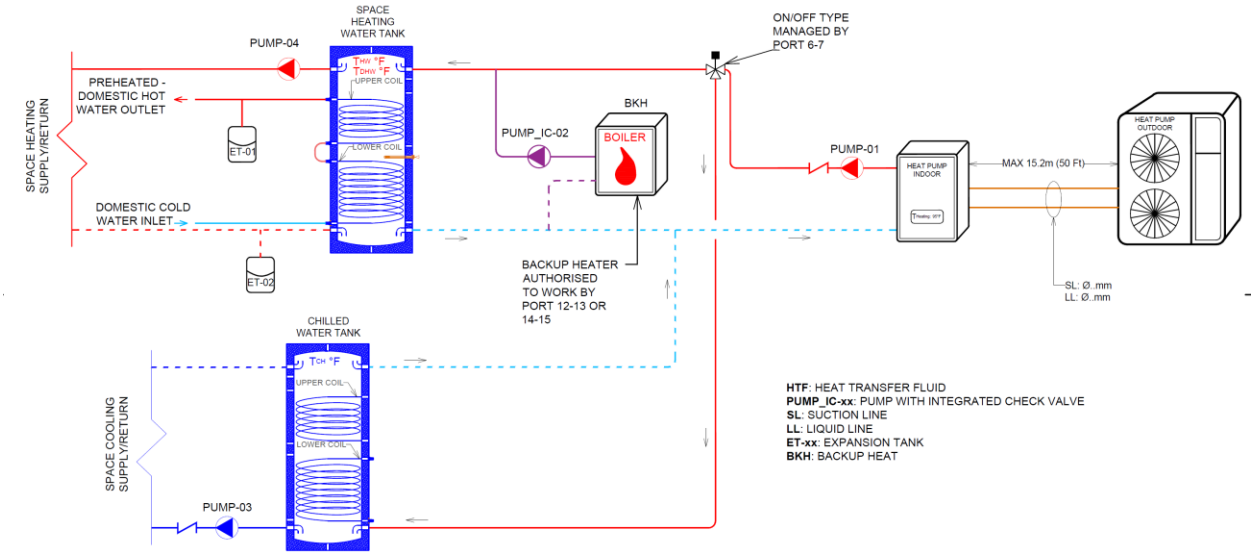


A sample wiring diagram for the heat pump with one tank and a single backup boiler can be seen below:

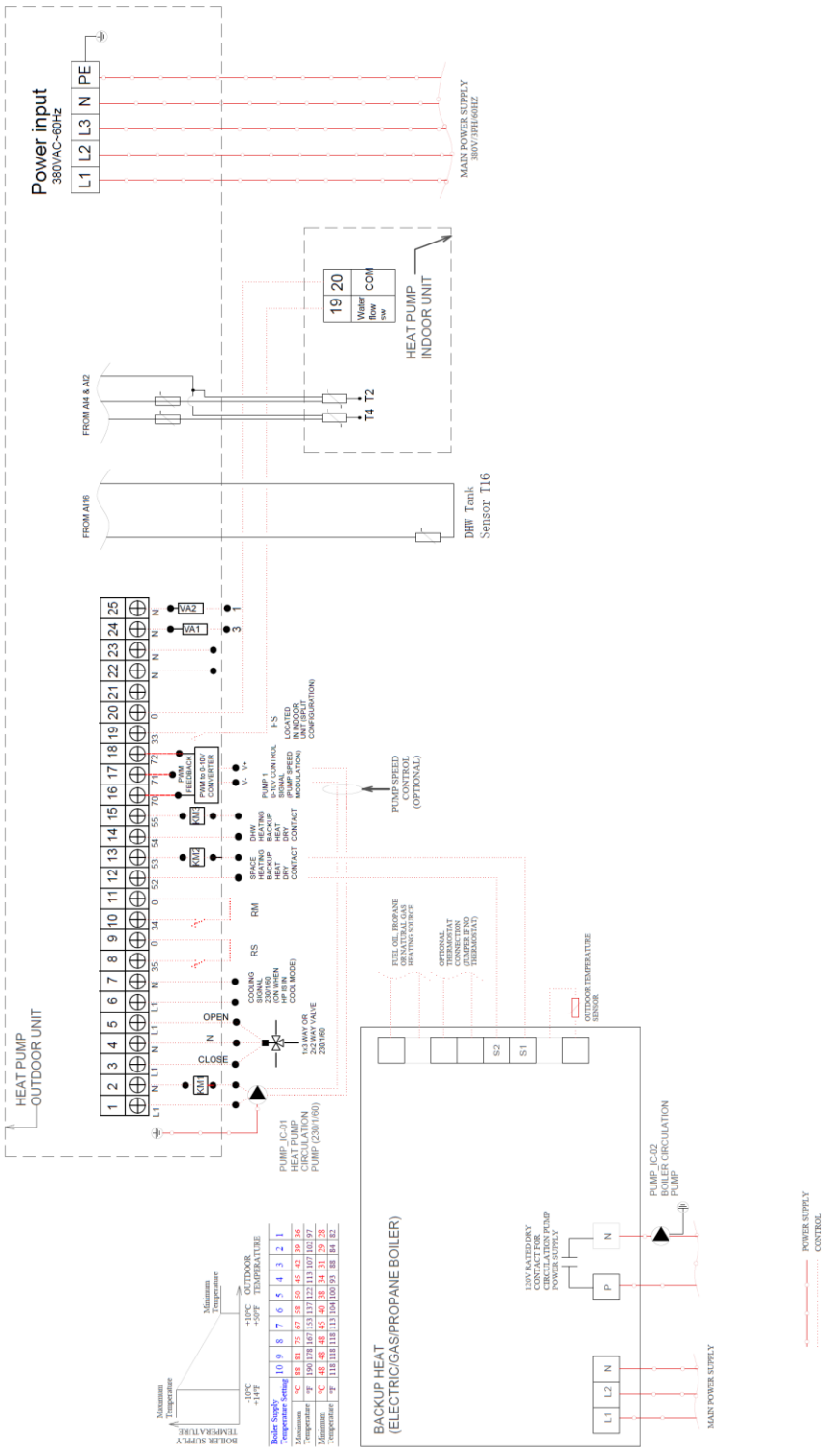


9.3 DUAL TANK – HEATING AND COOLING OR DOMESTIC HOT WATER PRE-HEATING (DHW)

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.

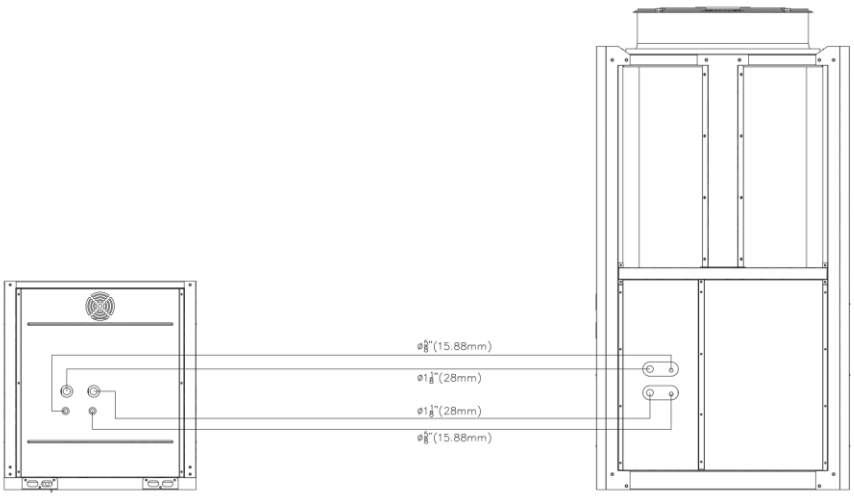


A sample wiring diagram for a heat pump with one tank and a single backup boiler can be seen below:

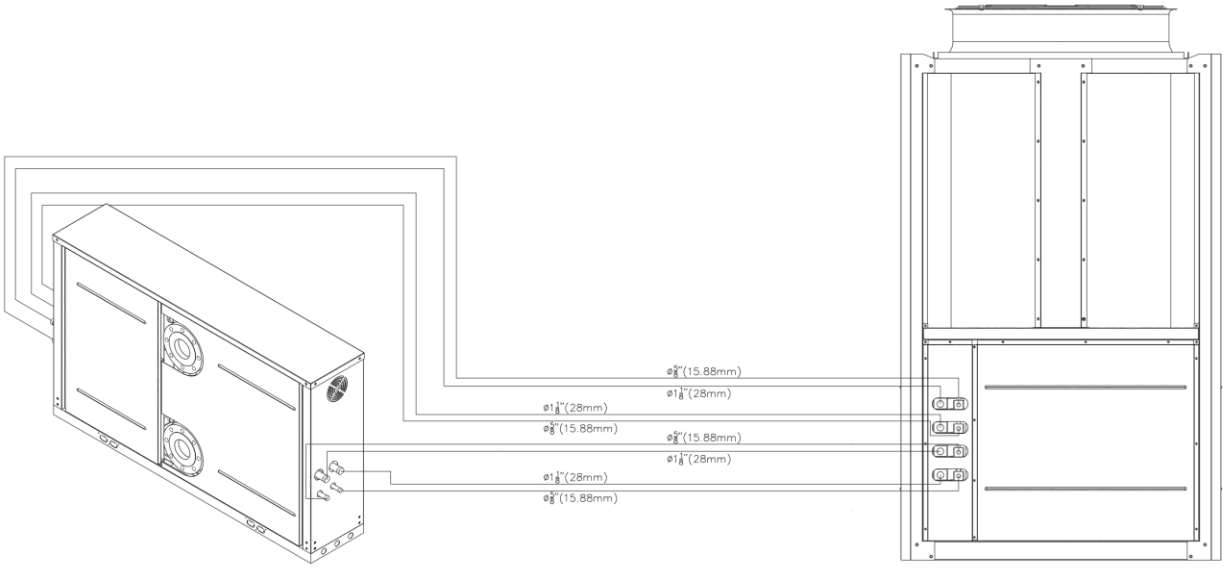


10 REFRIGERANT DIAGRAM

10.1 HSS250V3LS REFRIGERANT DIAGRAM



10.2 HSS500V3LS REFRIGERANT DIAGRAM



11 DEFROST MODE SEQUENCE OF CONTROL

When the air-cooled unit is in heating mode, the outdoor coil is the evaporator (it pumps heat from the outside to inside). For outdoor temperatures below freezing, humidity present in the ambient air will freeze on the outdoor coil, which lowers 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 indoor unit (*usually from the thermal storage tank*) and used for melting the accumulated ice on the outdoor coil.

11.1 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.

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 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 HSS Series 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 geothermal 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.

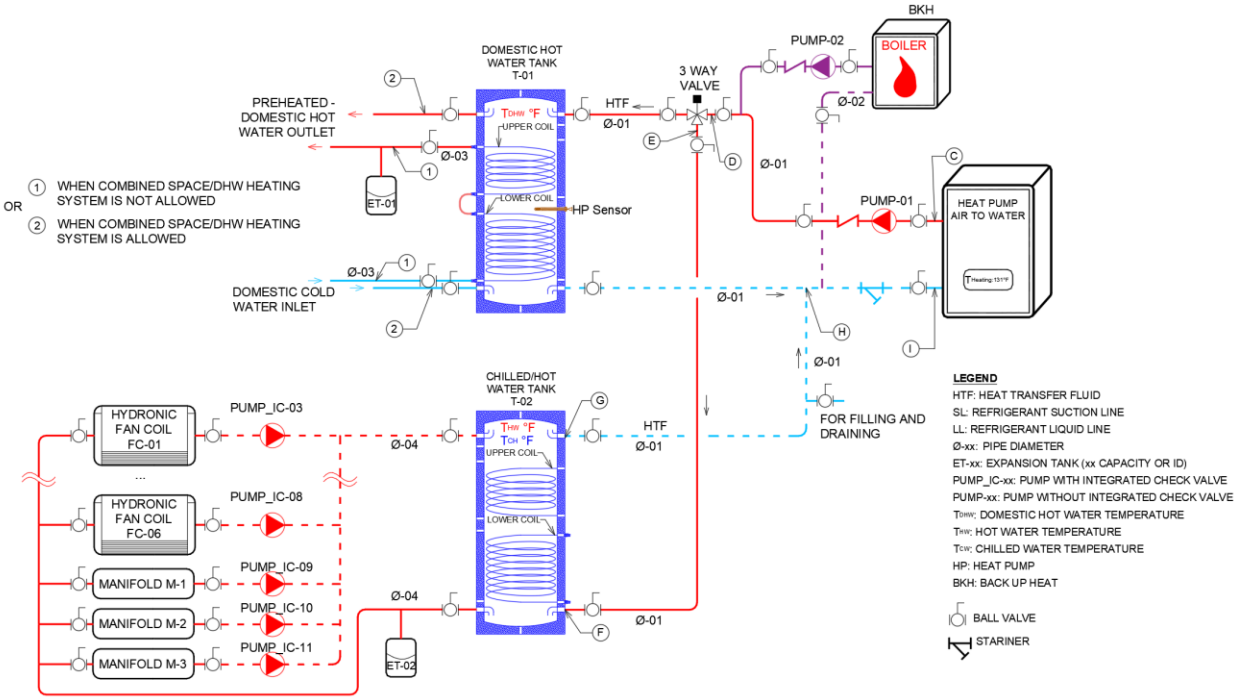
Homeowners are supposed to register the warranty of the installed heat pump. Registration entitles the submittal of installer license certificate as well as a startup and commissioning report.

