INSTALLATION & INSTRUCTION MANUAL

EVI DC INVERTER AIR TO WATER HEAT PUMP

Table of Contents

Notice

Save this manual for future reference. To use this product better and more safely, please read this manual carefully before installation and initial operation.

This heat pump must be installed by qualified and experienced technicians/trades-persons. Improper Installation of this heat pump may cause damage and danger.

This heat pump must be installed in accordance with local wiring regulations including an isolating switch from the supply mains and grounded power supply consistent with the power specification of this heat pump.

The installation of this heat pump must comply with the model's wiring chart in this manual and its power requirements as stated on the rating label on the side of the heat pump.

Do not install this heat pump close to flammable or explosive materials, or open flames.

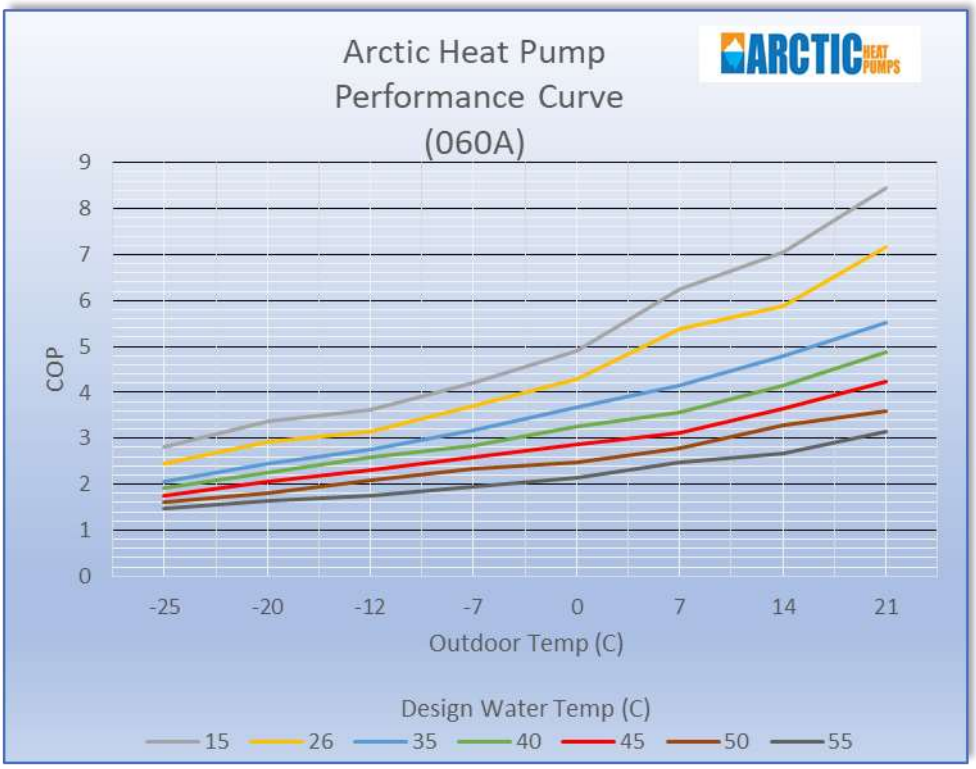
Checking and cleaning of the evaporator fin coil regularly is recommended for good and efficient air flow.

I. Specification

Technical Parameters of Arctic Air to Water Heat Pumps

Model	MAFP020A	MAFP040A	MAFP060A
Rated Cooling Capacity (kW) ①	7.5	12.5	150
Rated Input Power (kW) ①	3.0	4.1	6
Rated Input Current (A) ①	13.63	18.63	27.3
Performance COP (W/W) ①	2.5	2.5	2.5
Rated Heating Capacity (kW) ②	10.5	16.0	20
Rated Input Power (kW) ②	2.83	4.41	5.54
Rated Input Current (A) ②	12.86	20.04	25.2
Performance COP (W/W) ②	3.71	3.62	3.61
Rated Heating Capacity (kW) ③	8.5	14.0	17
Rated Input Power (kW) ③	2.7	4.4	5.35
Rated Input Current (A) ③	12.27	20.01	24.3
Performance COP (W/W) ③	3.14	3.18	3.18
Power Supply (V/Ph/Hz)	220-240/1/60	220-240/1/60	220-240/1/60
Max water output temp (℃)	60	60	60
Sound level (dba)	55	55	55
Compressor type	Rotary	Rotary	Rotary
Compressor Qty	1	1	1
Water inlet/outlet pipe diam. (inch)	1"	1"	1"
Recommended Water Flow Volume (USGPM)	6.5	11	13
Pressure drop at Recommended Flow Rate	15	21	21
Refrigerant type	R410a	R410a	R410a
Weight	110 KG	170 KG	180 KG

ASSUMPTIONS ① Outdoor air temp 35℃/24℃, Inlet water temp 12℃, Outlet water temp 7℃ (Cooling mode)
② Outdoor air temp 7℃/6℃, Outlet water temp 45℃ (Heating mode)
③ Outdoor air temp 7℃/6℃, Outlet water temp 55℃ (Heating mode)
* Using hydronic radiant skirting boards, note underfloor heating sizing depends on the floor covering, tiles are more efficient, carpet least efficient.



COP CURVE

Heating Performance Table

ARCTIC 020A

Power Input (W)

Outdoor Temp. / Water Inlet Temp.	-22℃<Tout	-22℃<Tout≤-15℃	-15℃<Tout≤-9℃	-9℃<Tout≤-3℃	-3℃<Tout≤4℃	4℃<Tout≤11℃	11℃<Tout≤18℃	18℃<Tout≤26℃	26℃<Tout≤35℃	Tout>35℃
≤10℃										
10℃<Ti≤20℃		2050	2108	1881	1907	1883	2038	1734	1696	1605
20℃<Ti≤32℃		2311	2348	2454	2201	2187	2106	2193	2144	2060
32℃<Ti≤38℃		2692	2704	2656	2617	2615	2524	2722	2796	2685
38℃<Ti≤43℃		2895	2934	2868	2913	3020	2706	2989	3101	2951
43℃<Ti≤48℃		3177	3219	3067	3257	3242	2946	3231	3285	3244
48℃<Ti≤53℃		3290	3250	3296	3257	3189	3070	3302	3079	3100
53℃<Ti		3259	3236	3320	3271	3245	3105	3149	3209	2993

Heating Capacity (W)

Outdoor Temp. / Water Inlet Temp.	-22℃<Tout	-22℃<Tout≤-15℃	-15℃<Tout≤-9℃	-9℃<Tout≤-3℃	-3℃<Tout≤4℃	4℃<Tout≤11℃	11℃<Tout≤18℃	18℃<Tout≤26℃	26℃<Tout≤35℃	Tout>35℃
≤10℃										
10℃<Ti≤20℃		5809	6860	7200	8290	9824	12657	13351	15638	17812
20℃<Ti≤32℃		5615	6756	7509	8372	9891	11240	12609	15437	17304
32℃<Ti≤38℃		5404	6603	7160	8343	9726	10189	12098	14696	16511
38℃<Ti≤43℃		5501	6633	6993	8220	9786	9861	11905	14484	15969
43℃<Ti≤48℃		5529	6658	6843	8069	9443	9360	11420	13810	15561
48℃<Ti≤53℃		5245	6027	6652	7081	8279	8454	10311	11882	13612
53℃<Ti		4544	5240	5668	6284	7306	7718	8817	10588	11619

COP (W/W)

Outdoor Temp. / Water Inlet Temp.	-22℃<Tout	-22℃<Tout≤-15℃	-15℃<Tout≤-9℃	-9℃<Tout≤-3℃	-3℃<Tout≤4℃	4℃<Tout≤11℃	11℃<Tout≤18℃	18℃<Tout≤26℃	26℃<Tout≤35℃	Tout>35℃
≤10℃										
10℃<Ti≤20℃		2.83	3.25	3.82	4.35	5.20	6.21	7.66	9.22	11.09
20℃<Ti≤32℃		2.43	2.88	3.06	3.82	4.52	5.34	5.75	7.17	8.37
32℃<Ti≤38℃		2.01	2.44	2.69	3.19	3.72	4.04	4.44	5.26	6.14
38℃<Ti≤43℃		1.90	2.26	2.44	2.82	3.24	3.64	3.99	4.67	5.40
43℃<Ti≤48℃		1.74	2.07	2.24	2.48	2.91	3.18	3.54	4.19	4.79
48℃<Ti≤53℃		1.59	1.85	2.02	2.17	2.6	2.75	3.14	3.86	4.39
53℃<Ti		1.40	1.62	1.70	1.92	2.25	2.49	2.81	3.31	3.89

ARCTIC 040A

-22℃<Tout	-22℃<Tout≤-15℃	-15℃<Tout≤-9℃	-9℃<Tout≤-3℃	-3℃<Tout≤4℃	4℃<Tout≤11℃	11℃<Tout≤18℃	18℃<Tout≤26℃	26℃<Tout≤35℃	Tout>35℃
		2989	2965	2879	2844	2768	2787	2510	2431
		3358	3355	3117	3260	3093	3338	3183	3186
	4082	3975	3941	3788	3706	3769	3876	3941	4077
	4322	4282	4243	4187	4225	4017	4250	4295	4585
	4683	4697	4637	4616	4694	4304	4600	4729	4521
	5012	4870	4956	4678	4708	4721	4684	4701	4561
	4932	4973	4845	4909	4759	4741	4185	4300	4409

-22℃<Tout	-22℃<Tout≤-15℃	-15℃<Tout≤-9℃	-9℃<Tout≤-3℃	-3℃<Tout≤4℃	4℃<Tout≤11℃	11℃<Tout≤18℃	18℃<Tout≤26℃	26℃<Tout≤35℃	Tout>35℃
		9482	10782	11204	13750	17330	19719	21159	23807
		9528	11041	11549	13882	16617	19664	22801	24968
	8098	9560	10786	11898	13785	15604	18571	21760	25701
	8265	9337	10430	11533	13534	14404	17655	20988	25041
	8342	9621	10225	11607	133328	13405	16752	20063	22870
	7988	9248	9647	9937	11526	13126	15422	16931	19728
	6657	7336	8087	9079	9860	11780	11195	13502	16051

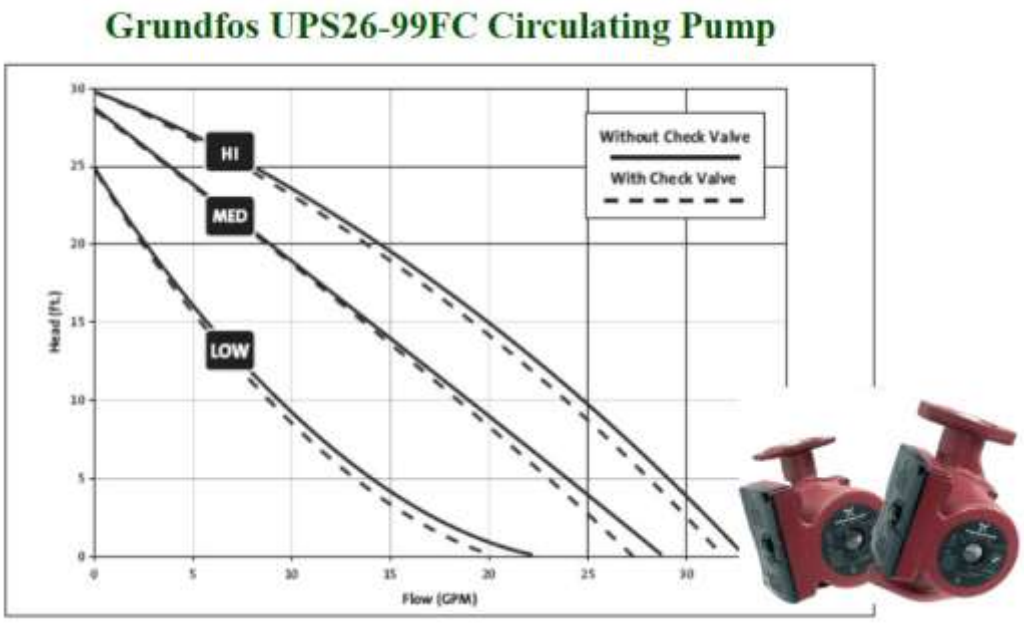
-22℃<Tout	-22℃<Tout≤-15℃	-15℃<Tout≤-9℃	-9℃<Tout≤-3℃	-3℃<Tout≤4℃	4℃<Tout≤11℃	11℃<Tout≤18℃	18℃<Tout≤26℃	26℃<Tout≤35℃	Tout>35℃
		3.17	3.61	3.89	4.84	6.26	7.06	8.45	9.79
		2.84	3.29	3.71	4.26	5.38	5.89	7.18	7.84
	1.99	2.4	2.75	3.14	3.72	4.14	4.79	5.52	6.3
	1.91	2.18	2.46	2.75	3.2	3.58	4.16	4.89	5.46
	1.78	2.05	2.22	2.49	2.85	3.12	3.64	4.23	5.06
	1.59	1.9	1.95	2.12	2.45	2.78	3.3	3.6	4.32
	1.35	1.48	1.67	1.84	2.07	2.48	2.67	3.14	3.64