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

12.2 FLOW REQUIREMENTS:

For the healthy operation of the heat pump, circulation pump shall be properly sized for the available friction loss between Refrigerant to Water heat exchanger 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.

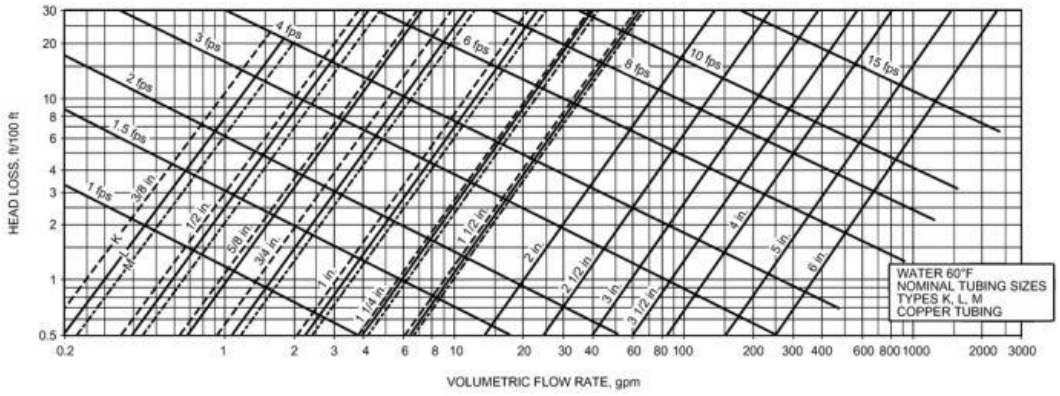


Circulation pump friction losses shall consider the fluid path at the outlet of the heat pump (C), to the three-way valve (D and E), to the tank (F) and back to the heat Pump G, H &I).

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:

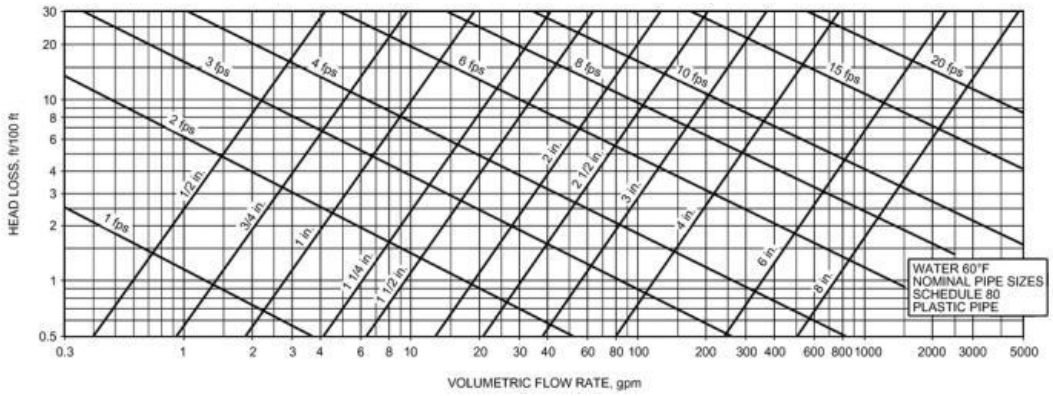
We recommend using either copper, stainless steel or plastic pipes on both ground and indoor loops. Black steel pipe can be used when heat transfer fluid contains enough anti-corrosion inhibitor to prevent corrosion. When using black steel pipes, install dielectric connectors between pipes and heat pump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

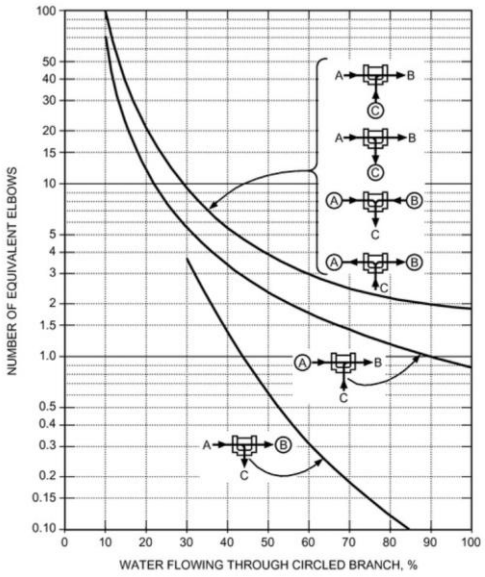
Table 4 *K* Factors: Flanged Welded Steel Pipe Fittings

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 cannot be used for 3-way valves since friction loss of 3-way valves has to be taken from manufacturer test data.



The table below 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

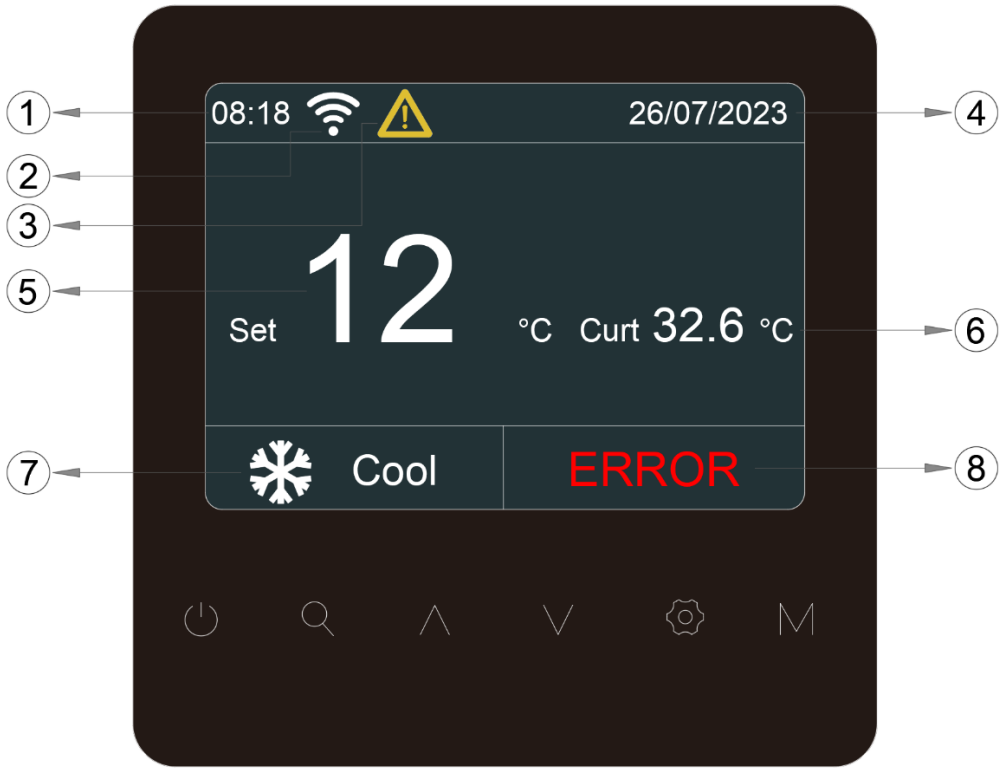
	Pipe Size														
Velocity, fps	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12
1	1.2	1.7	2.2	3.0	3.5	4.5	5.4	6.7	7.7	8.6	10.5	12.2	15.4	18.7	22.2
2	1.4	1.9	2.5	3.3	3.9	5.1	6.0	7.5	8.6	9.5	11.7	13.7	17.3	20.8	24.8
3	1.5	2.0	2.7	3.6	4.2	5.4	6.4	8.0	9.2	10.2	12.5	14.6	18.4	22.3	26.5
4	1.5	2.1	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 Operation Instructions For Wire Controller

12.3.1 Display Interface

Key icon	Function	Name
	Represents the on-off key, used to turn the machine on and off.	on-off
	12.3.1.1.1 Query key, used to query group status. Note: The return key is used in the sub- interface.	Query return
	Indicates the upward icon, which allows you to turn pages upward and add parameters	upward
	Indicates the downward icon, which allows you to scroll down and reduce parameters	downward
	Indicates the setting icon. The parameter setting directory page is displayed. Note: Confirm, enter or set the key in the sub-interface.	Setting Confirm Enter
	Represents the mode key icon, used to set the machine running mode. Note: As a check key in the sub-interface.	Model Check

12.3.2 Main Interface



No.	Meaning	Name
1	Indicates the system's time (hour: minute).	system time
2	Indicates the strength of the WIFI signal. Display only when the device has this function.	WIFI signal
3	Appears and flashes when an error occurs with the heat pump	Error icon
4	Represents the system date.	system date
5	Indicates the set temperature of the device in the current operating mode.	set temperature
6	Indicates the current operating water temperature of the device.	water temperature
7	Indicates the current running mode of the device.	running mode
8	Indicates the current status of the device.	current status

In this interface, the temperature setting can be adjusted by pressing the "up" or "down" button.

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

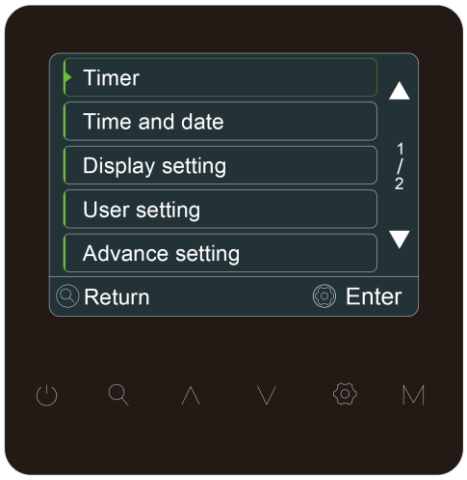
1. On the main interface, press the “M” button to enter the mode selection interface

2. On the interface, press the “up” or “down” button to select Auto/Cool/Heat/HotW/Cool HW/Heat HW modes.

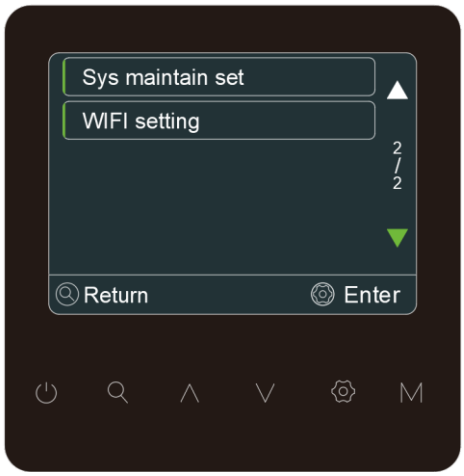
3. After confirming the mode, press the “Gear” to confirm or “Lens” to return to the main interface.