ARCTIC 060A										
Power Input (W)										
Outdoor Temp. / Water Inlet Temp.	-22℃<Tout	-22℃<Tout≤-15℃	-15℃<Tout≤-9℃	-9℃<Tout≤-3℃	-3℃<Tout≤4℃	4℃<Tout≤11℃	11℃<Tout≤18℃	18℃<Tout≤26℃	26℃<Tout≤35℃	Tout>35℃
≤10℃										
10℃<Ti≤20℃		3593	3512	3604	3555	3452	2768	2787	2510	2431
20℃<Ti≤32℃		4044	4013	4149	4091	3982	3093	3338	3183	3186
32℃<Ti≤38℃		4845	4767	4677	4858	4516	3769	3876	3941	4077
38℃<Ti≤43℃		5095	5179	5028	5108	5153	4017	4250	4295	4585
43℃<Ti≤48℃		5575	5566	5234	5626	5776	4304	4600	4729	4521
48℃<Ti≤53℃		5738	5807	5436	5710	5788	4721	4684	4701	4561
53℃<Ti		5779	5734	5779	5646	5675	4741	4185	4300	4409
Heating Capacity (W)										
Outdoor Temp. / Water Inlet Temp.	-22℃<Tout	-22℃<Tout≤-15℃	-15℃<Tout≤-9℃	-9℃<Tout≤-3℃	-3℃<Tout≤4℃	4℃<Tout≤11℃	11℃<Tout≤18℃	18℃<Tout≤26℃	26℃<Tout≤35℃	Tout>35℃
≤10℃										
10℃<Ti≤20℃		10088	11878	13083	15011	17064	17330	19719	21159	23807
20℃<Ti≤32℃		9954	11737	13017	15016	17055	16617	19664	22801	24968
32℃<Ti≤38℃		10001	11752	12933	15389	16696	15604	18571	21760	25701
38℃<Ti≤43℃		9834	11759	13003	14520	16853	14404	17655	20988	25041
43℃<Ti≤48℃		9667	11527	12166	14561	16651	13405	16752	20063	22870
48℃<Ti≤53℃		9227	10592	11355	13308	14309	13126	15422	16931	19728
53℃<Ti		8480	9499	10056	11092	12175	11780	11195	13502	16051
COP (W/W)										
Outdoor Temp. / Water Inlet Temp.	-22℃<Tout	-22℃<Tout≤-15℃	-15℃<Tout≤-9℃	-9℃<Tout≤-3℃	-3℃<Tout≤4℃	4℃<Tout≤11℃	11℃<Tout≤18℃	18℃<Tout≤26℃	26℃<Tout≤35℃	Tout>35℃
≤10℃										
10℃<Ti≤20℃		2.81	3.38	3.62	4.22	4.92	6.26	7.06	8.45	9.79
20℃<Ti≤32℃		2.46	2.92	3.14	3.7	4.28	5.38	5.89	7.18	7.84
32℃<Ti≤38℃		2.07	2.46	2.77	3.17	3.69	4.14	4.79	5.52	6.3
38℃<Ti≤43℃		1.93	2.26	2.59	2.84	3.27	3.58	4.16	4.89	5.46
43℃<Ti≤48℃		1.74	2.07	2.32	2.59	2.88	3.12	3.64	4.23	5.06
48℃<Ti≤53℃		1.62	1.82	2.09	2.33	2.47	2.78	3.3	3.6	4.32
53℃<Ti		1.47	1.65	1.74	1.96	2.15	2.48	2.67	3.14	3.64

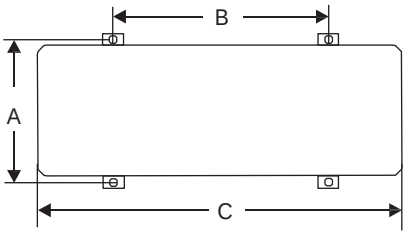
Recommended Circulation Pump (External)

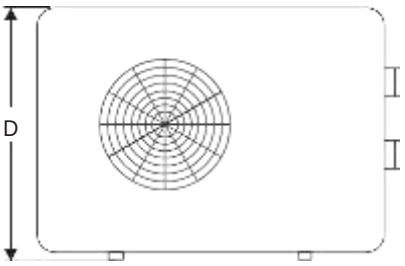
Technical Specifications
UPS26-99FC (240 VAC):

- Voltage: 230 VAC
- Amperage at Speed 1: 1.3 Amps;
- Amperage at Speed 2: 1.5 Amps;
- Amperage at Speed 3: 1.8 Amps;
- Hertz: 60 Hz;
- Phase: 1;
- Watts at Speed 1: 150W;
- Watts at Speed 2: 179W;
- Watts at Speed 3: 197W;
- Max Pressure: 145 psi;
- Max Temperature: 230F;
- Min Temperature: 36F;
- Flow Range: 0-33 GPM;
- Head Range: 0-29 ft;
- Horse Power: 1/6HP;
- Body: Cast Iron;
- Connections: Flanged, 1/2", 3/4", 1", 1-1/4";



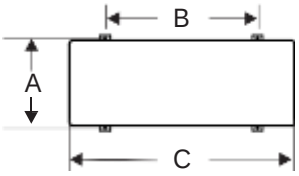
Product Dimensions

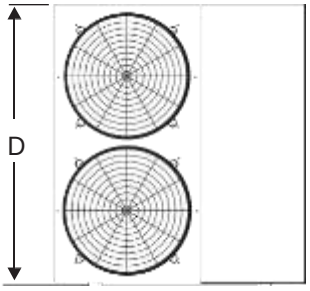




mm/inches

Size \ MAFP	020A
A	440mm/17.3”
B	760mm/29.9”
C	1145mm/45”
D	840mm/33”





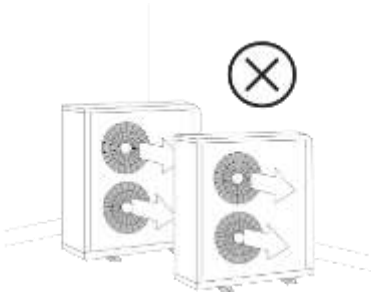
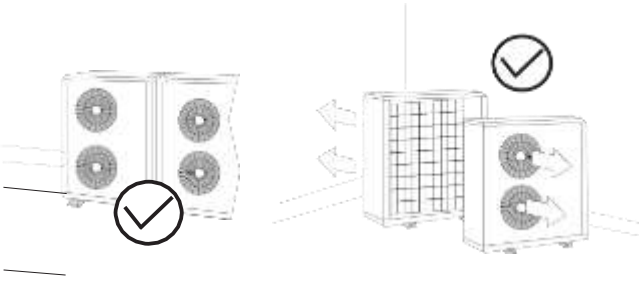
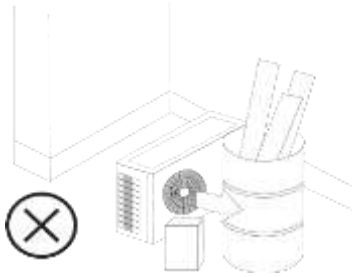
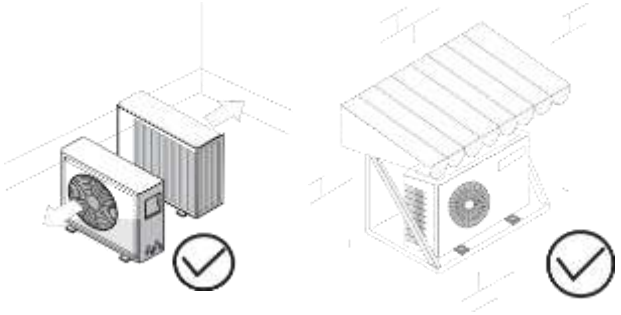
Size \ MAFP	040A & 060A
A	440mm/17.”
B	760mm/29.9”
C	1195mm/47”
D	1285mm/50.6”

II. Installation

Heat Pump Installation

This heat pump requires good air flow through the fin coils for maximum efficiency. Also, hotter outside air temperature in cooling mode and colder outside air temperature in heating mode will reduce performance of the heat pump. Therefore, the hot/cold discharged air in cooling/heating modes from the heat pump should not be allowed to deflect back to the air inlet.

Please keep enough space around the heat pump for repairs and maintenance.

Wrong	Right
	
	

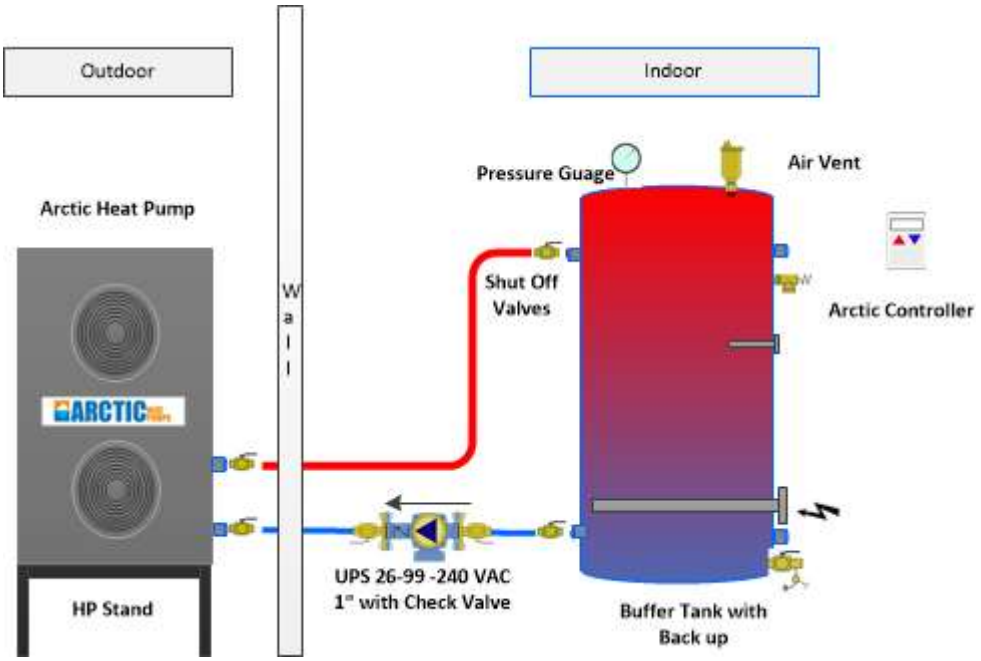
Installation Considerations:

- The installation position should have good ventilation.
- The installed heat pump should not make extraneous noises or rattling sounds.
- Try to minimize direct sunlight onto the unit.
- Water from rain or defrost mode will be discharged through a drain hole in the base plate. So unit must be raised in freezing climates to avoid ice build up.
- The outlet air position should not face into a prevailing wind direction or this will reduce performance efficiency.
- Try to site the heat pump so the outlet air does not discharge directly onto a fence or towards a neighbor.
- The installation position should not be located next to flammable or explosive materials, or open flames.
- The heat pump should be protected from oil (such as engine oil in a factory environment), salt (such as sea spay or salty air) and/or sulphides (that may be present in the air from industrial activity or a thermal spring).
- The heat pump should ideally be installed on a raised stand, preferably secured to a concrete pad. Alternately, the heat pump can be installed on a balcony, ledge, wall or roof provided there is a suitable load-bearing platform in place capable of supporting the weight of the unit and not transmitting vibration noise.
- There should be a drain-pipe or channel from the heat pump to take the condensate water away

- Do not install the control panel in a wet environment which may cause the control panel to malfunction.
- In cold regions where heat pump will be used primarily for heating, the unit should be raised off the ground 18-24” to allow ice accumulation below the drain hole, otherwise drain pan will become plugged.

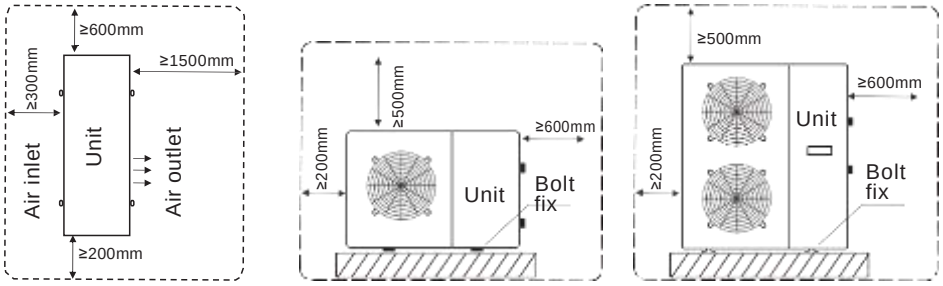
Elevate Heat Pump in Freezing Climate

Drain hole



Basic Layout

Installation Space Requirements:



Buffer Tank Installation

Site Selection

- The Buffer tank should be installed indoors
- When there is a chance of freezing, **glycol/water mixture** should be used in the buffer tank.
- The buffer tanks should be installed on a concrete pad and comply with local codes, so the tanks remain upright and stable.
- Some building codes require seismic restraint. Consider restraining the buffer tanks with stainless steel bands.
- Ensure the specification label is visible.
- A pressure limiting valve (pressure release valve) must be fitted with buffer tanks, consult local building codes.
- A pressure and temperature relief valve must be supplied with the domestic hot water tank, consult local building codes
- A tempering (mixing?) valve for hot water supply to bathrooms may be required by some local codes
- A drain must be included to allow full and complete draining of the tank.
- It is recommended that the hot water outlet pipes **are fully insulated with weather proof insulation** such as Armaflex or equivalent, to prevent heat loss externally
- The hot water outlet pipes should be angled down by 15 deg C minimum for the first 250mm (10 inches) after exiting from the hot water storage or buffer tanks. This will create a heat trap that will avoid any thermal siphoning from the tanks.
- Fill the storage and buffer tanks by opening the pressure release or air release valve on top of tank to release buildup of air pressure in the tank as fluid volume enters tank. Check all pipes for any signs of leaks. Power should not be turned on until the tanks are completely filled with water.