12.3.4 Parameter Setting

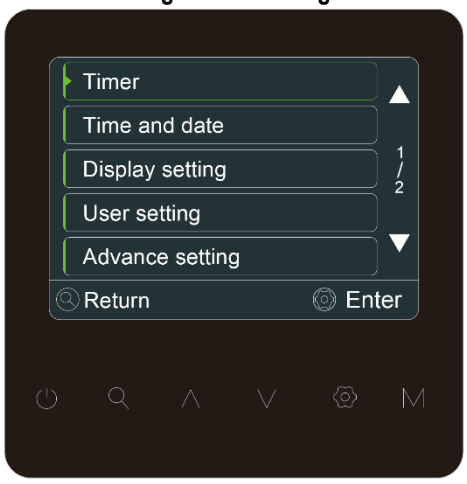
1. On the main interface, press the “Gear” button to enter the parameter setting directory



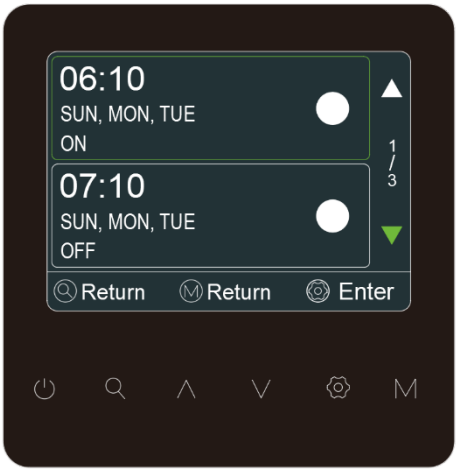
2. On the interface, press the “up” or “down” button to select the parameter to be set;
3. Press the “Gear” button to enter the corresponding parameter setting;
4. Press “Lens” button to return to the main interface;
5. Timer: to set the timing display;
6. Time and date: to set the date and time of the system;
7. Display Settings: to modify the display parameters of the wire controller;
8. User Setting: to set various device parameters, a user password is required to access the screen.
9. Advanced Setting: this setting is the manufacturer settings
10. Sys Maintain Set: this setting is the system settings
11. WIFI Setting: to set WIFI connection



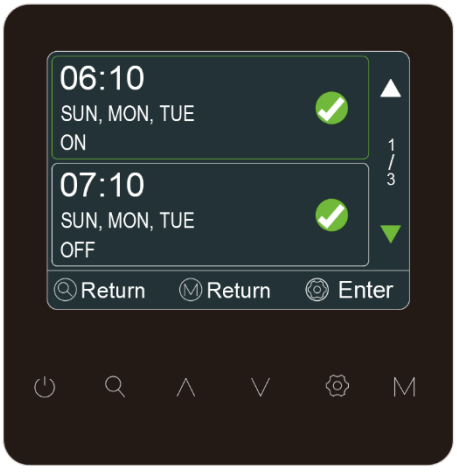
12.3.4.1 Timing Switch Setting



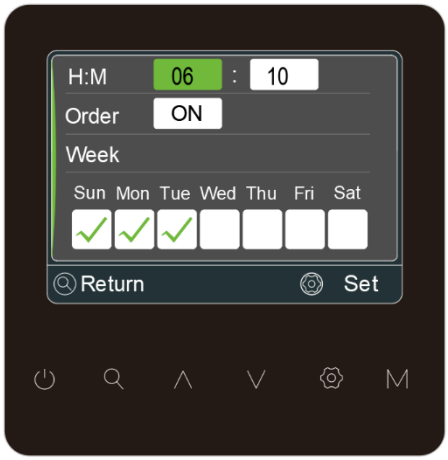
1. On the Parameter Setting directory screen, press the “Up” or “Down” button, select Timer Settings, and press the “Gear” button to enter the Timer Settings screen.



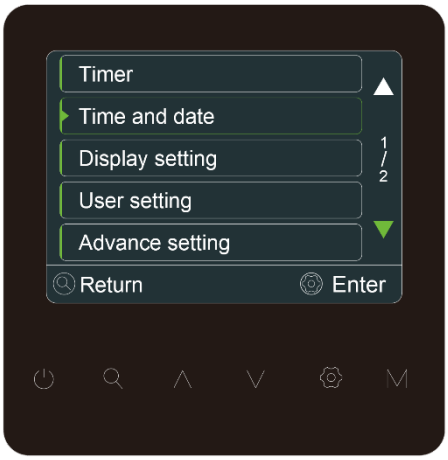
2. To enter the interface of timing setting, press the "Up" or "Down" button to select the "Time", "Command" and "Week" to be timed (for the selected parameter, the background color will turn green, press "Setting", and then press the "up" or "down" button to adjust the value).



3. After setting the timing parameters, remember to press the "Select" button to select the required timing Settings (if not checked, this function will be invalid).
4. Three time periods can be set for timed power on/off, and the settings for each period are the same as above.



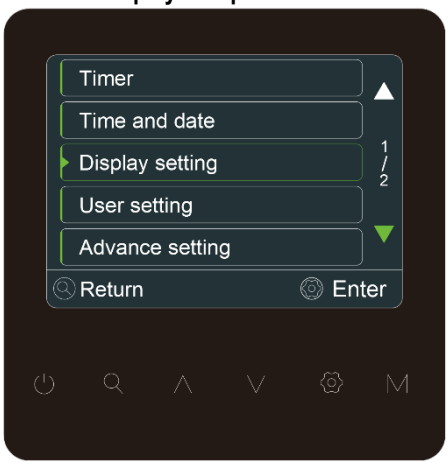
12.3.4.2 Date and Time Settings

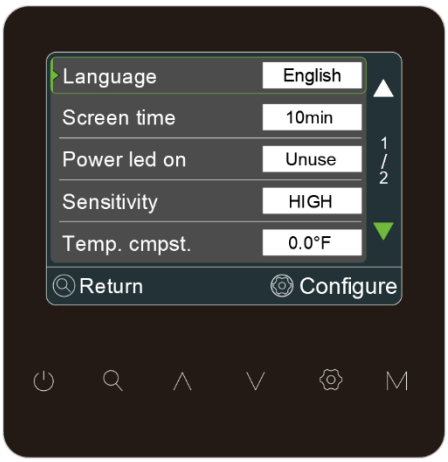


1. On the Parameter setting directory screen, press the “Up” or “Down” button, select Time and Date, and press the “Gear” button to enter the “Time and date” screen.

2. Enter the "Time and date" interface, press the "Up" or "Down" button, and select the "Year", "month", "day", "hour", "minute" and "second" to be set (for the selected parameter, the background color will turn green, press "Setting", and then press the "up" or "down" button to adjust the value).

12.3.4.3 Display Setup

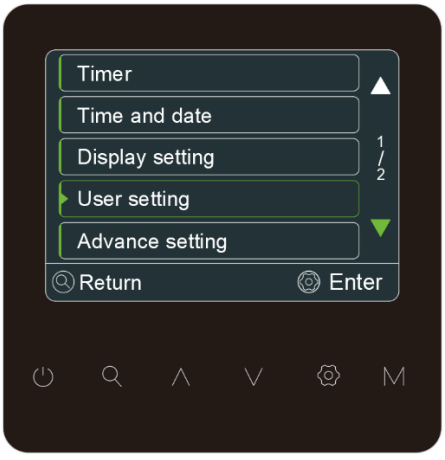




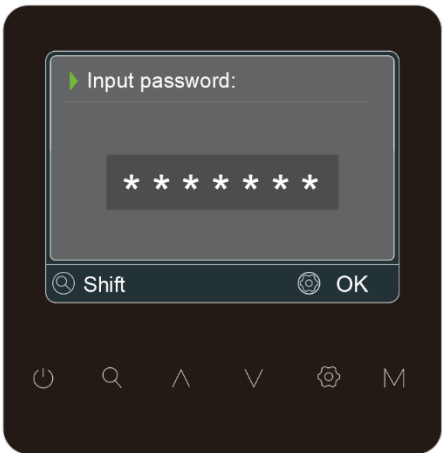
1. On the parameter setting directory interface, press the “Up” or “Down” button, select "Display Settings", and press the "Enter" button to enter the "Display Settings" setting interface.

2. "Language": The control panel can be switched to Chinese or English;
3. "Screen Time": You can set the time when the screen will go out after no operation;
4. "Power led on": set the power indicator light on and off of the wire controller;
5. "Sensitivity": the sensitivity of the key can be adjusted, with four options: high, medium, low and disabled (the default value is recommended);
6. "Temp.cmpst": this function is invalid

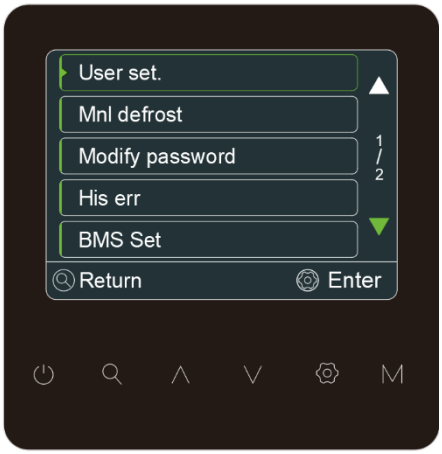
12.3.4.4 User Set Directory



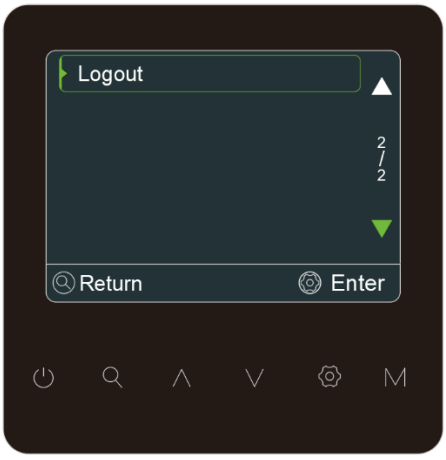
1. On the Parameter Setting directory screen, press the “Up” or “Down” key, select User Settings, and press the “Enter” key to enter the User Settings screen.



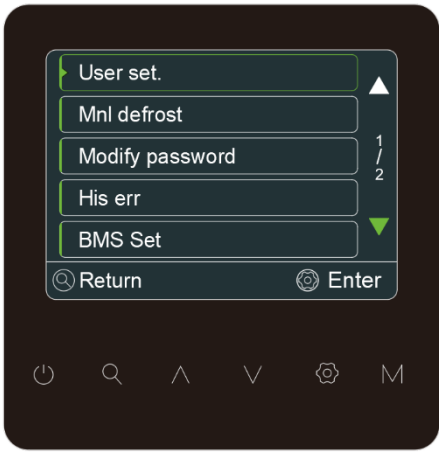
1. Enter the "Input password " interface, enter the user password: 123, (press the selected digit "shift", the background color will turn green, then press the "up" or "down" button, respectively from left to right to enter three-digit password value 123).
2. After entering the password, press the "OK" button. If the password is correct, the User Para directory page is displayed. If the password is incorrect, the user cannot enter the directory, should need to reenter the correct password.



3. User set.: to set device parameters on this screen.
4. Mnl defrost: to manually defrost by entering this interface.
5. Modify password: to change the original password on this screen.
6. His err: to view historical faults of the device on this screen.
7. BMS Set: to manage the BMS settings.
   Logout: to log out of the user on this screen and restores the function that requires you to enter the password to enter the user Settings.

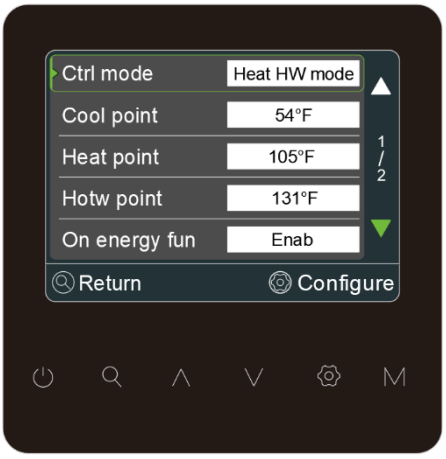


12.3.4.4.1 User Parameter Setting



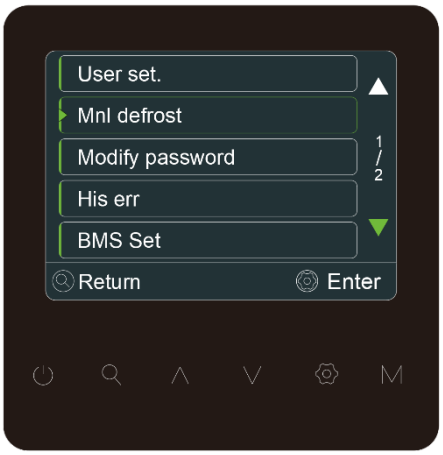
1. On the User Para directory screen, press the “Up” or “Down” key, select User Parameters, and press the “Enter” key to enter the User Settings screen.

   Parameter adjustment operation: press the "Up" or "Down" button to select the parameter to be modified, and then press the "Set" button, or press the "Set" button to adjust the parameter through the "Up" or "down" button.