Installation of Indoor Heating and Cooling Equipment

- Indoor heating and cooling equipment such as fan coils, radiator heating or floor heating, should be installed in accordance with relevant regulatory requirements, engineering design drawings, and the manufacturer's installation instructions.
- Use flexible piping to connect the heat pump and indoor heating and cooling equipment, such as PEX or flexible stainless steel or flexible cooper.
- If using fan coils to cool be sure to install condensate water drain pipes to the indoor fan coil units with smooth drainage lines for the condensate water to flow easily.

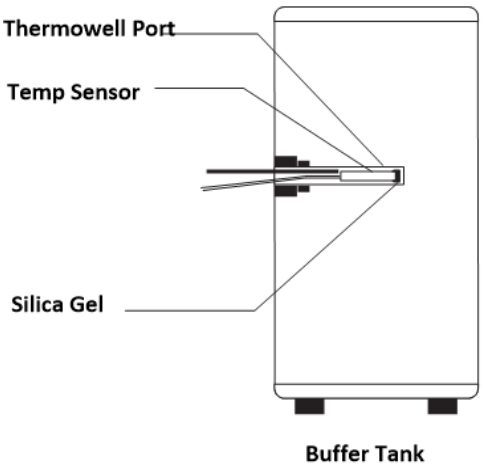
Water Pipe Connections

- Water pipe material should be heat resistant and rust-proof. This can be stainless steel, copper, aluminum, hot water PEX pipes, etc., according to local standards.
- The pipework of the system should follow the relevant standards, and transition to match the connection size of the heat pump
- The hot water storage and buffer tank drain port and pressure and temperature relief valve should be installed to allow for proper drainage according to relevant standards.
- The pump is installed **INDOORS** located on the water inlet line (lower line) **with arrow on pump flowing to the heat pump.** Be sure to add an **isolation shut off valves** to service pump in the future.
- The hot water storage and buffer tank must be installed with an isolating valve to allow for maintenance.
- The water pipes should be arranged with minimal bends to reduce pressure loss in the system.
- The water inlet should be fitted with a one-way check valve (found in the UPC 26-99fc pump) and isolating valves for service
- After all the pipes are connected, the system should be tested at water supply pressure for 24 hours to ensure that the system does not leak. Then insulate relevant hot water and cold pipes, and ther plumbing fittings.
- In order to discharge all air from the water pipeline, the water supply return pipe should have an automatic air bleeding valve installed at the highest point.
- An **expansion tank must be installed** into the system to absorb expansion of the closed loop as temperature increases in the system. It should be installed on suction side of pump.
- It is recommended to install in the water flow and return a thermometer and water pressure gauge to enable monitoring of key operational parameters.

Note:

1. The recommended pressure of the heat pump loop should be 11-20 psi.
2. The water pipes should be subjected to a pressure test before operation of the heat pump twice the operating pressure.
3. A drainage pipe should be installed to drain from the pressure and temperature relief valve.
4. The pressure and temperature relief valve should be periodically exercised by gently pulling the lever up. This will help to remove possible accumulation of calcium carbonate and ensure that the valve is working properly.
5. Install one-way (check) valves, shut on valves, pressure and temperature relief valves, and any other plumbing fittings consistently with the marked flow direction and in accord with relevant local standards.

Installation of the Temperature Detector



1. Firstly, place a small amount of heat conductive silicone onto the front of the temperature sensor, then insert it into the temperature thermowell port.
2. Next, push the temperature sensor through to the end of the thermowell, then mark the depth of the pin on the sensor wire.
3. Next, pull the senor and check that the position of mark is at the same depth as the end of the sensor well to ensure the sensor is inserted into the sensor well all the way (use a thin wire to check depth of sensor well)
4. Finally, seal the inlet of the temperature detector with silicone.

Electrical Wiring

- The heat pump should use dedicated power cable with voltage and current capacity following the electrical code given the voltage and amperage rating of the heat pump and circulating pump
- Outdoor rated disconnect must be installed near the heat pump as per local codes.
- The power cable for the heat pump must be outdoor rated and protected in a metal jacket or conduit.
- The heat pump power supply circuit must have a grounding wire, which should connect with a reliable and effective external ground wire.
- Wiring must be installed by qualified electrician with reference to the circuit diagram.
- The layout of power wires/cables and control cables should be neat, well supported and with power and control cables separated so they cannot interfere with each other.
- When power lines and control cables are parallel, the wires must be placed inside conduit, with appropriate distance between the cables.
- For electrical connection of the heat pump, pull the following wiring through the wiring hole of the electrical box, then connect to the appropriate terminals in the electrical box according to wiring diagram:
  - Power cable (240 VAC)
  - Digital Controller cable
  - Electric back up heater switch control cable
  - Temperature tank sensor cable
  - Pump cable (240 VAC)
  - Optional 3-way Valve cable (240 VAC)

Electrical Wire Selection – Warning

- The internal compressor motor insulation does not protect the compressor against all possible conditions. Please be sure that the system is properly grounded when installed in the field.
- To avoid fire, electric shock and other accidents, only use the power supply voltage indicated on the label.
- To protect the power cables, they should be secured appropriately so that they cannot become damaged and people cannot trip over them. Outdoor rated wire should be used from the disconnect to the heat pump
- Dedicated circuits should be used to avoid overloading breakers from other appliances.
- Check to ensure your electrical cable and fuse rating is appropriate for the power load and is properly grounded.

Specification Table of Power Code (single unit)

Mode	Power	Amps	Fuse	Wire size
020	208~240V/1PH/60Hz	13.6	20 Amps	12 AWG
040		20.0	30 Amps	10 AWG
060		24.5	40 Amps	10 AWG

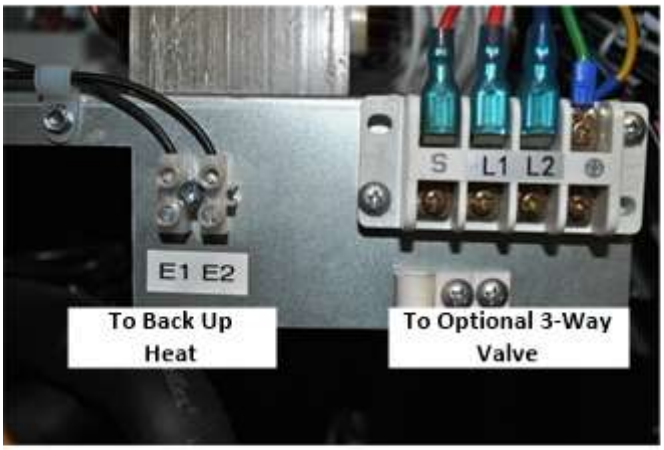
What Gets Connected and Where

Electrical wiring should be performed by a qualified electrician. There are 5-6 required connections that will need to be connected indoors. A hole should be drilled where the wires will transition through the wall

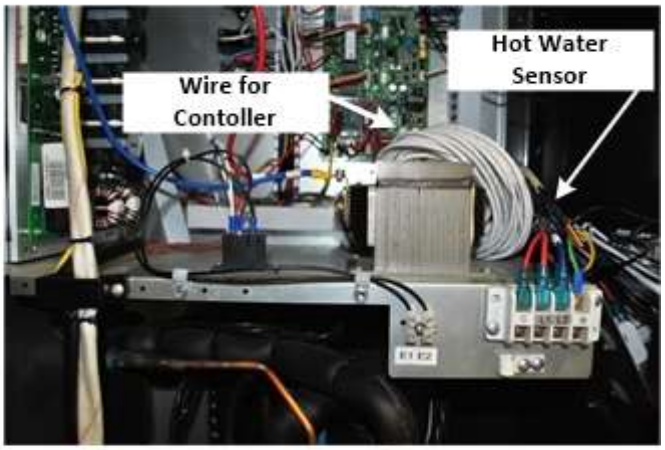
Main Supply Power – 240 VAC – Must have an outdoor disconnect
Pump Output Power – 240 VAC AWG #16
Control Panel (mount indoors)
Hot Water Tank Sensor
Back Up Heat Control (dry contact)
Optional 3 – Way Valve Output for Cooling -240 VAC AWG #16

Remove Power Access Panel

Connect Main & Pump power

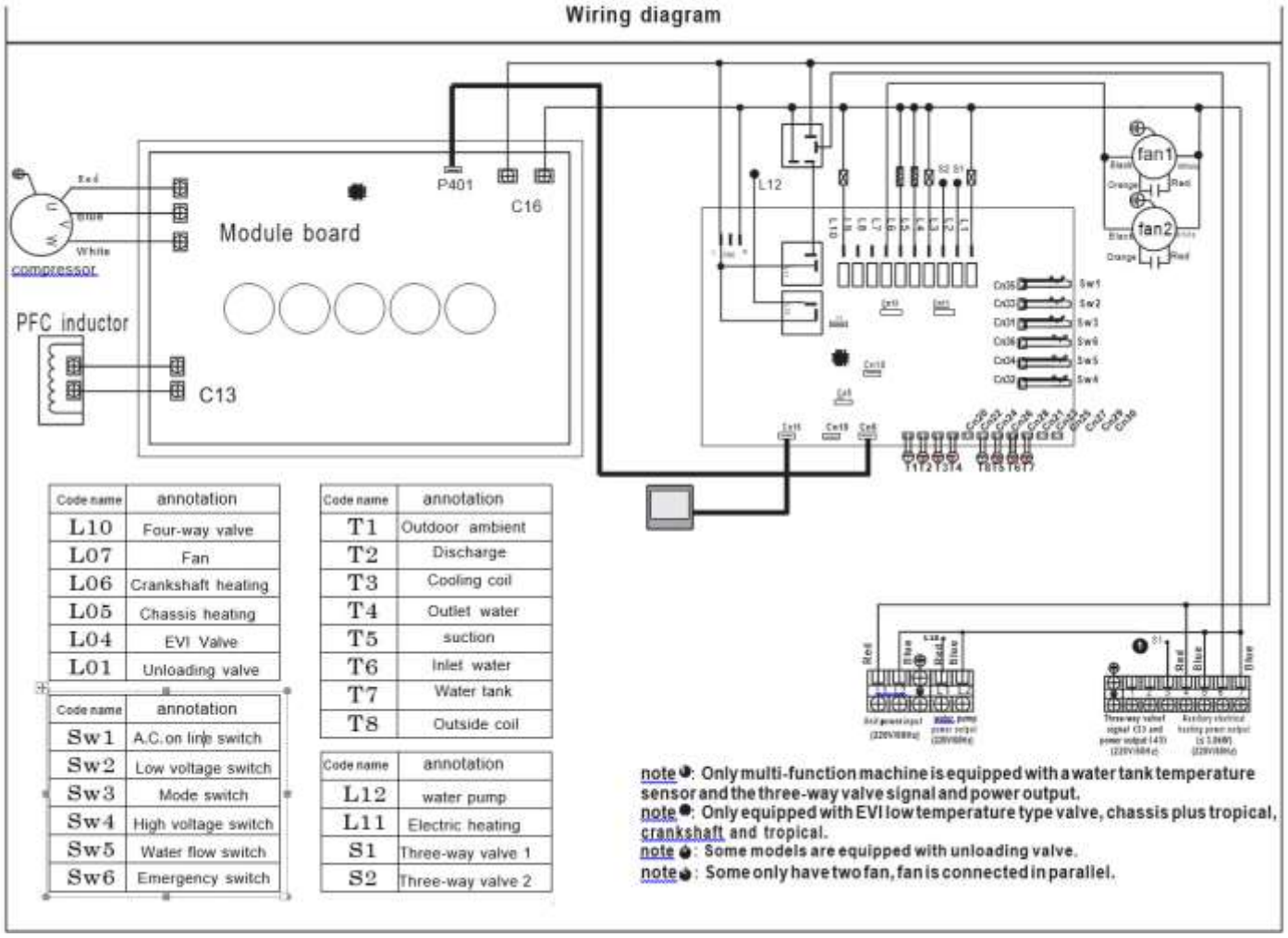


Remove front panel to access accessory Termainal Blocks



Remove Wiring for Controller and Hot Water Tank Sensor

Wiring diagram



Code name	annotation
L10	Four-way valve
L07	Fan
L06	Crankshaft heating
L05	Chassis heating
L04	EVI Valve
L01	Unloading valve

Code name	annotation
Sw1	A.C.on line switch
Sw2	Low voltage switch
Sw3	Mode switch
Sw4	High voltage switch
Sw5	Water flow switch
Sw6	Emergency switch

Code name	annotation
T1	Outdoor ambient
T2	Discharge
T3	Cooling coil
T4	Outlet water
T5	suction
T6	Inlet water
T7	Water tank
T8	Outside coil

Code name	annotation
L12	water pump
L11	Electric heating
S1	Three-way valve 1
S2	Three-way valve 2

note : Only multi-function machine is equipped with a water tank temperature sensor and the three-way valve signal and power output.
note : Only equipped with EVI low temperature type valve, chassis plus tropical, crankshaft and tropical.
note : Some models are equipped with unloading valve.
note : Some only have two fan, fan is connected in parallel.