2. Press the “Up” or “Down” key, View and set other parameters. For more detail refer to “Annex B: Table 1”.

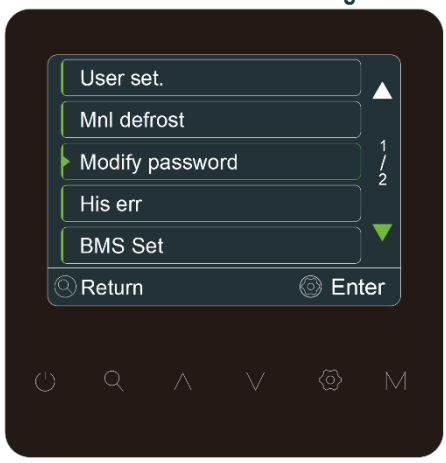
12.3.4.4.2 Manual Defrosting

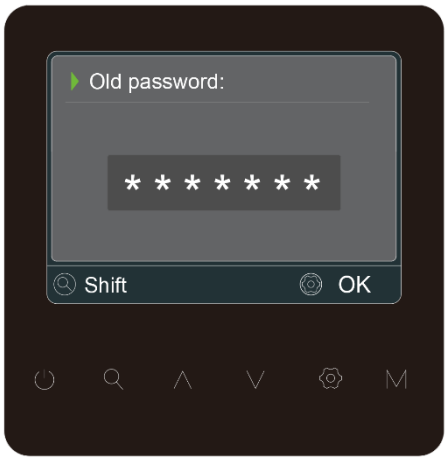


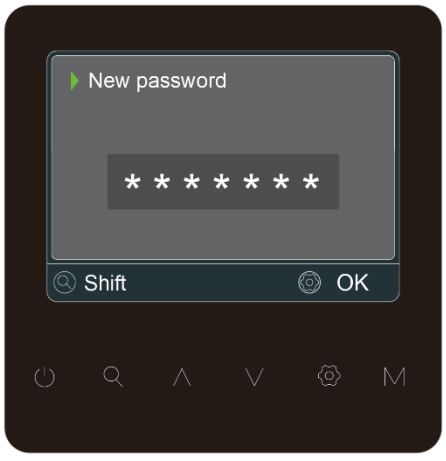
1. On the User Parameter directory screen, press the “Up” or “Down” button to select “Mnl Defrost”. Press the “Enter” button to enter the setting screen of “Mnl Defrost”.

2. Press the "Enter" button on the interface, and the device will enter the manual dehumidification state. After defrosting, the device will automatically restore to the original state.

12.3.4.4.3 User Password Setting



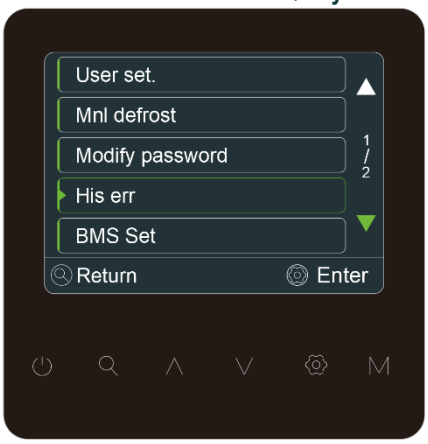




1. On the User Parameter directory screen, press the “Up” or “Down” key, select “Modify Password”, and press the “Enter” key to enter the Password setting screen.
2. Enter the correct old password to enter the new password interface;

3. If you need to exit from the old password input interface, please press the "Enter" button directly or press the "Enter" button if you enter the wrong password, the password error dialog box will pop up at this time;
4. On the User Parameter directory screen, press the “Up” or “Down” key, select “Modify Password”, and press the “Enter” key to enter the Password setting screen.

12.3.4.4.4 Historical Fault Query

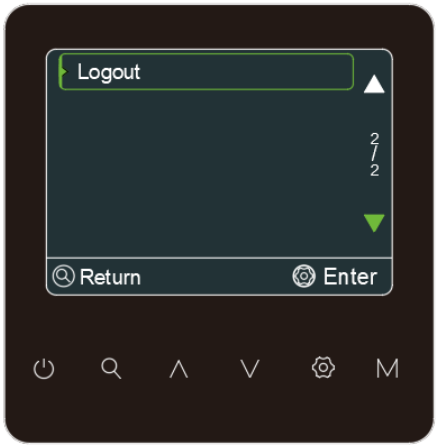


1. On the User Parameter Directory screen, press the “Up” or “Down” key, select “His err”, and press the “Enter” key to go to the Historical Fault Query screen.

2. On this screen, view the fault type and fault occurrence time of the device.

3. In this interface, press the "Clear" button to clear all fault records (once the fault records are cleared and cannot be recovered, please exercise caution);

12.3.4.4.5 Account Cancellation

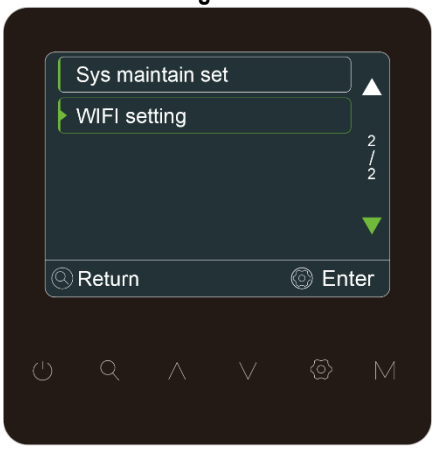


1. Press the "Up" or "Down" button, select "His err ", and press the "Enter" button to log out of the user. When you enter the "User Settings" screen again, you need to enter the password again.

2. If you do not logout and the online controller does not enter the screensaver, there is no need to re-enter the password when you re-enter the User Settings screen.

3. After you logout, the Parameter Settings directory page is displayed.

12.3.5 WIFI Setting



1. On the parameter setting directory screen, press the "Up" or "Down" button, select "WIFI Setting", and press the "Enter" button to enter the "WIFI Setting" screen.
2. Follow the instructions step by step to connect to WIFI and control the device through the APP.
3. Android System: Download the “Huilian Smart” APP from QR. IOS System: Search and install the "Huilian Smart" app on the APP Store.

12.3.6 Device Information Query

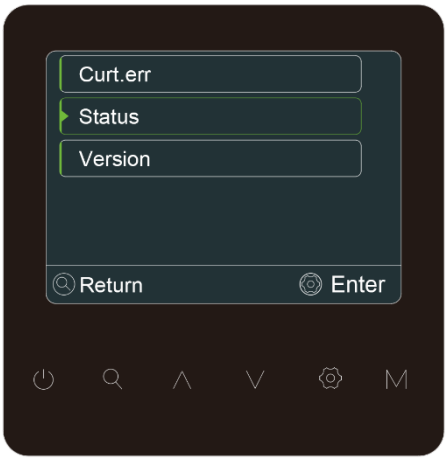
1. On the home screen, press Query to enter the Query Device Status screen.
2. “Curt.err”: Query the current fault of the device.
3. “Status”: Queries the current running status parameters of the device.
   "Version": query the driver version number of the device;

12.3.6.1 Current Fault Query

1. On the device status query screen, press the “Up” or “Down” key and select “Curt.err”. The Current Fault screen is displayed

2. Press the “Detail” button to view error information;
3. After the error is solved, press the "Reset" button to eliminate the current fault.

12.3.6.2 Status Query

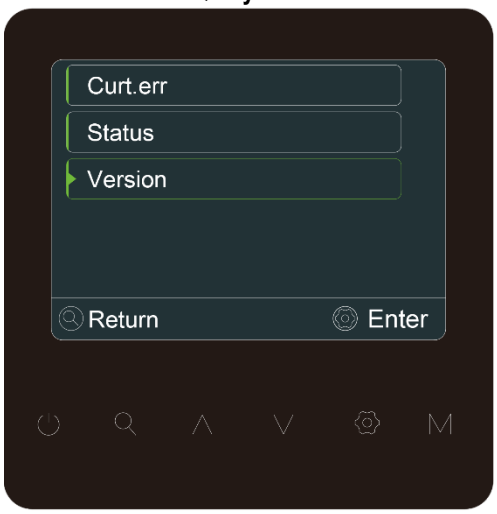


1. On the device status query screen, press the “Up” or “Down” key and select "Status Query".

2. Press the "Up" or "Down" button to turn the page and view other parameters’ status;
3. Press the "Output querying" button to check the output status of the device;
4. “Switch module” button, which only works when a wire controller controls multiple units

5. Press the "Up" or "Down" button to turn the page and view other output status of the device;
6. Press the "Analog querying" button to check the parameters’ status;
7. “Switch module” button, which only works when a wire controller controls multiple units

12.3.6.3 Version Query

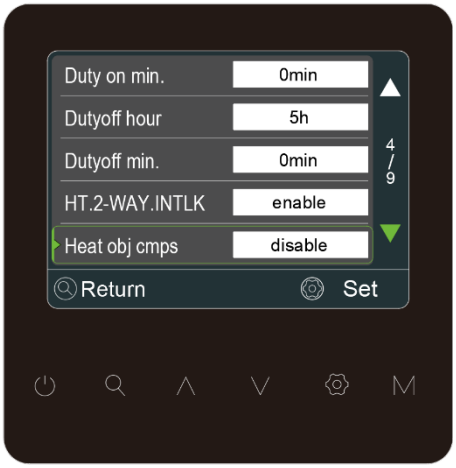


1. On the device status query screen, press the “Up” or “Down” key and select “Version”. The “Version” screen is displayed;

2. Press the "Up" or "Down" button to turn the page and view other version information.

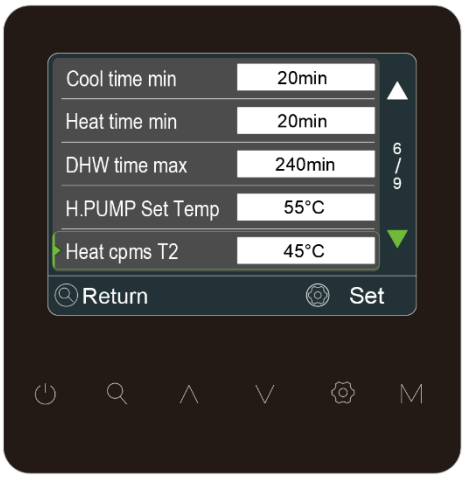
12.3.7 Target Temperature Compensation Function

The ambient temperature in the heating target compensation function control refers to the ambient temperature of the main module. Automatically set the heating target temperature based on the ambient temperature, which can be set during operation.

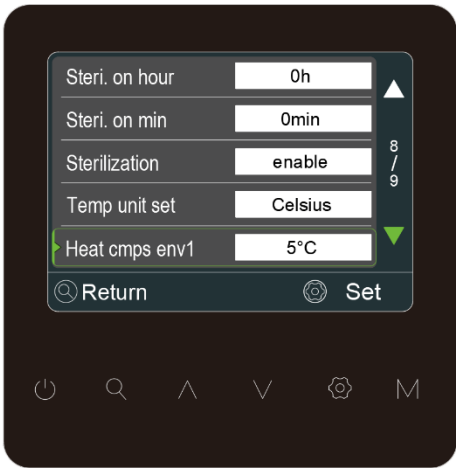


1. “Heat obj cmps” defaults to use.

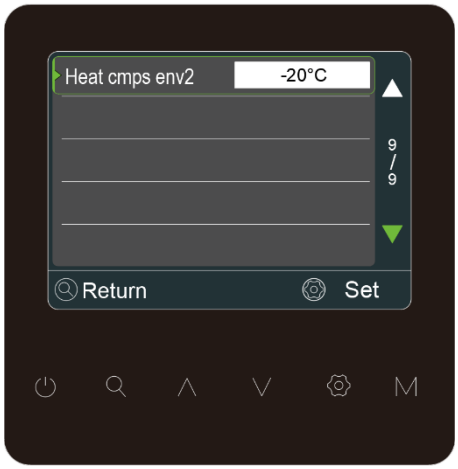
2. “Heat cmps T1” Default "40", adjustable (30-60)



3. “Heat cmps T2” Default "45", adjustable (30-60)



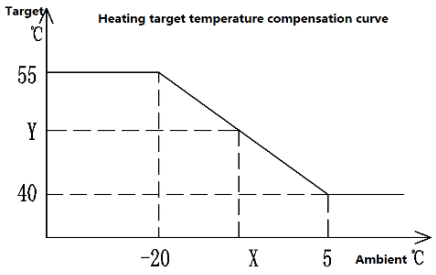
4. “Heat cmps env1” Default “5”, adjustable (-30~45)



5. “Heat cmps env2” Default "-20", adjustable (-30~45)

Heating target temperature compensation function: When the ”Heat obj cmps” is set to "use", the heating target value will change when there are changes in ambient temperature (updated every “load correction time”, and immediately updated when the “Heat obj cmps” is changed from "disable" to "use"), and is no longer based on the set value. The Y value in the table below is used as the target temperature. The loading and unloading logic remains unchanged. In heating mode, when the “Heat obj cmp” is set to "disable", the target temperature correction function in the adaptive load temperature control logic is invalid.

Example: Introduce the temperature compensation function for heating targets.

<table>
<tr><th>Parameter Setting</th><th>Compensating Curve</th><th colspan="2">Compensation Formula for Heating Target Temperature</th></tr>
<tr><td rowspan="4">“Heat obj cmps”: Enabled
“Heat cmps T1”: 40 ℃
“Heat cmps T2”: 55 ℃
“Heat cmps env1”: 5 ℃
“Heat cmps env2”: -20 ℃</td><td rowspan="4"> 
</td><td>Current ambient temperature - X</td><td>Heating target temperature value - Y</td></tr>
<tr><td>X≥5℃</td><td>Y=40℃</td></tr>
<tr><td>-20℃＜X＜5℃</td><td>Y=0.6(5-X)+40
Note: 0.6 is not a fixed value and varies with changes in the set parameters.。0.6=（55-40）/（5-(-20)）</td></tr>
<tr><td>X≤-20℃</td><td>Y=55℃</td></tr>
</table>

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
L1	N	L1	N	L1	L1	N	35	0	34	0	52	53	54	55	70	71	72	33	0		N	N	N	N

KM1

CLOSE

N

OPEN

PUMP 1
230/1/60
MAX 1.5 KW

1x3 WAY OR
2x2 WAY VALVE
230/1/60

COOLING
SIGNAL
230/1/60
(ON WHEN
HP IS IN
COOL MODE)

RS

RM

KM2

KM3

SPACE
HEATING
BACKUP
HEAT
DRY
CONTACT

DHW
HEATING
BACKUP
HEAT
DRY
CONTACT

PWM
FEEDBACK

PWM to 0-10V
CONVERTER

V- V+

PUMP 1
0-10V CONTROL
SIGNAL
(PUMP SPEED
MODULATION)

FS

LOCATED
IN INDOOR
UNIT (SPLIT
CONFIGURATION)

VA1

VA2

3 1

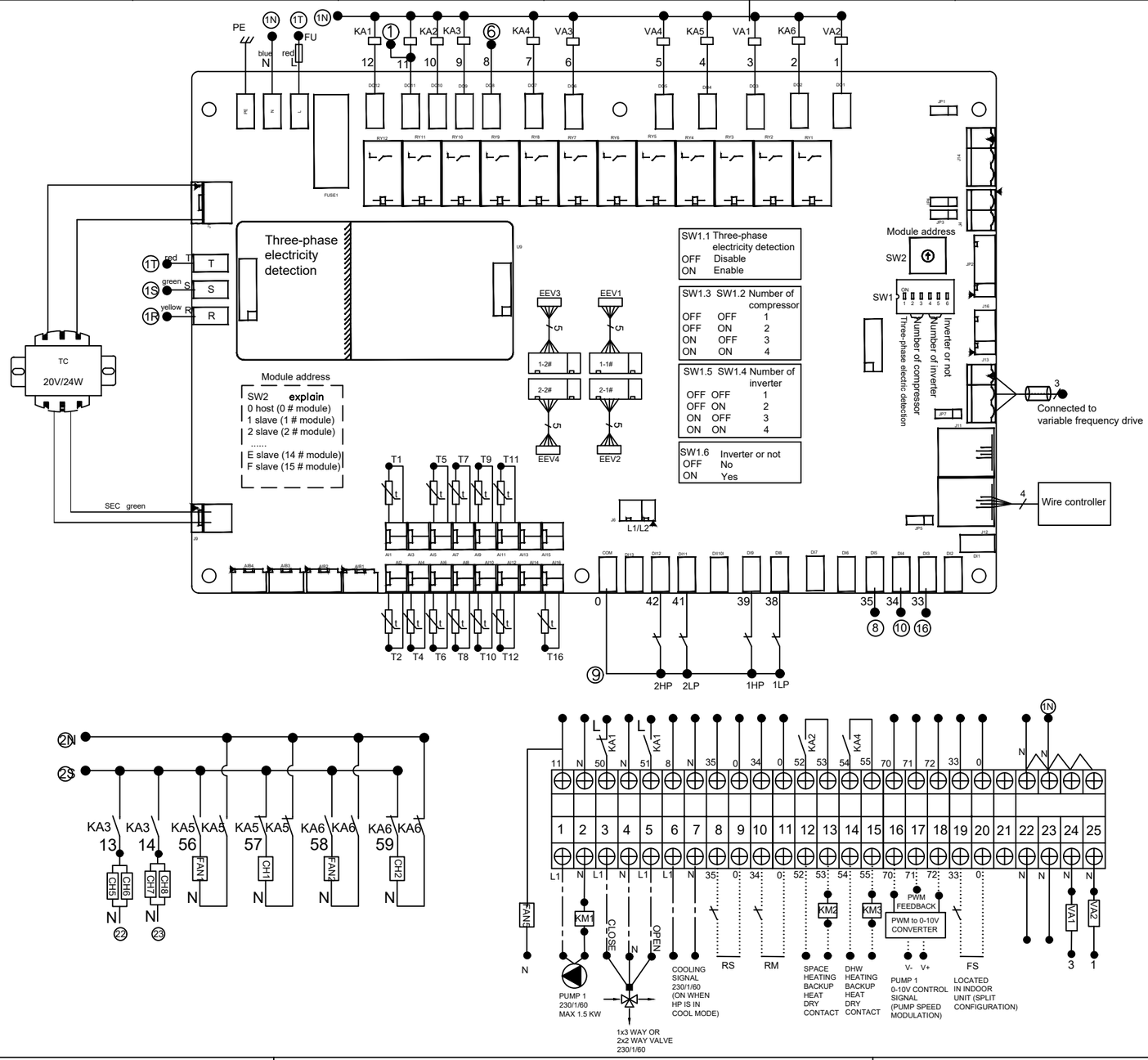
Ref. #	P/N				
Designed by LAETITIA	Checked by ROGER	Approved by - date 2024-08-15	File name HSS250V3LSCTRLCD	Date 2024-08-15	Scale NTS

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

HSS250V3LS_CTRL_CD

DWG.NO.:HPCC250V3LS | Revision 0 | Sheet 1

KM1	Air-condition pump dry contact
KM2	Space heating dry contact
KM3	Domestic hot water dry contact
KA1	Hot water there-way relay
KA2	Space heating backup heat
KA3	Chassis electric heating relay
KA4	Domestic hot water backup heat
KA5	1# Variable frequency drive board cooling fan relay
KA6	2# Variable frequency drive board cooling fan relay
VA1	1# Four-way valve
VA2	2# Four-way valve
VA3	1# Auxiliary solenoid valve
VA4	2# Auxiliary solenoid valve
FAN1	1# Variable frequency drive board cooling fan
FAN2	2# Variable frequency drive board cooling fan
FAN5	DC Fan Variable frequency drive board cooling fan
EEV1	1# Main electronic expansion valve
EEV2	2# Main electronic expansion valve
EEV3	1# EVI electronic expansion valve
EEV4	2# EVI electronic expansion valve
T1	Ambient temperature sensor 10KΩ
T2	Water Outlet temperature sensor 10KΩ
T4	Water inlet temperature sensor 10KΩ
T5	1# Fin temperature sensor 10KΩ
T6	2# Fin temperature sensor 10KΩ
T7	1# Suction temperature sensor 10KΩ
T8	2# Suction temperature sensor 10KΩ
T9	1# Discharge temperature sensor 10KΩ
T10	2# Discharge temperature sensor 10KΩ
T11	1# Temperature sensor after expansion valve 10KΩ
T12	2# Temperature sensor after expansion valve 10KΩ
T16	Domestic hot water tank temperature sensor 10KΩ
HP1	1# System high pressure protection switch
HP2	2# System high pressure protection switch
LP1	1# System low pressure protection switch
LP2	2# System low pressure protection switch
CH1	1# Compressor crankshaft heating band
CH2	2# Compressor crankshaft heating band
CH5	1# Chassis electric heating
CH6	2# Chassis electric heating
CH7	3# Chassis electric heating
CH8	4# Chassis electric heating
RS	Remote switch (ON/OFF)
RM	Remote mode on-off (cool: turn off, heat: turn on)
FS	Water flow switch
①~㉒	TX2 line bank number



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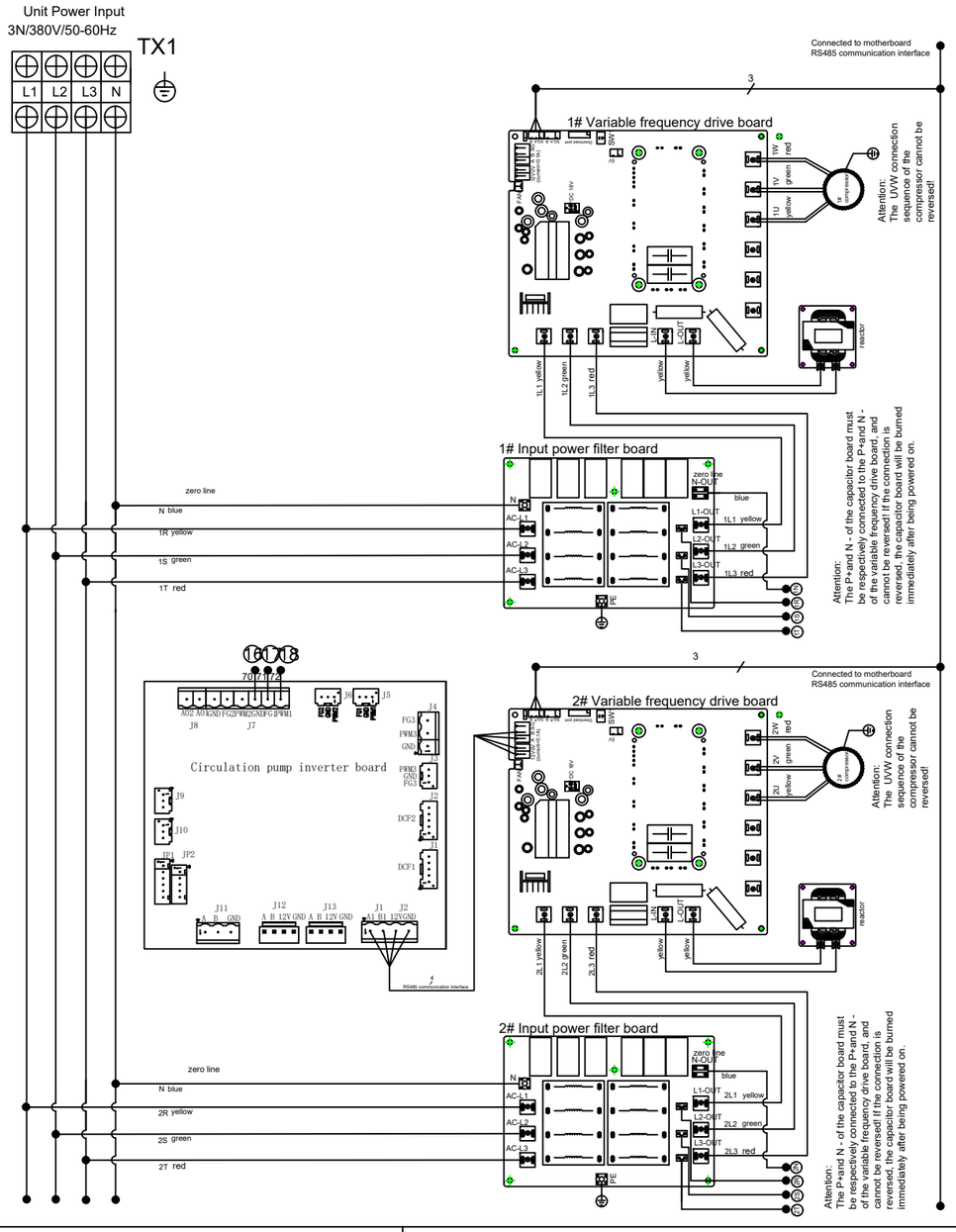
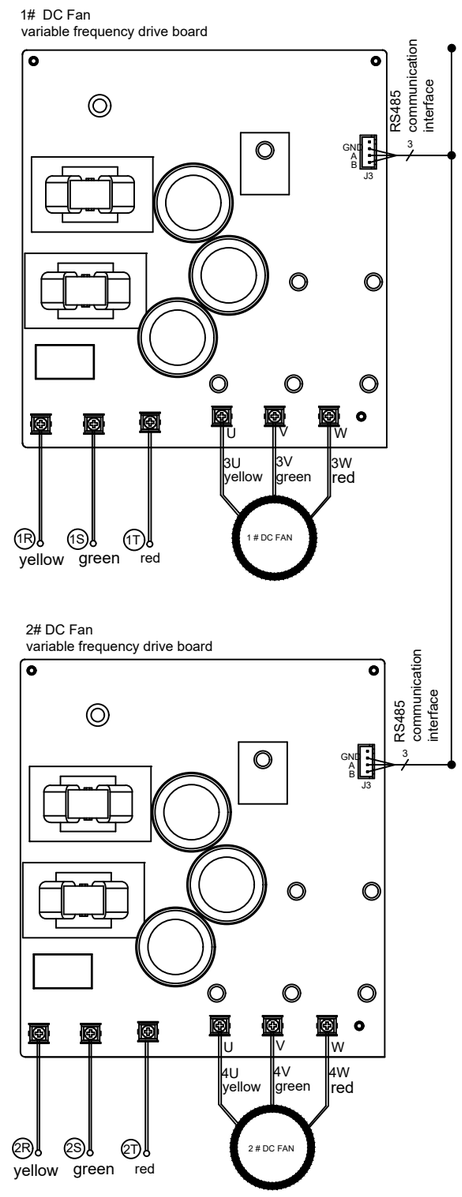
AQUA SOLANOR
2305 46th AVENUE, LACHINE (QC) H8T3C9