See Appendix for Detailed Wiring Options

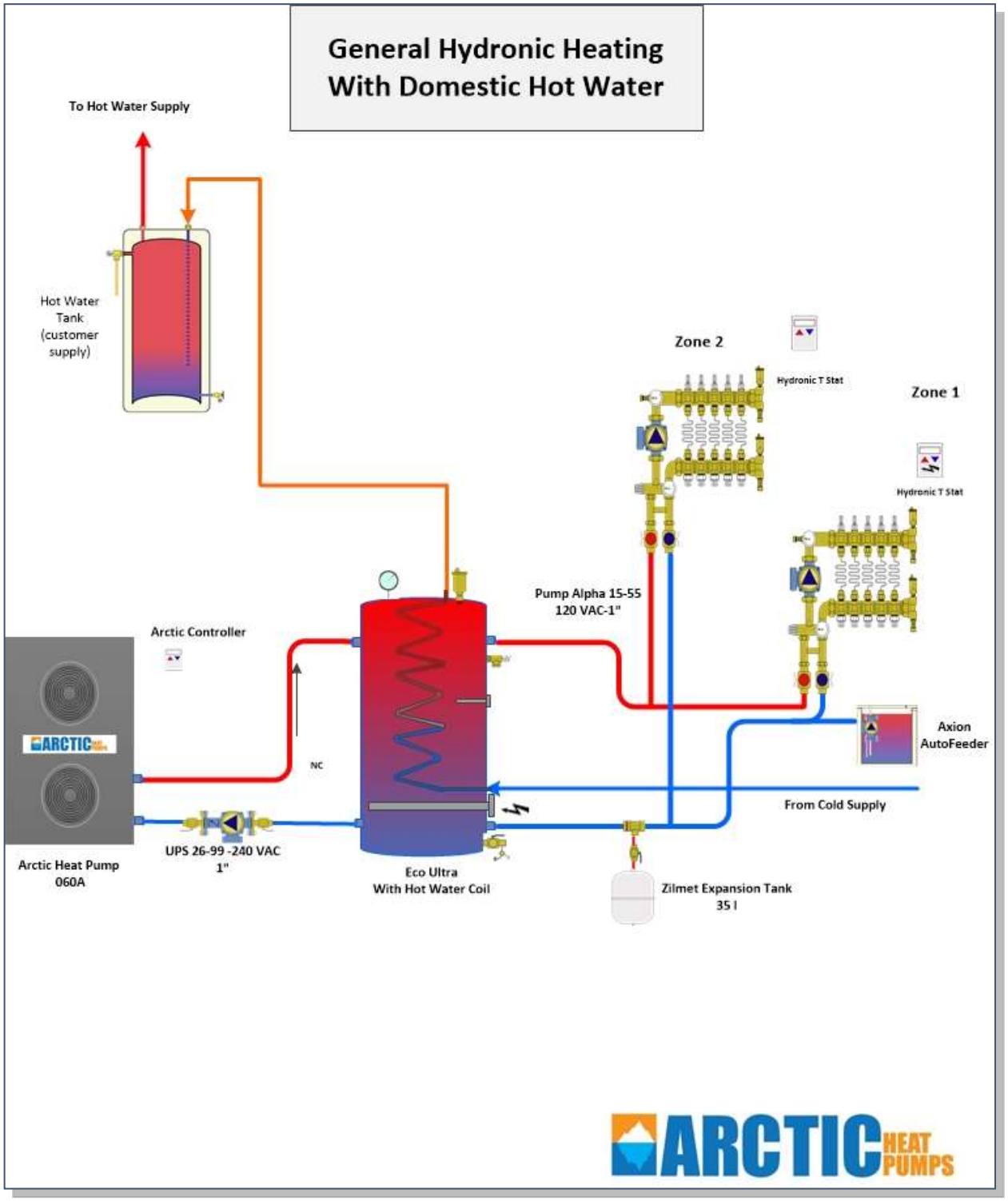
Trial Operation by Qualified Installer

Pre-start-up checks:

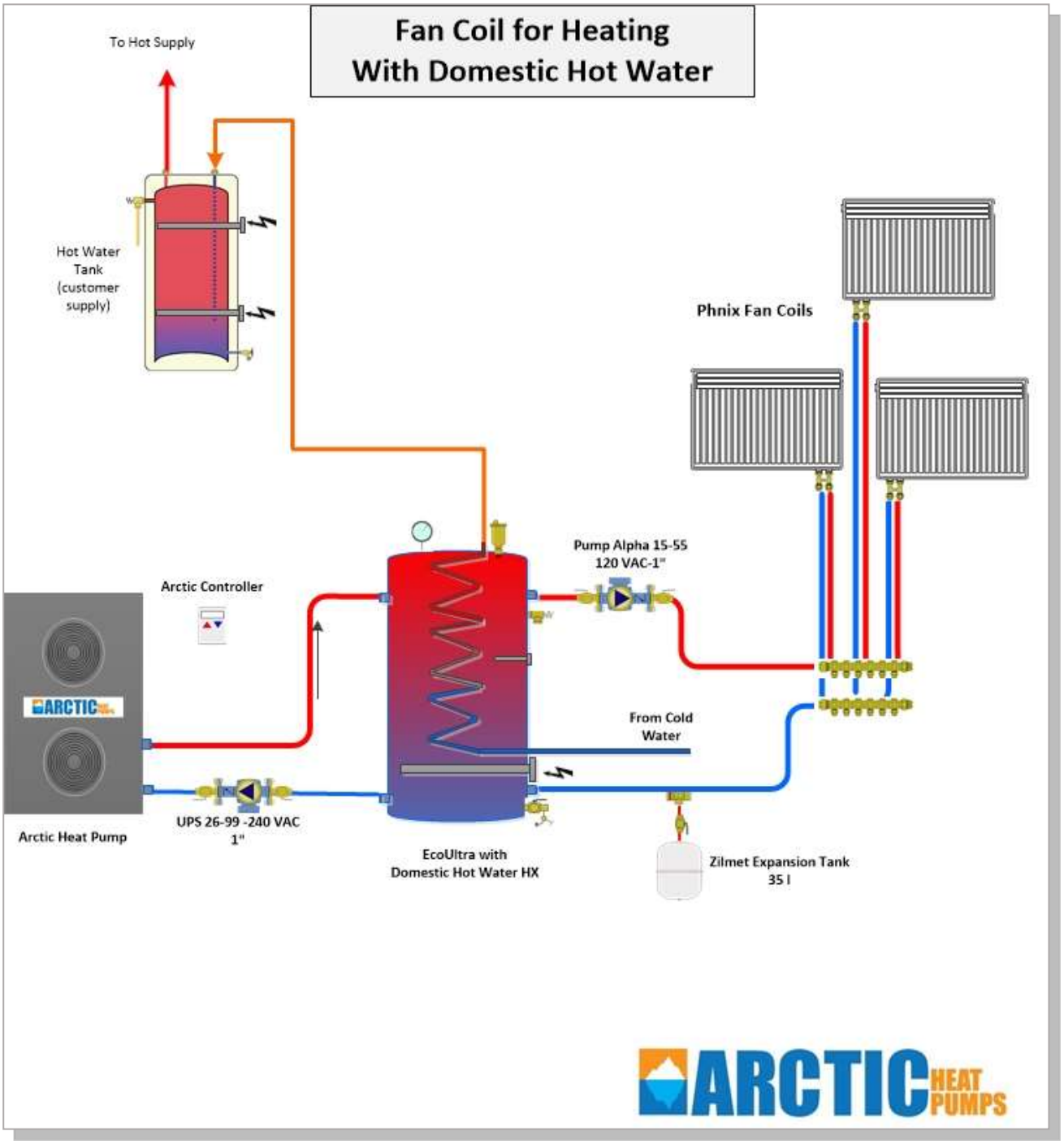
- Check the entire pipe system. Ensure the system is full and the air is removed completely. Check whether the valves are open throughout the system.
- Check the thermal insulation of the pipe work, make sure relevant pipes are appropriately insulated (hot and cold).
- Check the power supply and distribution system. Check whether the power supply voltage is correct (240 volts), the power connection screws are tight, supply power complies with the wiring diagram and heat pump specifications and the equipment is properly grounded.
- Press and hold on/off button on the digital controller. The water pump should start immediately. The compressor should start shortly after. Observe and determine if there is any abnormal sound during operation. If so stop the unit and determine the cause. The heat pump should be restarted only when the cause has been fixed and there is no more abnormal sound.
- Check whether the input power and current of the unit are within the parameters set out in this manual under Parameters (C1 and C7 2017 and older models and A4 and A13 on 2019 and newer). If not, stop the heat pump and check it.
- Observe whether the outlet water temperature is normal. Should be 2-6 degrees above the inlet temp (Parameter Ce and Cd- 2017 and older and o2 and o3- 2018 and newer)
- The parameters of the remote controller have been pre-set at the factory. We recommend that you leave these parameters as set.

III. Installation Illustrations

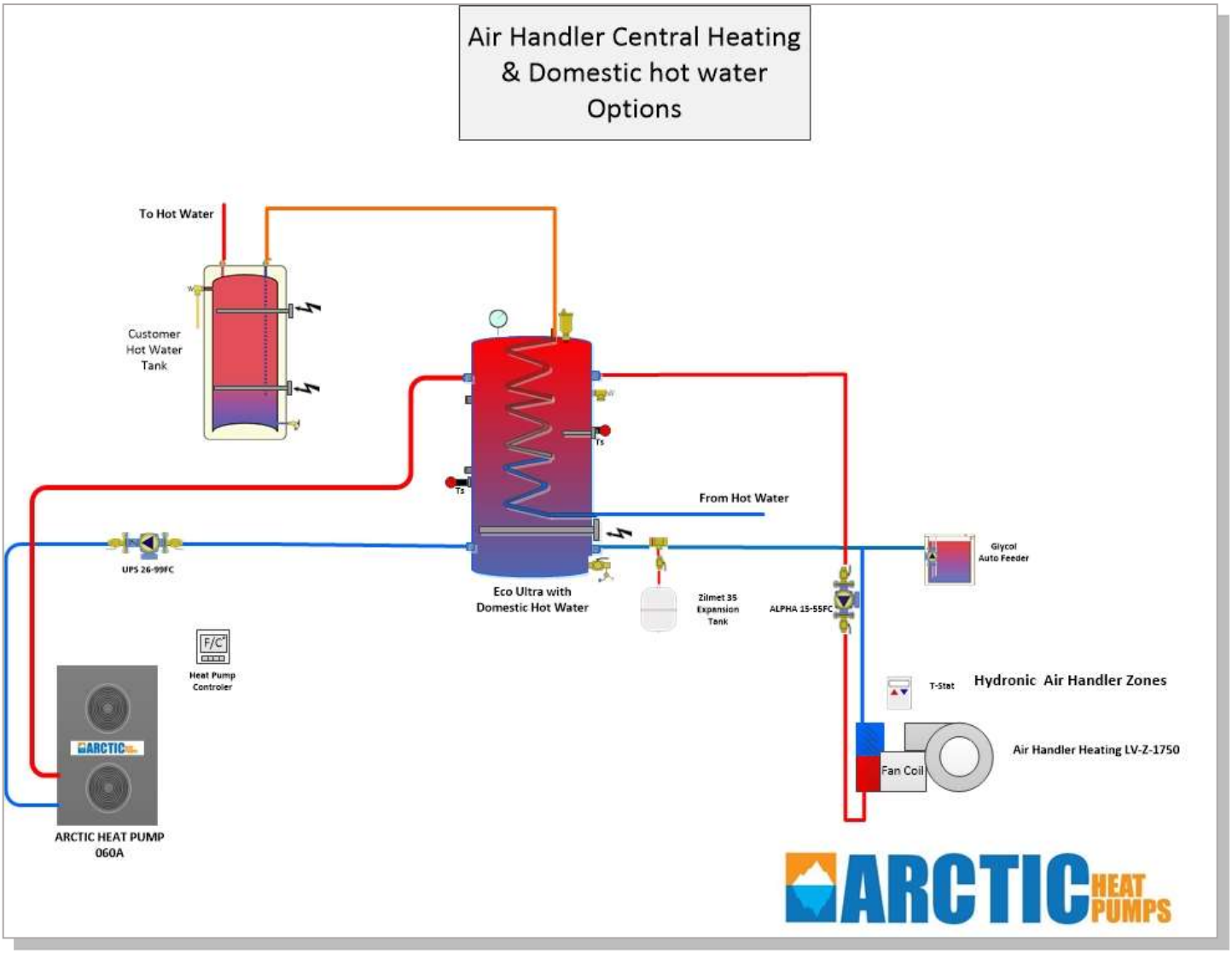
Hydronic Heating
With Optional Hot Water Coil



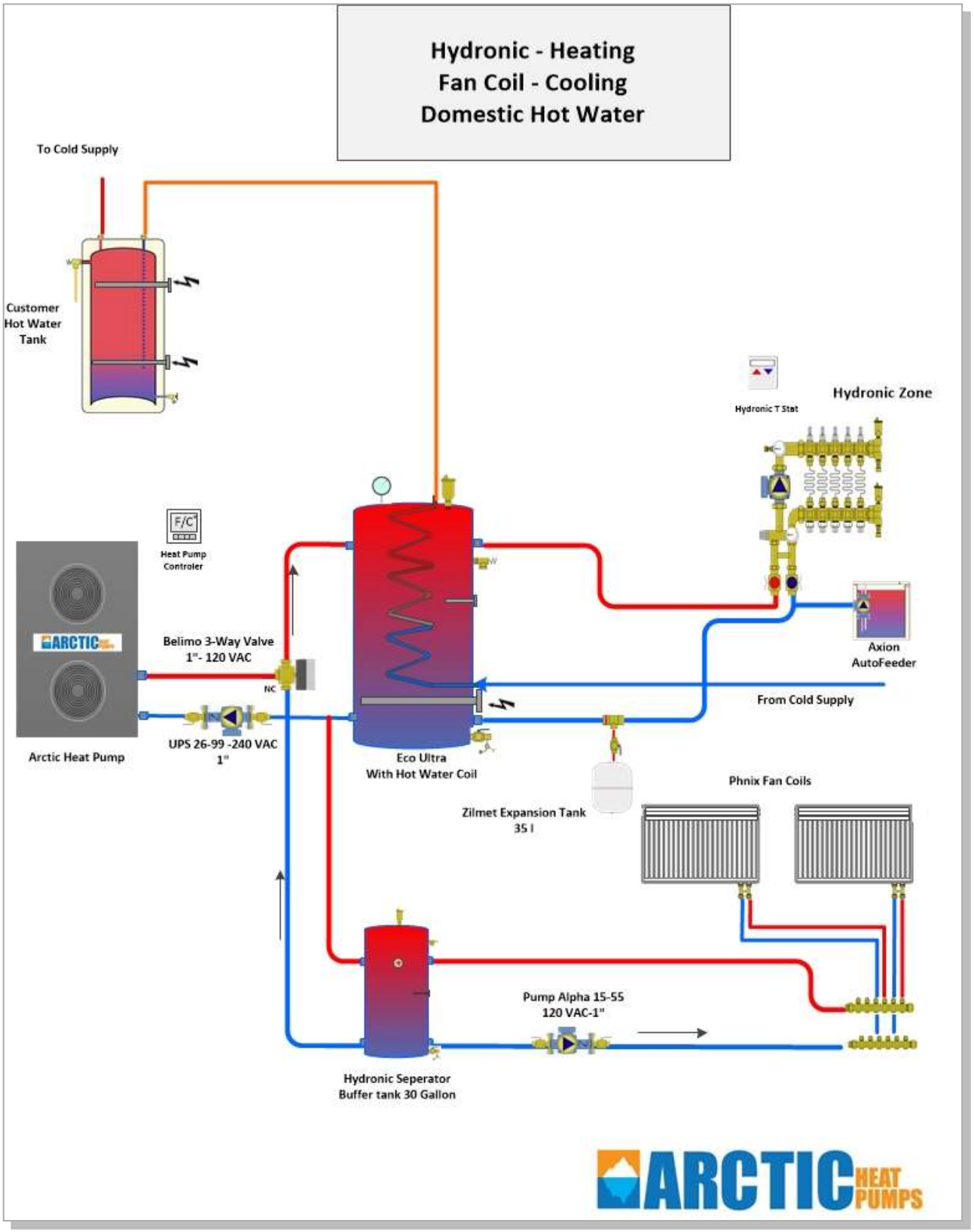
Fan Coil Heating
With Optional Hot Water Coil



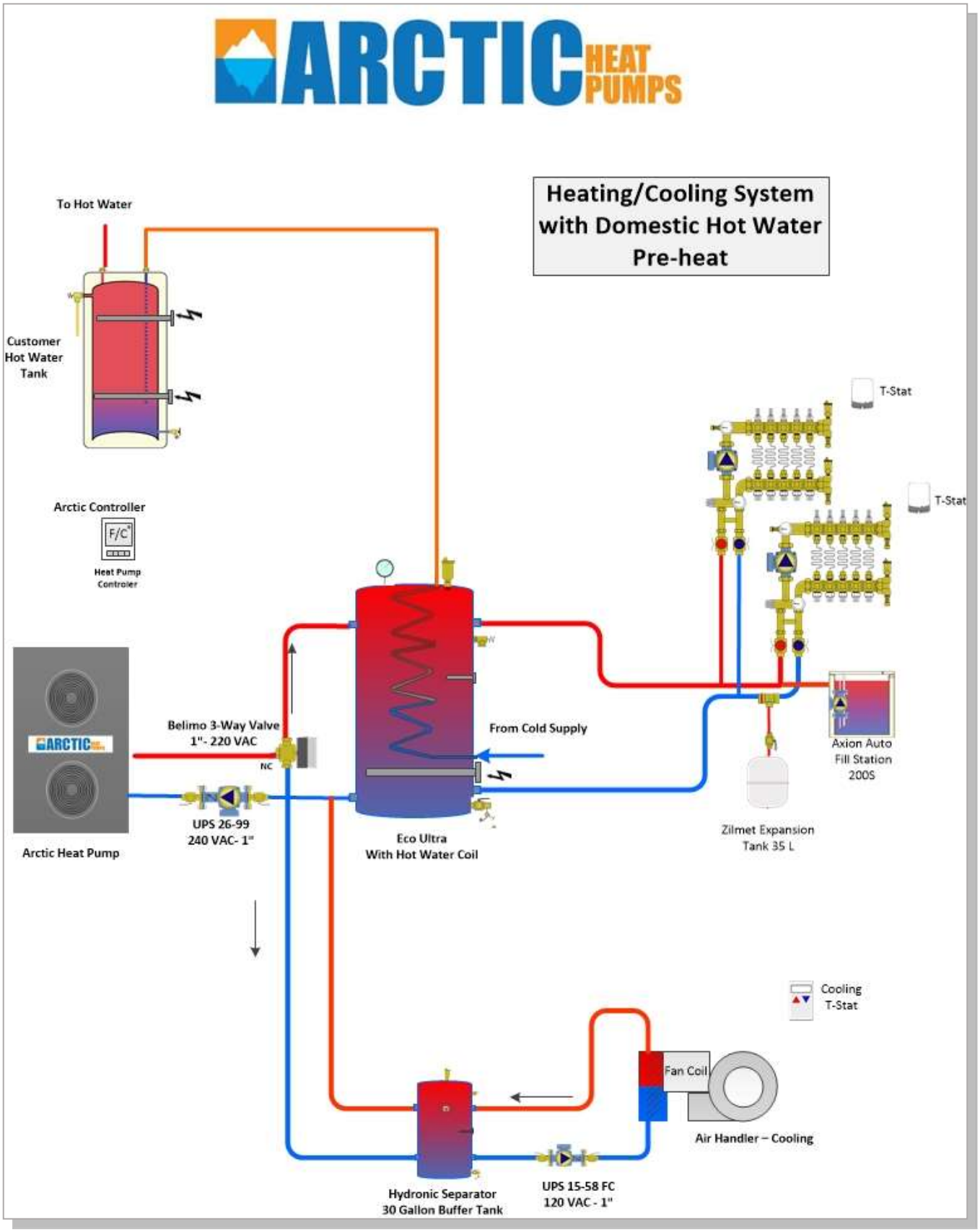
Air Handler Heating
With Optional Hot Water Coil



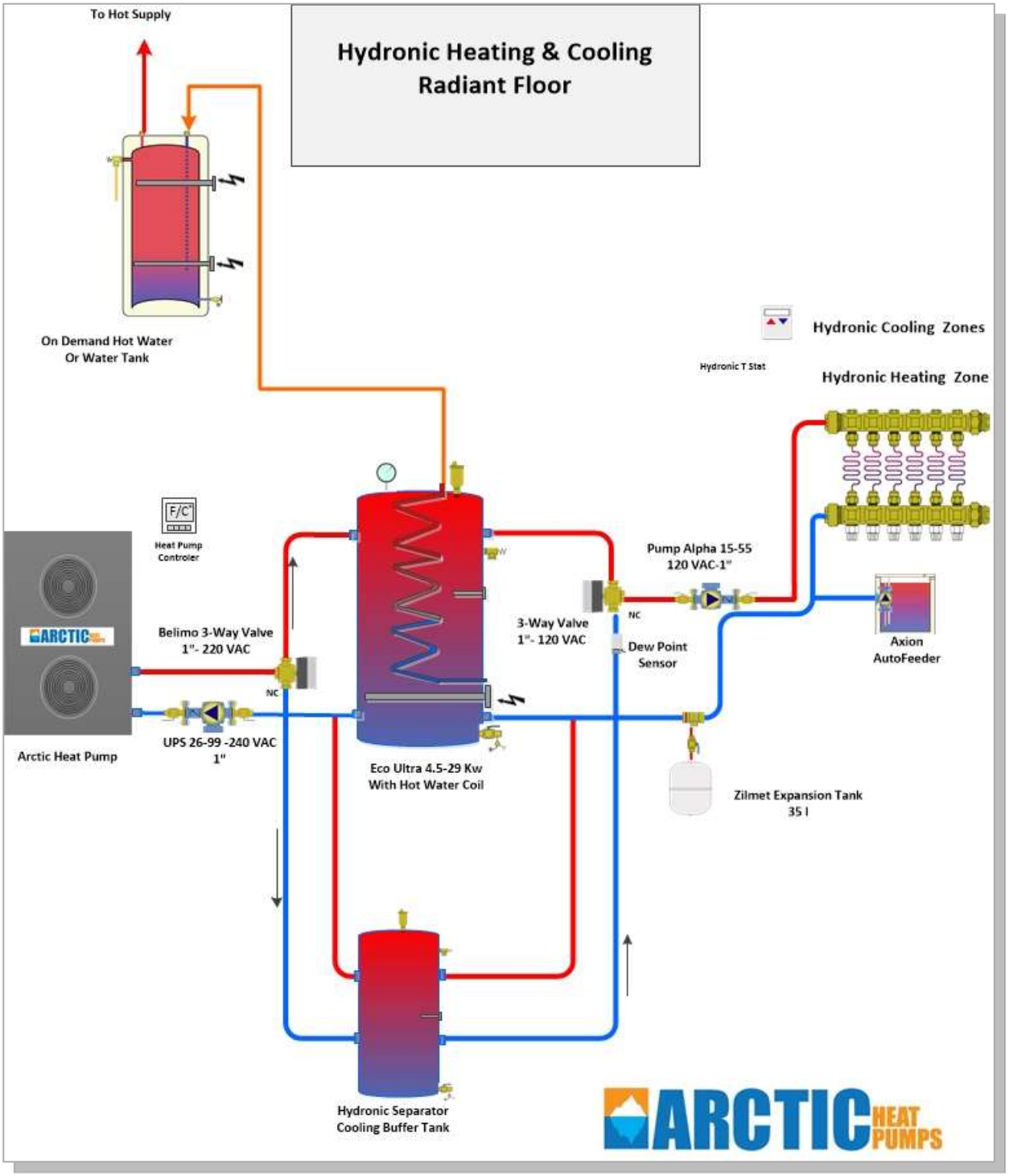
Hydronic Heating (Priority) Fan Coil Cooling
With Optional Hot Water Coil



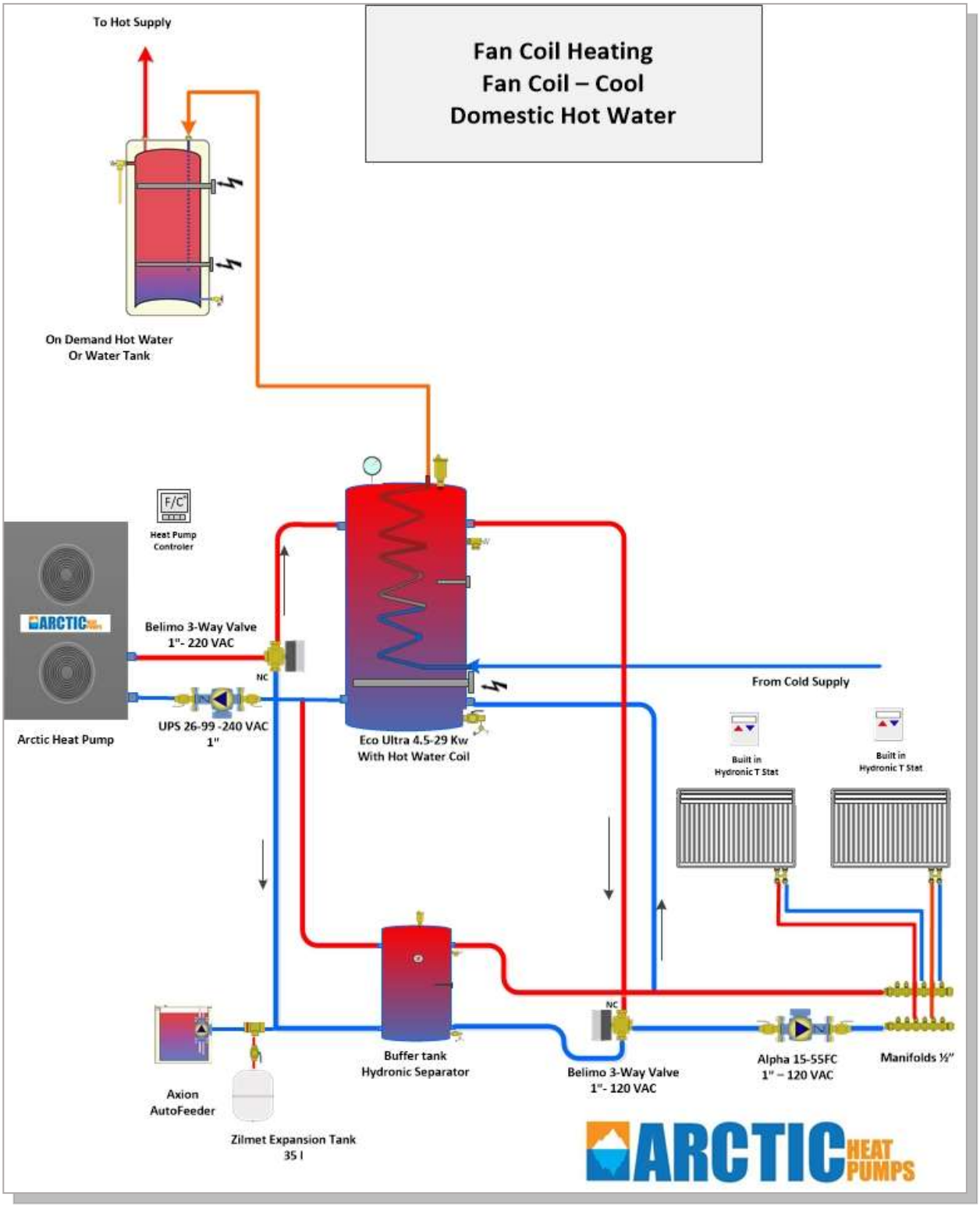
Hydronic Heating (Priority) Air Handler Cooling
With Optional Hot Water Coil