HSS250V3LS_WIRING1

DWG.NO.:HPCC250V3LS-1 | Revision 0 | Sheet 1





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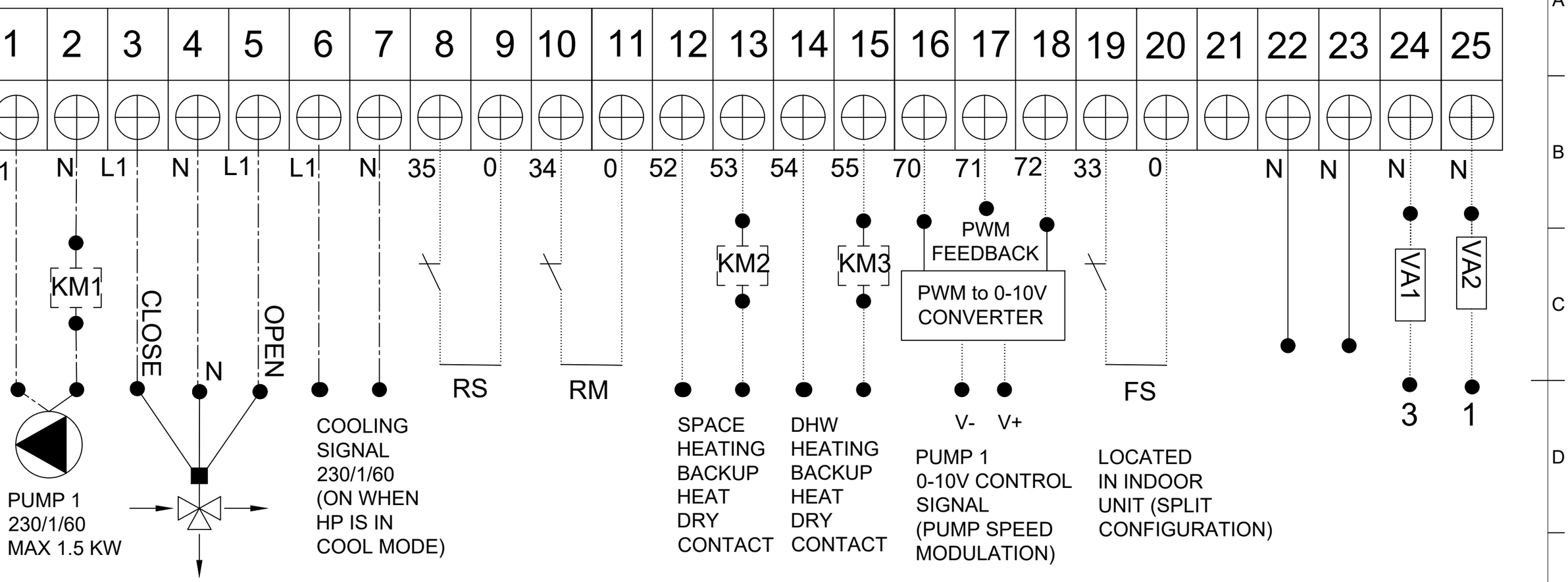
AQUA SOLANOR
2305 46th AVENUE, LACHINE (QC) H8T3C9

HSS250V3LS_WIRING2

DWG.NO.:HPCC250V3LS-2	Revision 0	Sheet 1

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
L1	N	L1	N	L1	L1	N	35	0	34	0	52	53	54	55	70	71	72	33	0		N	N	N	N



Ref. #	P/N				
Designed by DAPHNE	Checked by ROGER	Approved by - date 2024-08-15	File name HSS500V3LSCTRLCD	Date 2024-08-15	Scale NTS

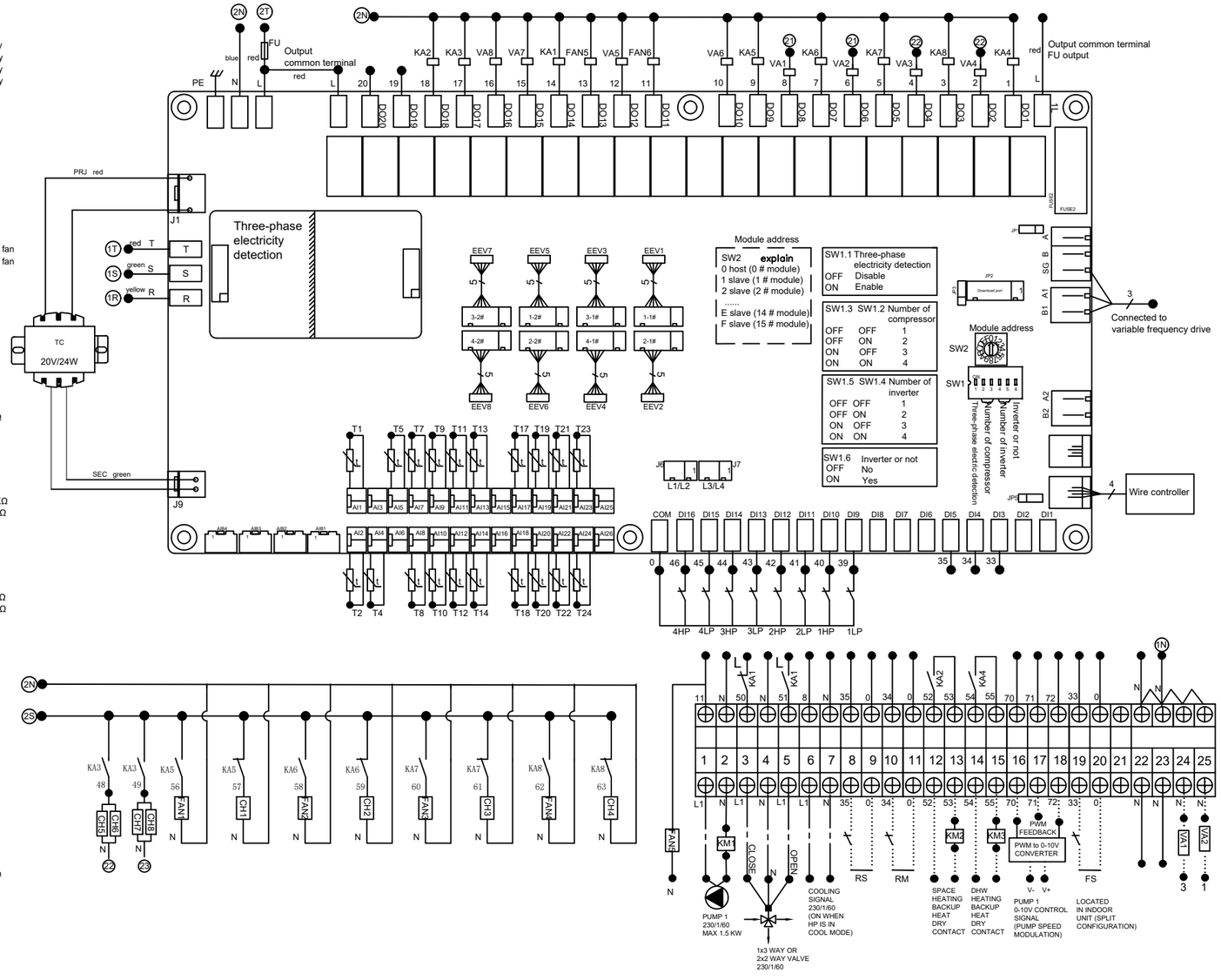
AQUA SOLANOR
2305 46th AVENUE, LACHINE (QC) H8T3C9

HSS500V3LS_CTRL_CD

DWG.NO.:HPCC500V3LS	Revision 0	Sheet 1

KM1	Air-condition pump dry contact
KM2	Space heating dry contact
KM3	Domestic hot water dry contact
KA1	Hot water there-way relay
KA2	Space heating backup heat
KA3	Chassis electric heating relay
KA4	Domestic hot water tank backup heating relay
KA5	1# Variable frequency drive board cooling fan relay
KA6	2# Variable frequency drive board cooling fan relay
KA7	3# Variable frequency drive board cooling fan relay
KA8	4# Variable frequency drive board cooling fan relay
KA9	Electric three-way relay
VA1	1# Four-way valve
VA2	2# Four-way valve
VA3	3# Four-way valve
VA4	4# Four-way valve
VA5	1# Auxiliary solenoid valve
VA6	2# Auxiliary solenoid valve
VA7	3# Auxiliary solenoid valve
VA8	4# Auxiliary solenoid valve
FAN1	1# Variable frequency drive board cooling fan
FAN2	2# Variable frequency drive board cooling fan
FAN3	3# Variable frequency drive board cooling fan
FAN4	4# Variable frequency drive board cooling fan
FAN5	1# DC Fan Variable frequency drive board cooling fan
FAN6	2# DC Fan Variable frequency drive board cooling fan
FAN7	Electric box fan
EEV1	1# Main electronic expansion valve
EEV2	2# Main electronic expansion valve
EEV3	3# Main electronic expansion valve
EEV4	4# Main electronic expansion valve
EEV5	1# EVI electronic expansion valve
EEV6	2# EVI electronic expansion valve
EEV7	3# EVI electronic expansion valve
EEV8	4# EVI electronic expansion valve
T1	Ambient temperature sensor 10KΩ
T2	Water Outlet temperature sensor 10KΩ
T4	Water inlet temperature sensor 10KΩ
T5	Domestic hot water tank temperature sensor 10KΩ
T7	1# Fin temperature sensor 10KΩ
T8	2# Fin temperature sensor 10KΩ
T9	1# Suction temperature sensor 10KΩ
T10	2# Suction temperature sensor 10KΩ
T11	1# Discharge temperature sensor 10KΩ
T12	2# Discharge temperature sensor 10KΩ
T13	1# Temperature sensor after expansion valve 10KΩ
T14	2# Temperature sensor after expansion valve 10KΩ
T17	3# Fin temperature sensor 10KΩ
T18	4# Fin temperature sensor 10KΩ
T19	3# Suction temperature sensor 10KΩ
T20	4# Suction temperature sensor 10KΩ
T21	3# Discharge temperature sensor 10KΩ
T22	4# Discharge temperature sensor 10KΩ
T23	3# Temperature sensor after expansion valve 10KΩ
T24	4# Temperature sensor after expansion valve 10KΩ
CH1	1# Compressor crankshaft heating band
CH2	2# Compressor crankshaft heating band
CH3	3# Compressor crankshaft heating band
CH4	4# Compressor crankshaft heating band
CH5	1# Chassis electric heating
CH6	2# Chassis electric heating
CH7	3# Chassis electric heating
CH8	4# Chassis electric heating
HP1	1# System high pressure protection switch
HP2	2# System high pressure protection switch
HP3	3# System high pressure protection switch
HP4	4# System high pressure protection switch
LP1	1# System low pressure protection switch
LP2	2# System low pressure protection switch
LP3	3# System low pressure protection switch
LP4	4# System low pressure protection switch
TC	Transformer
RS	Remote switch (ON/OFF)
RM	Remote mode on-off (cool: turn off; heat: turn on)
FS	Water flow switch
PRJ	Circuit board power primary transformer - red
SEC	Circuit board power secondary transformer - green
FU	Fuse
①~㉒	TX2 line bank number

Attention:
The temperature probe behind the valve is installed at the outlet of the casing.