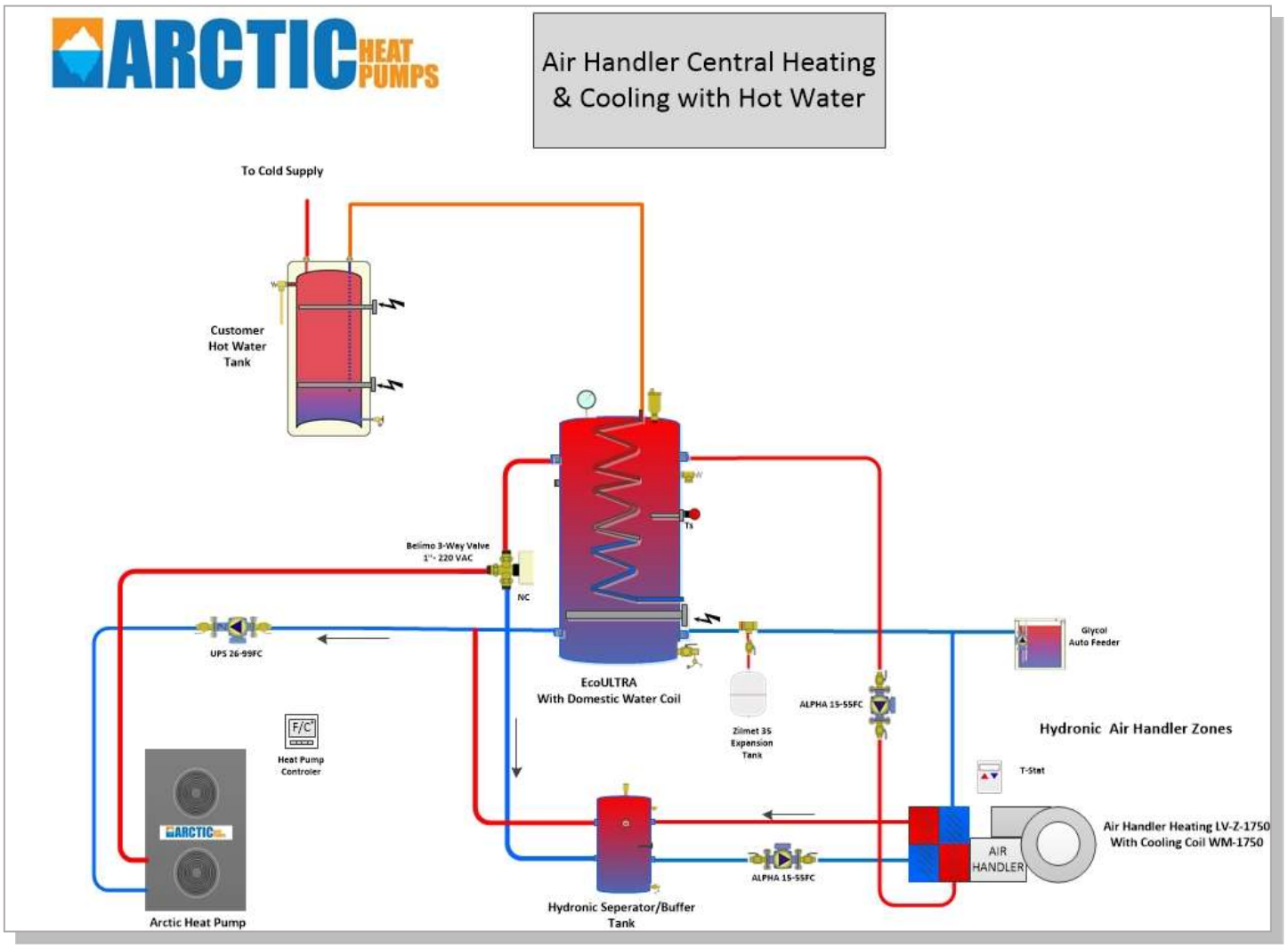
Hydronic Heating & Hydronic Cooling
With Optional Hot Water Coil



Fan Coil Heating & Cooling
With Optional Hot Water Coil



Air Handler Heating & Cooling
With Optional Hot Water Coil

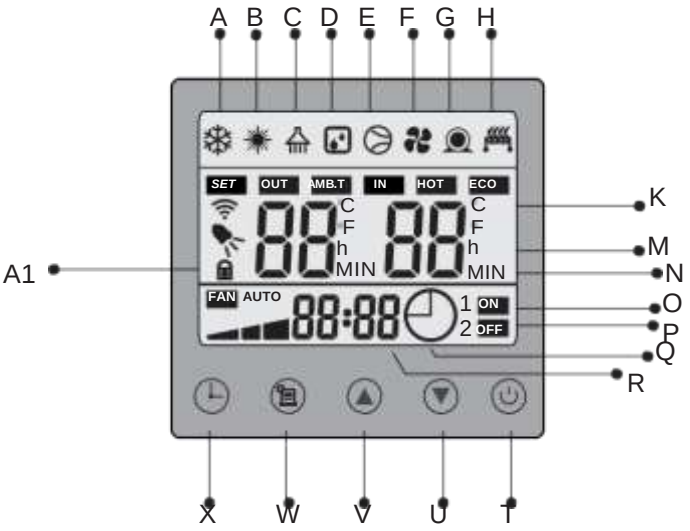


IV. The Use of the Wired Controller

Buttons and Display Symbols Explanation

The User Interface and Functions Display is as below:

symbol	icon	instructions
A		Cool mode icon
B		Heating mode icon
C		Hot water mode icon
D		defrost mode icon
E		Compressor run icon
F		Fan run icon
G		Pump run icon
H		Auxiliary electrical heating icon
K	℃	The temperature icon
M	h	Hours icon
N		Minutes icon
O	MIN	Timing ON icon
P		Timing OFF icon
Q		Set the time icon
R	88:88	Time icon
T		The unit switch
U		Down button icon
V		Up button icon
W		Function button icon
X		Timing button icon
A1		Lock icon



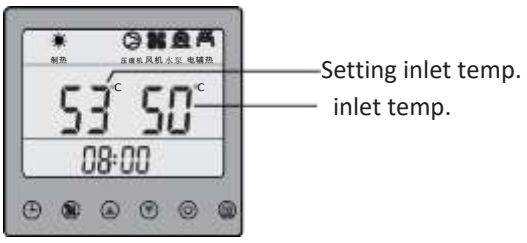
Wired Controller Operations

Keyboard Locking / Unlocking Operation

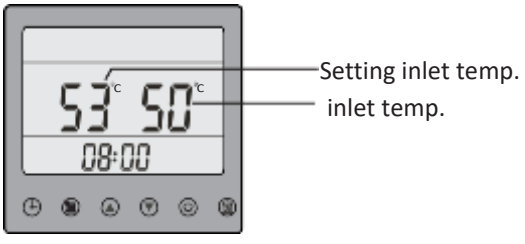
If no buttons are depressed on the controller for 30 seconds, the unit will switch to locked mode automatically and the lock icon will display on the wired controller. It means that the keys (buttons) are locked. To unlock, long-press the on/off button for 3 seconds

Turning the Unit ON/OFF

Under standby status (electric power is present, but unit is not operational), the display will look as right figure below. Press the on/off button to turn the unit on. The operation mode icon will display on the wired controller (cool or hot water mode or both). Long-press the on/off button again, and the unit will turn off and show the Standby display.



Working Status



Standby status

Modifying the Temperature Setting

While in operating status, **short-pressing** the ▲ button or ▼ button, which will modify the temperature setting. For example, if in the hot water mode, it will modify the hot water tank temperature setting. If in cooling condition mode, it will modify the setting of the **returning inlet temperature** to the heat pump.

Mode Select Operation

While in operating status, **long-press** the ▲ button to change the operational mode.

		
Hot water mode	Cooling mode	Hot water + Cooling mode

In *hot water mode*, the temperature on the left side of the wire controller is the temperature setting for the hot water tank, and on the right side is the actual temperature of the hot water tank.

In *cooling mode* the temperature on the left side of the wire controller is the temperature setting for the returning water to the heat pump and on the right side is the actual temperature of the returning water.

In *hot water & cooling mode*, **the unit default priority is the hot water mode**. So, the unit will run the hot water mode at first, and the temperature on the left side is the temperature setting for the hot water tank, while on the right side is the actual temperature of the water in the hot water tank. When the hot water tank temperature reaches its setting, the unit will switch to cooling mode automatically. Now the temperature on the left side of the wire controller is the temperature setting for the water returning to the heat pump, and on the right side is the actual temperature of the returning water.

Note: The **room control strategy** for heating and cooling, is not controlled by the heat pump. That is done by the thermostat of the air handler or radiant heating zone for example. The heat pump attempts to maintain a buffer tank temperature that is sufficient for the air handler to do the job of heating or cooling that space. When in heating mode the Heat Pump is controlling only the temperature of the buffer tank which is then used by an additional controller to heat zones. With cooling the heat pump keeps the cooling buffer tank at the set temperature. The secondary fan coil or air handler distributes this cold water as required to cool the space.

Forced Defrost

In heating mode, press ▼ and 📝 at the same time to run defrost mode, and the defrost icon will flash.

Clock Setting

Short-press the time button 🕒, and the time of the wire controller will flash. At this time press 🕒 button to confirm, and the hours will be flashing. Press ▲ or ▼ to change the hours. Press 🕒 button again to change the minutes. When correct, press 🕒 button to set the new time and exit setting.

Timer ON/OFF Settings

While in standby status, long-press time button 🕒, the icons 🕒 ON and hours will flash. Now press ▲ or ▼ to change the on-time hours. Short press 🕒 again, and the time for on-time minutes can be changed. Now you have finished the unit on-time setting. Then short-press the 🕒 button and 🕒 OFF and hours will flash. Now press ▲ or ▼ to change the off-time hours. Short press 🕒 again and the off-time minutes can be changed. Short-press 🕒 button one more time to finish the timer settings and exit. (see sequence diagram next page)

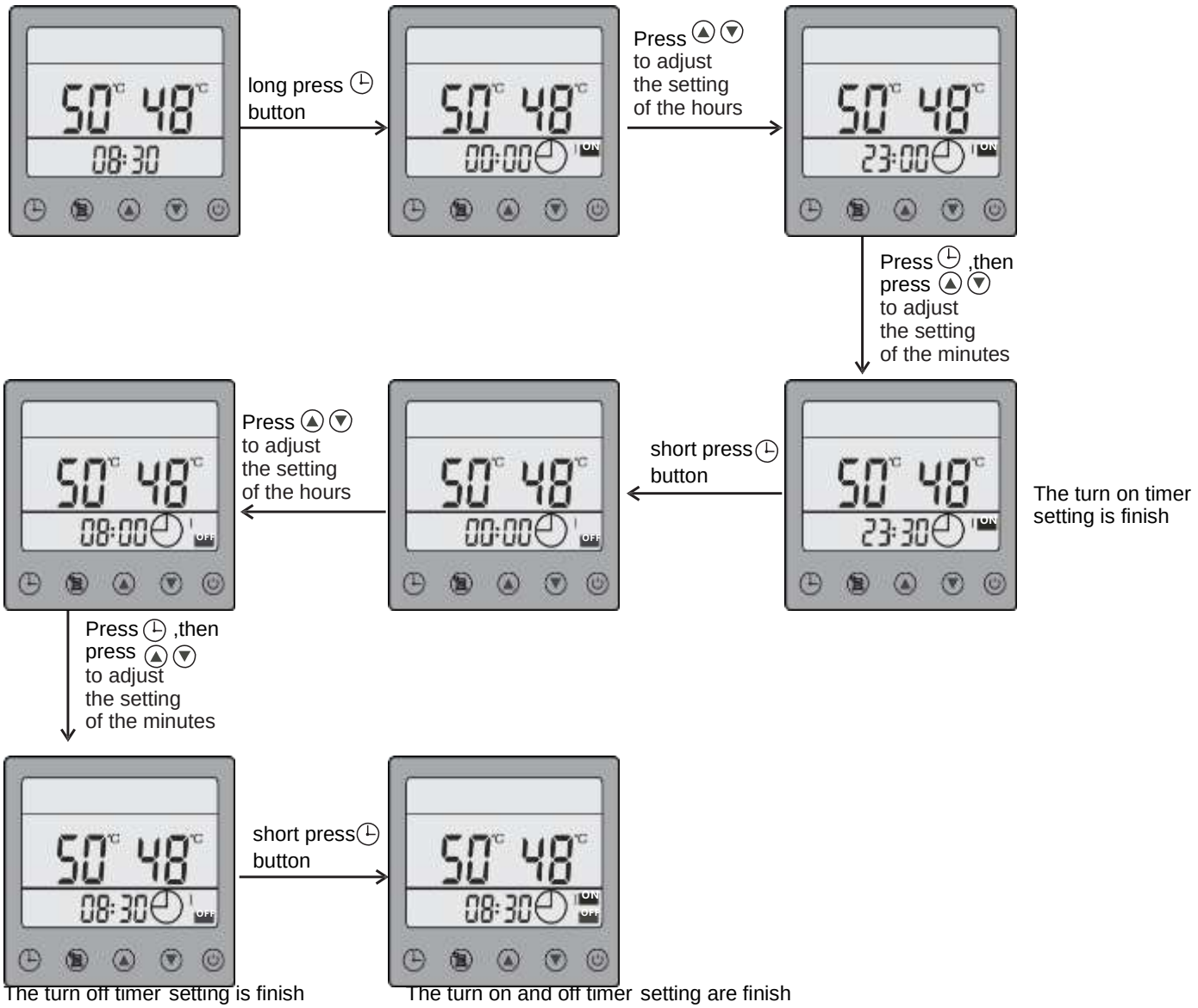
Cancelling Timer Operation

Cancelling the timer operation implies that the timer will not interrupt the operation of the heat pump. To cancel the timer Long press the 🕒 button, entering the timer setting, and then press the 📝 button.