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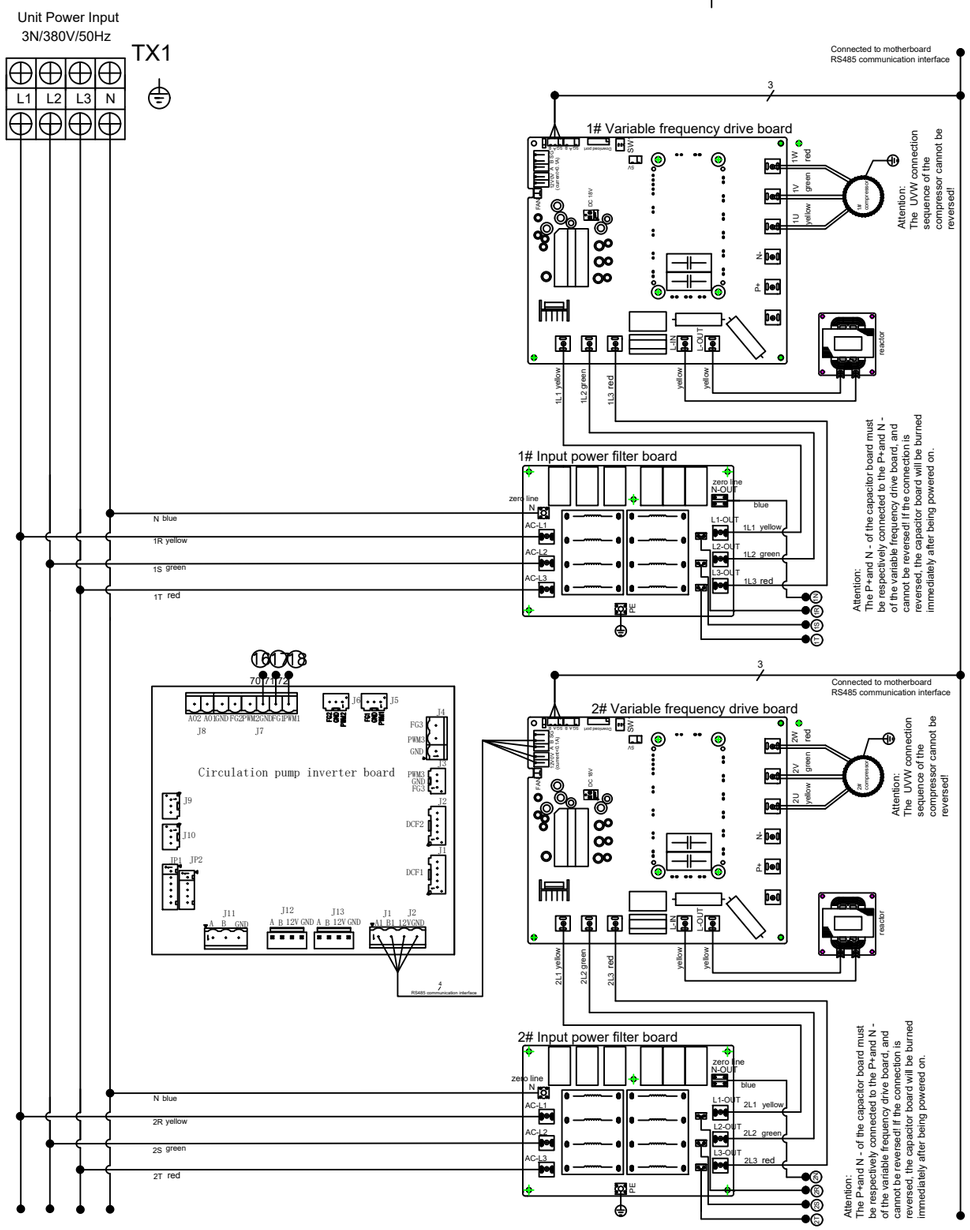
AQUA SOLANOR
2305 46th AVENUE, LACHINE (QC) H8T3C9

HSS500V3LS_WIRING1

DWG.NO.:HPCC500V3LS-1	Revision 0	Sheet 1



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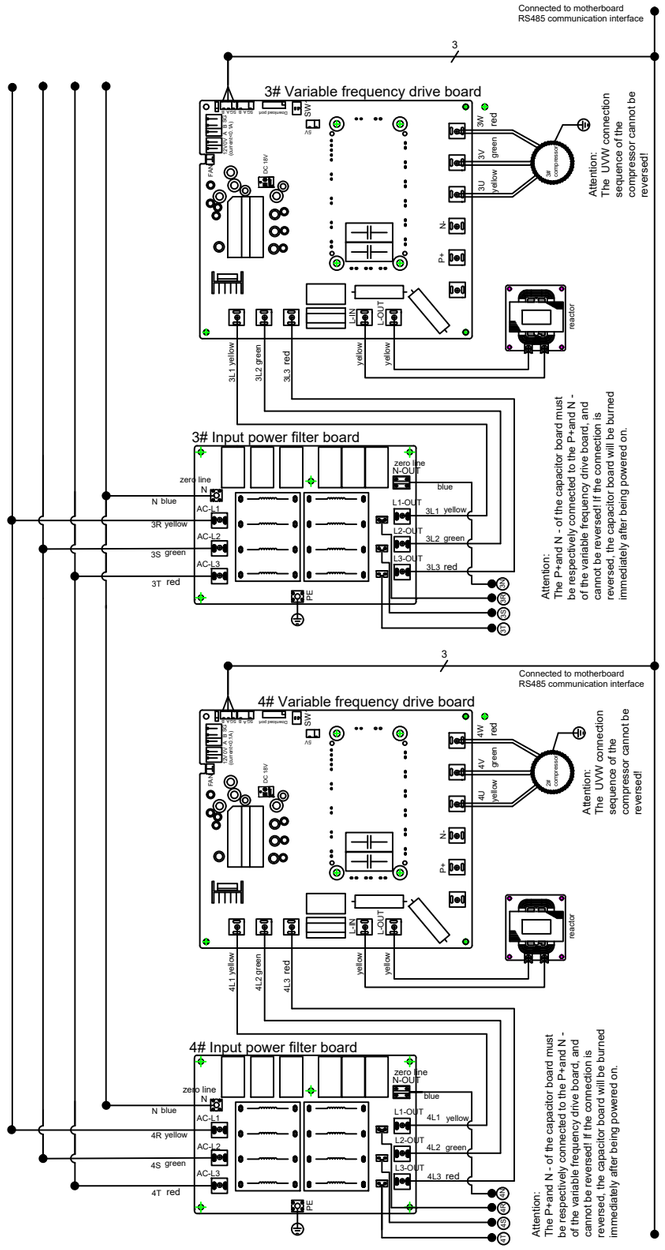
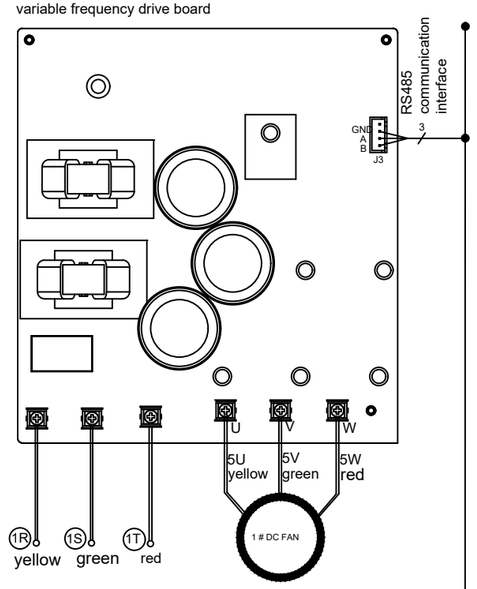
AQUA SOLANOR
2305 46th AVENUE, LACHINE (QC) H8T3C9

HSS500V3LS_WIRING2

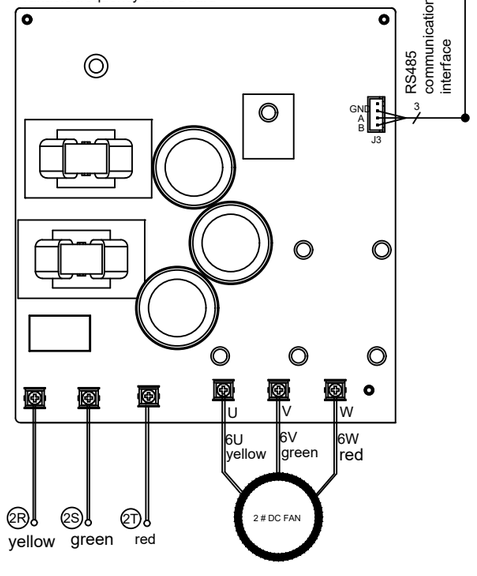
DWG.NO.:HPCC500V3LS-2	Revision 0	Sheet 1



1# DC Fan
variable frequency drive board



2# DC Fan
variable frequency drive board



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Designed by LAETITIA	Checked by ROGER	Approved by - date 2024-08-15	File name HSS500V3LSCTRLCD	Date 2024-08-15	Scale NTS

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

HSS500V3LS_WIRING3

DWG.NO.:HPCC500V3LS-3	Revision 0	Sheet 1

Annex B: User Parameter Settings

No	Item	Setting range	Default value	Unit	Remark
1	Control Mode	Cool Mode/Heat Mode/DHW Mode/DHW&Cool Mode /DHG&Heat Mode	Cool Mode		
2	Cool Set Temp	10～23	12	℃	
3	Heat Set Temp	28～55	40	℃	
4	DHW Set Temp	30～55	50	℃	
5	Auto Set Temp	30～55	50	℃	
6	Power mode	standard/strong/silent	standard		
7	ModeSilent	unused/Night/AllDay	unused		
8	SilentBgn Hour	0～23	22	h	
9	SilentBgn Min	0～59	0	min	
10	SilentEnd Hour	0～23	7	h	
11	SilentEnd Min	0～59	0	min	
12	Duty function en.	disable/enable	disable		Within the set time period, use [Heating Duty Temperature] or [Cooling Duty Temperature] as the target temperature
13	Duty set HT.	10～23	20	℃	
14	Duty set CL.	28～55	17	℃	
15	Duty on hour.	0～23	0	h	
16	Duty on min.	0～59	0	min	
17	Duty off hour.	0～23	0	h	
18	Duty off min.	0～59	0	min	
19	HT.2-WAY.INTLK	disable/enable	enable		
20	Heat obj cmps	disable/enable	disable		
21	Lock screen	disable/enable	disable		When using the lock screen function, if there is no operation for 45 seconds, return to the Home screen

Annex B: User Parameter Settings

No	Item	Setting range	Default value	Unit	Remark
					and lock the keys; Long press the 'Confirm' button to unlock
22	Alarm Sound Set	sound off/sound on/once 10sec/cycle 10sec	once 10sec		Set the buzzer sound mode for the alarm prompt sound, with a cycle of ten seconds to sound ten seconds every half hour.
23	PUMP.MODE	run/off/inter run	inter run		Interval operation: The water pump runs at intervals when the temperature is reached
24	END.PUMP.EN	disable/enable	disable		
25	Heat cmps T1	30～60	40		
26	Max Lun Time	0～999	30	min	
27	Cool time min	0～999	20	min	
28	Heat time max	0～999	20	min	
29	DHW time max	0～999	240	min	
30	H.PUMP Set Temp	10～55	55	°C	
31	Heat cmps T2	30～60	45		
32	Unit number	1～8	1		
33	00#Unit	disable/enable	enable		
34	All Comp Diff	0～20	6	°C	
35	Egy Ctrl Period	0～999	10	sec	
36	Steri. on day	Sunday～Saturday	Sundy		When any of the following conditions occur, timed sterilization cannot be performed: 1. When the 【 Setting Mode 】 is not set to "Hot Water", "Refrigeration + Hot Water", or "Heating + Hot Water"; 2. When the 【 Sterilization Function 】 is set to "Disabled"; 3. Domestic hot water tank without electric heating.
37	Steri. on hour	0～23	0	h	
38	Steri. on min	0～59	0	min	
39	Sterilization	disable/enable	enable		
40	Temp unit set	Celsius/Fahrenheit	Celsius		
41	Heat cmps set1	-30～45	5	°C	
42	Heat cmps set2	-30～45	-20	°C	

Annex C: Common Controller Error Codes

Fault category	ERROR CODE	Meaning	English name on controller	Heat Pump Alarm Action	Cause of malfunction	Solution
system failure	1	phase error protection	wrong phasic	Alarm, unable to power on	1. There is an issue with the phase sequence of the live wire 2. Problem with phase sequence detection "	1. Swap the positions of two live wires 2. Replacing the motherboard
	2	EEPROM data error fault	eep data err	Alarm, unable to power on	There is an issue with the program	1. Initialize all parameters. 2. If the fault cannot be eliminated after initialization, replace the motherboard of the same model
	3	System environmental temperature fault	SysEnvTempErr	Stop the compressor	1. Environmental temperature sensor malfunction 2. Main board malfunction	1. Replace the 10KΩ temperature sensor 2. Replacing the motherboard
	4	System temperature return fault	SysInTempErr	Stop the compressor	1. Return temperature sensor malfunction 2. Main board malfunction	1. Replace the 10K Ω temperature sensor 2. Replacing the motherboard
	5	System temperature failure	SysOutTempErr	Stop the compressor	1. Fault in the outlet temperature sensor 2. Main board malfunction	1. Replace the 10K Ω temperature sensor 2. Replacing the motherboard
	6	System maintenance data error	Protect eep err	Alarm, unable to power on	There is an issue with the program	1. Initialize all parameters. 2. If the fault cannot be eliminated after initialization, replace the motherboard of the same model
	7	Phase loss protection	lack phasic	Alarm, unable to power on	1. One to two of the three live wires are dead 2. Problem with phase sequence detection	1. Check if the incoming call has electricity 2. Replacing the motherboard
Compressor malfunction	0	Low pressure compressor	CM DI LP	Stop the compressor	1. System fluorine leakage and low pressure 2. Pressure switch faulty 3. Main board faulty 4. Fan or air duct blockage 5. Expansion valve too small or filter clogged	1. Find and fill in any gaps 2. Replace pressure switch 3. Replacing the motherboard 4. Replace the fan or clean the air path 5. Replace with accessories of the same model

Annex C: Common Controller Error Codes

Fault category	ERROR CODE	Meaning	English name on controller	Heat Pump Alarm Action	Cause of malfunction	Solution
	1	High pressure compressor	CM DI HP	Stop the compressor	1. The refrigerant system is blocked and the high pressure is too high 2. Pressure switch faulty 3. Main board faulty 4. The waterway system is out of water	1. Replace blocked accessories 2. Replace pressure switch 3. Replace the same model motherboard 4. Check the waterway to ensure sufficient water flow
	2	Excessive compressor current	CM curr high	Stop the compressor	The compressor current exceeds the set value	Measure current with a clamp meter
	3	The current of the compressor is too small	CM curr low	Stop the compressor	Compressor current too low	Measure current with a clamp meter
	4	Fin probe malfunction	WING T ERR	Stop the compressor	1. Temperature sensor faulty 2. Main board faulty	1. Replace the 10K Ω temperature sensor 2. Replacing the motherboard
	5	Exhaust probe malfunction	EXH T ERR	Stop the compressor	1. Temperature sensor faulty 2. Main board faulty	1. Replace the 10K Ω temperature sensor 2. Replacing the motherboard
	6	Exhaust temperature too high	EXH T HIGH	Stop the compressor	1. The exhaust temperature sensor is faulty 2. System fluorine deficiency 3. The refrigerant system is blocked	1. Replace the 10K Ω temperature sensor 2. Check for leaks 3. Replacing filters
	7	Low pressure transmission fault	LP SENSOR ERR	Stop the compressor	Pressure sensor malfunction	Replace the pressure sensor of the same model
	8	High pressure transmission failure	HP SENSOR ERR	Stop the compressor	Pressure sensor malfunction	Replace the pressure sensor of the same model
	9	Pressure transmission low pressure too low	CM press low	Stop the compressor	1. System fluorine leakage and low pressure 2. Fan or air duct blockage 3. Expansion valve too small or filter clogged	1. Find and fill in any gaps 2. Replace the fan or clean the air path 3. Replace with accessories of the same model
	10	Pressure transmission high pressure too high	CM press high	Stop the compressor	1. The refrigerant system is blocked and the high pressure is too high 2. The waterway system has no water or the water flow rate is too low	1. Replace blocked accessories 2. Check the waterway to ensure sufficient water flow

Annex C: Common Controller Error Codes

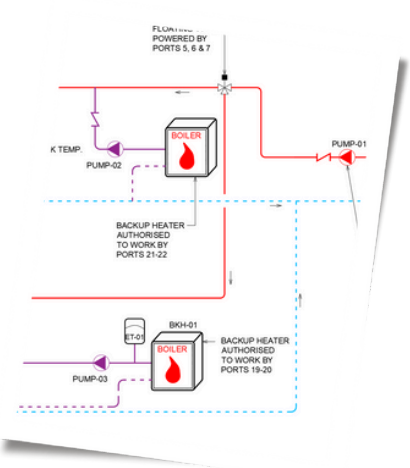
Fault category	ERROR CODE	Meaning	English name on controller	Heat Pump Alarm Action	Cause of malfunction	Solution
	11	Inhalation temperature malfunction	CM GAS IN ERR	Stop the compressor	1. Temperature sensor faulty 2. Main board faulty	1. Replace the 10K temperature sensor 2. Replacing the motherboard
	12	Valve rear temperature fault	CM EVAP IN ERR	Stop the compressor		1. Replace the 10K temperature sensor 2. Replacing the motherboard
	13	Low refrigeration suction	GasInLow	Stop the compressor	1. Less refrigerant 2. Air duct blockage	1. Check the pressure 2. Cleaning impurities
	14	Frequent emergency defrosting	Emerg defrost	Stop the compressor	1. Less refrigerant 2. Air duct blockage	1. Check the pressure 2. Cleaning impurities
	15	Abnormal temperature difference between suction and discharge	gasInOutErr	Stop the compressor	Inhalation temperature or exhaust temperature sensor malfunction	Replace the sensor with the same model
	19	Low return temperature	temp in low	Stop the compressor	The temperature return sensor is faulty	Replace the sensor with the same model
	20	The return temperature is too high	temp in high	Stop the compressor	The temperature return sensor is faulty	Replace the sensor with the same model
	21	Fan 1 abnormal speed	fan1 except	Stop the compressor	1. Motor malfunction 2. Wiring error	1. Replace the motor with the same model 2. Correct wiring
	22	Fan 2 abnormal speed	fan2 except	Stop the compressor	1. Motor malfunction 2. Wiring error	1. Replace the motor with the same model 2. Correct wiring
	23	EC1 communication failure	ec1 commu err	Stop the compressor	1. Poor communication 2. Missing zero line	1. Check the circuit or replace the communication line 2. Check income power
	24	EC1 malfunction	ec1 err	Stop the compressor	Variable frequency fault	Check the frequency converter of the fan
	25	EC2 communication failure	ec2 commu err	Stop the compressor	1. Poor communication 2. Missing zero line	1. Check the circuit or replace the communication line 2. Check income power
	26	EC2 malfunction	ec2 err	Stop the compressor	Variable frequency fault	Check the frequency converter of the fan
	27	Variable frequency	invt commu err	Stop the compressor	Poor communication	Check the circuit or replace the communication line

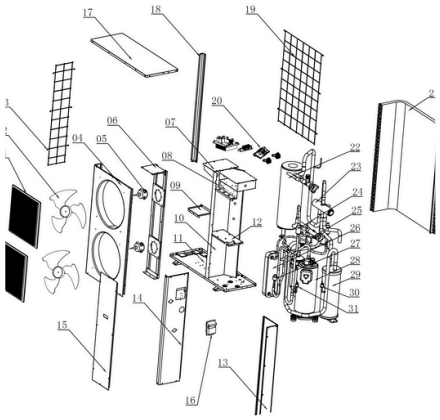
Annex C: Common Controller Error Codes

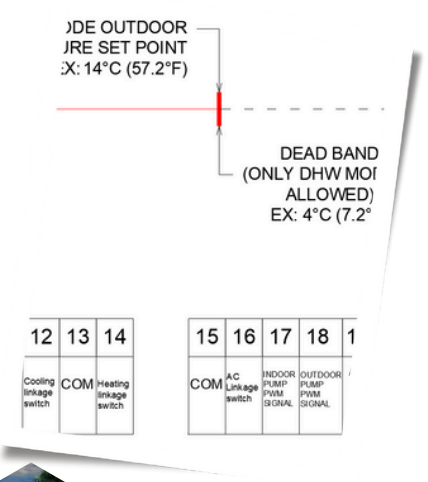
Fault category	ERROR CODE	Meaning	English name on controller	Heat Pump Alarm Action	Cause of malfunction	Solution
		communication failure				
	28	Variable frequency fault	invt err	Stop the compressor		
	32	Compressor overheating	CM OVERHEATING			
Unit failure	64	Module environmental temperature fault	unit env err	Stop the compressor	1. Temperature sensor faulty 2. Main board faulty	1. Replace the 10K temperature sensor 2. Replacing the motherboard
	65	Communication failure	commu err			
	66	EEPROM data error	eeprom data err	Alarm, unable to power on	There is an issue with the program	1. Initialize all parameters. 2. If the fault cannot be eliminated after initialization, replace the motherboard of the same model
	67	Phase loss protection	lack phasic	Alarm, unable to power on	1. One to two of the three live wires are dead 2. Problem with phase sequence detection	1. Check if the power supply has electricity 2. Replacing the motherboard
	68	Reverse phase protection	wrong phasic	Alarm, unable to power on	1. There is an issue with the phase sequence of the live wire 2. Problem with phase sequence detection	Swap the positions of two live wires Replacing the motherboard
	69	Module outlet temperature too low	temp out low	Stop the compressor	1. The outlet temperature sensor is faulty 2. The water flow rate is too small	1. Replace the sensor with the same model 2. Check water flow rate
	70	Module outlet temperature too high	temp out high	Stop the compressor	1. The outlet temperature sensor is faulty 2. The water flow rate is too small	1. Replace the sensor with the same model 2. Check water flow rate
	71	Module temperature failure	unit out err	Stop the compressor	The outlet temperature sensor is faulty	Replace the sensor with the same model
	72	Insufficient water flow	air lack water	If the compressor is stopped and the ambient temperature is below 2 °C, the air conditioning pump	1. Water flow switch malfunction 2. The water flow rate is too small 3. The water pump did not start 4. The water pump is too small	1. Replace the same model of water flow switch 2. Check for blockages or air in the waterway 3. Check the water pump

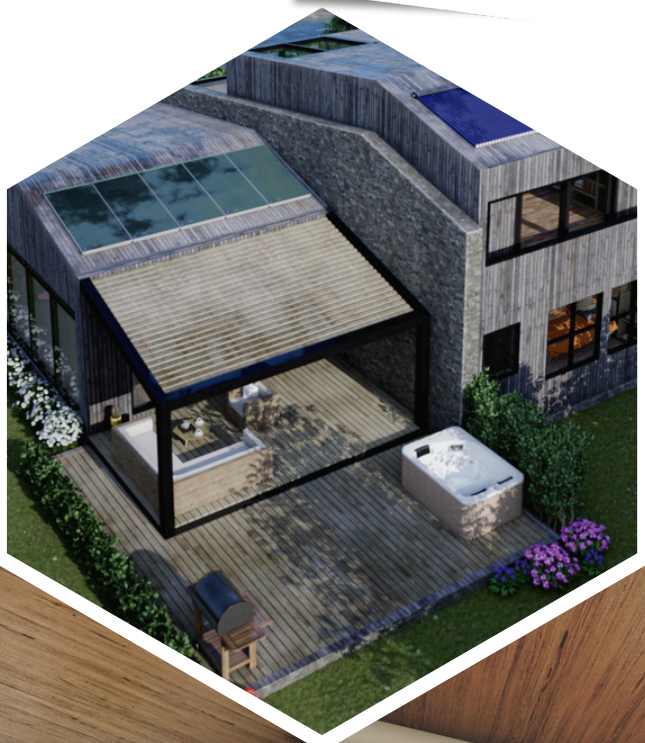
Annex C: Common Controller Error Codes

Fault category	ERROR CODE	Meaning	English name on controller	Heat Pump Alarm Action	Cause of malfunction	Solution
				will not be turned off		4. The water pump is too small
	74	Module return temperature fault	unit in err	Stop the compressor	1. Temperature sensor faulty 2. Main board faulty	1. Replace the 10K Ω temperature sensor 2. Replacing the motherboard
	77	Excessive temperature difference between outlet and return	outInDiffHigh	Stop the compressor	1. The water flow rate is too small	Check if there is any blockage or air in the waterway
	78	Abnormal temperature difference between outlet and return	outInDiffErr	Stop the compressor	Return or outlet temperature sensor malfunction	Replace the sensor with the same model
	80	Communication abnormality	commu except	Alarm, unable to power on	1. The communication line between the control board and the variable frequency drive board is connected incorrectly or disconnected 2. Severe communication interference	1. Check the control board, variable frequency drive board, and wiring 2. Check the wiring and grounding of the communication circuit









Aqua Solanor Inc. is the owner of **Hydro Solar Innovative Energy**
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