Changing Between Celsius & Fahrenheit

To switch between ℃ and ℉, long-press the function button 📝 and ON/OFF button ⏻ at the same time until it changes.

Timer Programming



Checking of State Parameters

In the main interface Press  to enter the state parameter interface. Then press  or  button to navigate to the state parameters.

2018 - Current

Display	Meaning	Display	Meaning
o1	Water tank temperature	A5	Main elec. Expansion valve degree
o2	Water inlet temperature	A6	Cool coil temperature
o3	Water outlet temperature	A7	Dc bus voltage
o4	Ambient temperature	A8	IPM module temperature
o5	NOT USED	A9	Real-time power
o6	Auxiliary elec. Expansion valve degree	A10	Dc motor speed
A1	Discharge temperature	A11	High pressure
A2	Coil temperature	A12	Low pressure
A3	Suction temperature	A13	AC input voltage
A4	AC input current	A14	Frequency of compressor operation

2017 -2016

Display	**Meaning**	**Display**	**Meaning**
C0	DC inverter compressor frequency	C9	DC Voltage x 10
C1	AC Voltage x10	Ca	IPM mode temperature
C2	Compressor Discharge temperature	Cb	Real-time power x 100
C3	Compressor Suction temperature	Cc	Not Used
C4	Evaporator coil temperature	Cd	Water inlet temperature
C5	Outdoor ambient temperature	Ce	Water outlet temperature
C6	Water tank temperature	Cf	Coil Cooling Temp
C7	AC Current	CH	Not Used
C8	EEV efficiency x 10	CL	Not Used

V. Maintenance and Repair

Notes

- Keep the unit in a dry environment, that is clean and well ventilation. Clean the evaporator fins regularly (once per 1-2 months) in order to maintain high exchange efficiency and save energy.
- The unit has self-diagnosis built into it and as such will display error codes on the control display if any items need attentions.

Antifreeze Protection of the Unit

In most heating climates antifreeze protection is of great importance to the operation security and service life of the unit, therefore, please be sure to follow the instructions below:

- The hot water piping must be well insulated to reduce heat loss
- Coiling piping will condensate so to avoid this use water proof piping insulation on child lines also
- Limit the distance of the piping run into the house. Shorter pipes will lose less heat.
- Ensure the drain plug on the bottom of the heat pump pan is elevated 24" so that ice buildup does not plug drain.
- The unit is equipped with both a drain pan and compressor low temperature supplemental heating trace to ensure proper operation in low temperature.
- Polypropylene glycol should be used in an appropriate ratio corresponding to the lowest possible ambient temperature (see table below).
- System pressure drop will increase by 25% with 35% water to glycol mixture so this must be considered when sizing pump.

Percent Glycol Concentration Required			
Temperature		For Freeze Protection	For Burst Protection
C	F	Volume %	Volume %
-7	20	18	12
-12	10	29	20
-18	0	36	24
-23	-10	42	28
-29	-20	46	30
-34	-30	50	33
-40	-40	54	35
-46	-50	57	36
-51	-60	60	37

Malfunction Code Table

Code Interpretation and Resolution:

Wire Controller Display	Meaning	Resolution
E01	Compressor discharge temperature sensor fault	Check if the compressor discharge temperature Sensor for short, or open circuit and correct or replace.
E05	Heat Pump Coil temperature sensor fault	Check the heat pump coil temperature sensor and wires for a short or open circuit and correct or replace sensors.
E09	Compressor suction temperature sensor fault	Check if the compressor suction temperature Sensor for short, or open circuit and correct or replace.
E13	Cool coil temperature sensor fault	Check the coil temperature sensor for a short, or open circuit and correct or replace.
E18	Outlet water temperature sensor fault	Check the outlet water temperature sensor at the heat exchanger for a short, or open circuit and correct or replace.
E19	Inlet water temperature sensor fault	Check the inlet water temperature sensor at the heat exchanger for a short, or open circuit and correct or replace.
E20	Water tank temperature sensor fault	Please check if the hot water tank temperature sensor or wires have a short or open circuit. Correct or replace.
E21	communication fault between wired controller and circuit board	Please check the wired controller's cable and its connections.
E22	Outdoor ambient temperature sensor fault	Please check if the ambient temperature sensor for the heat pump or its wiring has a short or open circuit and correct or replace.
E28	Outdoor EE fault	Please Contact the dealer
E33	High pressure sensor fault	Compressor high pressure switch or wiring faulty. Correct or replace
E34	EEV back sensor fault	Please check if the suction temperature sensor short circuit or disconnect.
FA	Dc fan protection	Please Contact the dealer
r01	IPM mode fault	Please Contact the dealer
r02	The compressor start fault	Please Contact the dealer
r05	IPM mode temperature too high protection	Please Contact the dealer

r06	The compressor phase current protection	This applies to 3-phase units, were the phasing of the wires is incorrect and needs to be corrected
r10	Ac voltage too high or too low protection	Please Contact the dealer
r11	DC bus voltage is too high or too low protection	Please Contact the dealer
r20	Compressor protection	Please Contact the dealer
P01	Water flow switch protection	Flow is too low, or wiring is open circuit. Check the water system, water pump, and operation of water flow switch and correct problem
P02	High pressure protection activated	1: check whether the water temperature is too high or blocked 2: check whether the fan blades are blocked or if evaporator fins are blocked and this is impacting heat transfer efficiency. 3: check whether the snow or ice has built up too much inside the unit. 4: check that the water tank temperature setting is not too high
P06	Low pressure protection activated	1: check whether the unit is leaking of Freon 2: repair and vacuum system, then according to the nameplate refill with exact amount of Freon as per name plate.
PA	Tank temperature protection activated	Please Contact the dealer
P11	Compressor discharge temperature too high protection activated	1: check water system is operating normal, look for reduction in normal water flow. 2: Check whether there was a refrigerant leak and repair 3. The unit is normal operation, the exhaust temperature, system pressure is normal.
P15	In and out of the water temperature difference is too large to protect	1: Check if water system is operating abnormally, such as water flow is too low. 2: the unit is normal operation, the exhaust temperature, system pressure is normal.
P16	Outlet water temperature too low protection	1: water system is normal, water flow is smaller. 2: the unit is normal operation, the exhaust temperature, system pressure is normal.
P19	Ac current protection	Please Contact the dealer
P27	Cooling coil temperature overheating protection activated	1: check that the fan is in good condition, and that the evaporator fins are not in need of cleaning.
P30	Antifreeze cooling coil temperature protection	The unit antifreeze
EB	High pressure protection (pressure sensor)	Please check if the room ambient temperature sensor short circuit or disconnect.
EC	EEV circuit of low voltage protection	1: check whether the unit is leaking of snow 2: after the snow kind of leakage after repair and vacuum, According to the nameplate again into the corresponding kind of snow
ED	Low pressure protection (pressure sensor)	Please check if the room ambient temperature sensor short circuit or disconnect.
FE	Start the differential protection pressure sensor (only)	Please Contact the dealer
FF	Run the differential protection	Please Contact the dealer

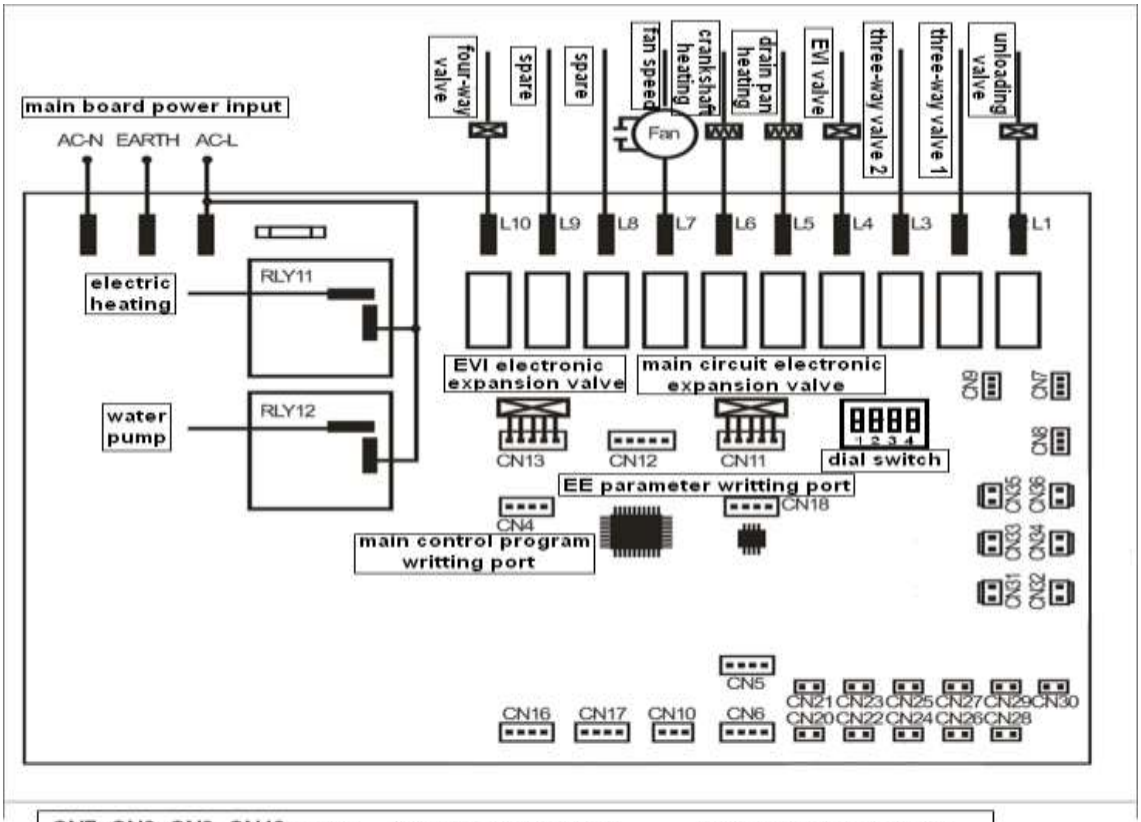
Quick Fixes

Malfunction	Reason	Solution
Unit does not work	1.Power failure 2.Loose power wire connection 3. Fuse of controller burn-out	1.Turn off power and inspect power supply 2. Identify the cause and rectify 3.Identify the cause and replace with new fuse
Unit heating capacity is low or compressor working too long	1.Shortage of refrigerant or leakage 2.Poor air flow into the air heat exchanger	1. Check the system for leakage, fix leak and re-fill 2. Improve thermal insulation of the system pipeline 3. Clean the fin coil with water and improve air flow
Compressor discharge pressure too high	1. Fan is not working 2. Excessive refrigerant (from repair / re-fill) 3.Heat exchanger not working properly	1. Check / fix power supply to the fan. 2. Call refrigeration mechanic to reduce refrigerant 3. Call Arctic Heat Pumps
Compressor suction pressure too low	1.Shortage of refrigerant or leakage 2. Filter or capillary blocked 3.Poor condenser heat dissipation	1.Call refrigeration mechanic to check the system for leakage, fix the leak and re-fill the heat pump 2.Replace capillary tube or filter 3. Clean the heat exchanger.
Compressor will not turn on	1.Power failure 2.Compressor contactor malfunctions 3. Loose connection 4.Overload protection of compressor activates	1.Check the power supply and restore 2. Replace the contactor 3.Check for loose wires and re-connect 4. Check that the current / Amp draw of compressor is within specification, may require replacement of the compressor

Appendix

Wiring Diagrams

Controller Board

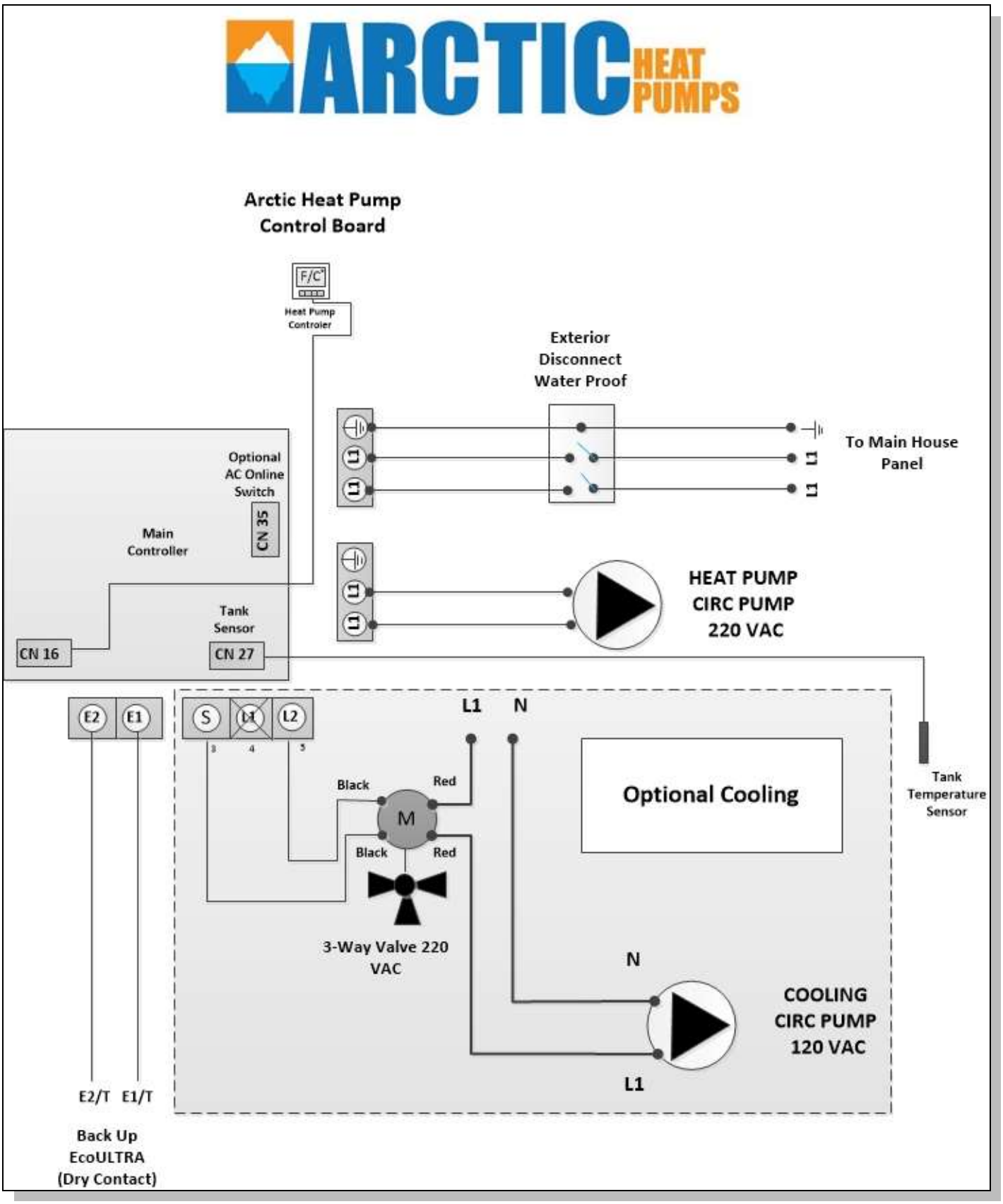


CN7, CN8, CN9, CN10: spare
CN31: mode switch
CN32: high voltage switch
CN33: low voltage switch
CN34: water flow switch
CN35: A.C. online switch
CN36: emergency switch

CN20: ambient temp.
CN21: coil temp.
CN22: discharge temp.
CN23: sunction temp.
CN24: cooling coil temp.
CN25: water inlet temp.
CN26: water outlet temp.

CN27: water tank temp
CN28, CN29, CN30: spare

CN16: wired controller
CN17: Modbus available
CN5: computer monitor
CN6: drive board


ARCTIC HEAT PUMPS
Arctic Heat Pump
Control Board
F/C°
Heat Pump
Controler
Exterior
Disconnect
Water Proof
To Main House
Panel
L1
L1
L1
Optional
AC Online
Switch
CN 35
Main
Controller
HEAT PUMP
CIRC PUMP
220 VAC
Tank
Sensor
CN 16
CN 27
E2
E1
S
L1
L2
3
4
5
L1
N
Black
Red
M
Black
Red
Optional Cooling
Tank
Temperature
Sensor
3-Way Valve 220
VAC
N
COOLING
CIRC PUMP
120 VAC
L1
E2/T
E1/T
Back Up
EcoULTRA
(Dry Contact)

Intelligent Defrost

By default, the arctic heat pump is designed to defrost itself as needed. The algorithm is factory supplied based on optimized performance parameters for cold climate. These are based on coil temperature differentials and compressor time run. When unit enters defrost it will go through various stages including a reverse to cooling removing some heat from the buffer tank. This provides heat to the coils to defrost any frost that has formed. When it finishes it will turn on the fan to hi speed to dry the coil before resuming back to heating.

Enter Defrost Mode

1. When ambient temperature is detected to be ＞ -10℃), coil temp. is < -7, and unit has been working for 45min, unit will enter defrost mode.

   OR

2. When ambient temperature is detected to be as be 18℃ coil temp. is -10 C, and unit has been working for 90min, or when unit has been working for 45min and ambient temperature - coil temperature is ≥10℃ unit will enter defrost mode.

Exit Defrost Mode

Condition to exit defrost mode: when outdoor coil temperature reaches above 13 C or when defrost time reaches 8 min setting.

Back Up Heating

The Arctic Heat Pump has an intelligent back up heating system that allow it to signal a backup heating source when the **heat demand exceeds the heat production** such as during very cold temperatures. It also has the ability to call on a backup heat source in case of a **failure or emergency**. The backup heating control signal (closing of a dry contact E1, E2) is built into the unit and will function as follows.

Turn On

The backup heater will be called upon when all the items in a, b, c, d have occurred **OR** item e is met.

a. System is in Heating or Water Heating mode **AND**
b. Ambient temperature is <18°C **AND**
c. Water tank temp setting– Actual Water tank temperature > 5 C **AND**
d. Compressor has worked for 30 consecutive minutes and temperature rise is less than 2 degree C.

e. System is in failure mode or compressor has been turned off for 5 min and no condition was reached that would normally cause a **Turn Off** (see below)

Turn Off

1. The electric back up heater will turn off when any of the conditions have been met
   a. Water tank temperature>= setting temperature **OR**

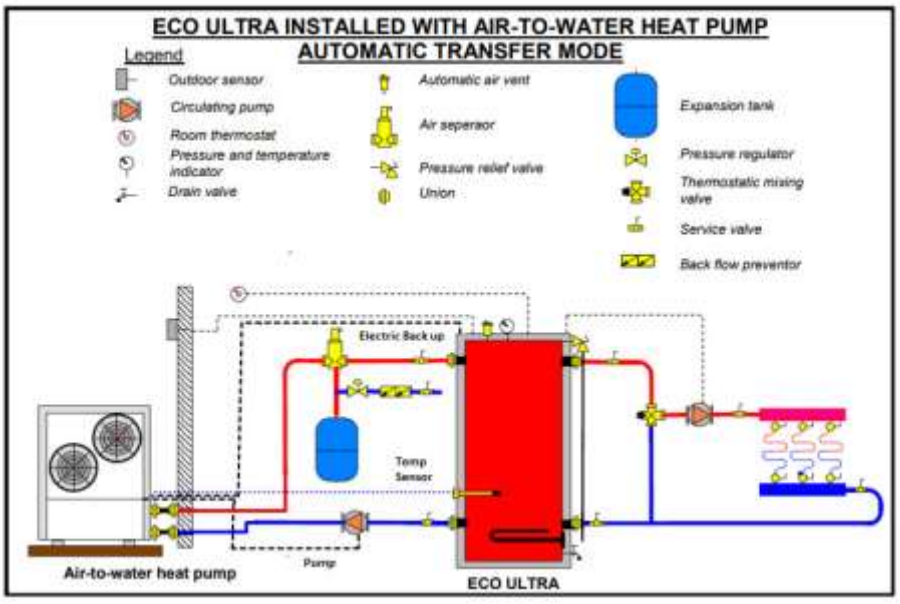
b. Unit is in cooling or defrost mode **OR**
c. “Emergency” or “AC Remote On” switch is (activated)

To connect the backup heater function (terminals) to a remote heating element you will need to use a 240 VAC contactor, as the system is not designed to provide power directly to a heating system due to the amperage restrictions. Instead the system will control the heater indirectly by the HP activating the contactor coil. A dry contact relay is supplied for back up. If you are using the EcoULTRA tank, then you can simply connect the contacts (E1 & E2 terminals) on the Heat Pump to the same terminals on the EcoULTRA (see next section). If you are not using a dry contact back up heating source and need to connect a direct back up heating element such as a water tank please contact us of modification instructions for a contactor.

Eco ULTRA Integration

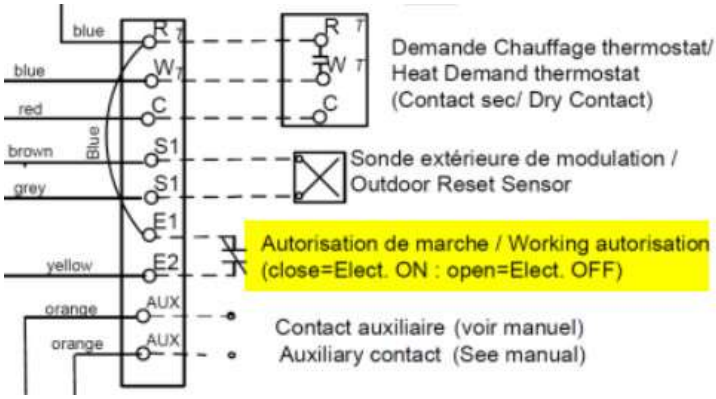
Eco ULTRA is a unique buffer/boiler tank that can fully control most hydronic systems. The Eco Ultra can be configured with 4.5 Kw to 29 Kw back up electric power sources. The 50 or 70 US-gallon storage capacity makes this tank the ultimate back up heating source for any Air Source Heat Pump or Geothermal Hydronic System.

Figure 9: Back of the Controller



If you have purchased an Eco ULTRA boiler buffer tank to back up your heat pump, then the integration between the heat pump and boiler is done by turning on the Bi-Energy Mode on the Eco ULTRA. This is done by removing the front access panel. Raise the panel up and on the back of the controller panel you will see a switch marked “Elec or Bi-Energy” Select **Bi Energy**.

On the Eco ULTRA cut the jumper between E1 and E2 and connect it using #16 or #18 AWG wire to the E1 and E2 terminals on the Arctic Heat Pump located on the front panel.



E1/E2

Connect E1 to E1 and E2 to E2 on heat pump and Eco ULTRA

Aux heat source dry contact on Eco ULTRA

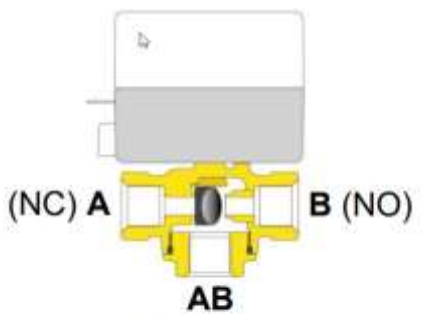
Now when the Arctic Heat Pump calls for supplemental back up heat, the dry contact behind terminal E1/E2 will close, signaling to the boiler to begin contributing energy via its electric heating element. The Eco ULTRA will do so systematically only applying as much heat energy as needed. When the tank reaches its target temperature (set up in the heat pump controller), the call for back up heat will end, and the boiler will turn off. During this period the hydronic pump will continue to stay on as long as there is thermostatic call regardless whether the energy is coming from the heat pump or the Eco ULTRA (see separate manual for setting up pump and room thermostat on Eco ULTRA).

3 Way Valve

The Arctic Heat Pump has a built in 3-Way switching valve that is powered in 240 VAC – only 240 VAC Normally Open switches should be used. We recommend Belimo or Caleffi 3-way valves with 1" NPT. These valves also come with built in internal dry contact switch that is used in most of our cooling layouts to activate an auxiliary source such as a circulation pump. When using a spring loaded valve such as mentioned above you will only use the S and L2 contacts on the 3-Way Valve terminal block. L1 is reserved for dual motorized switches.

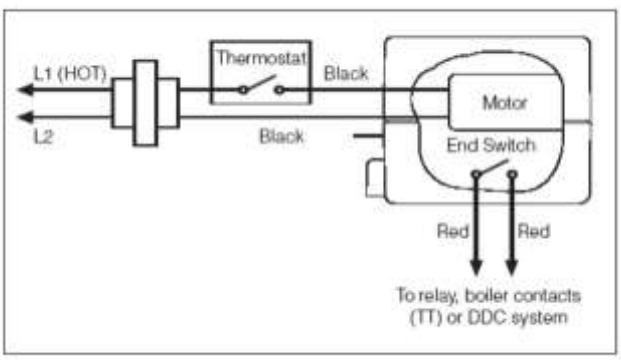
Connect the black wires of the 3-way valve to either terminal on the Arctic Heat Pump. The red wires on the 3 way valve are the internal switch that closes once the 3- way valve is energized and opens

When installing a 3 way valve pay careful attention to the direction of flow. The bottom of the valve is the AB connection and is common flow that both paths take. **B** is the Normally Open (NO) path that is opened when no power is supplied to the valve. **A** is the Normally Closed (NC) path and is energized when 240 is supplied to the valve from the heat pump when the AC online switch is closed and there is a cooling call.



3-way valve with normally closed actuator
(Note: 3-way uses only normally closed actuator)

Wiring Diagram

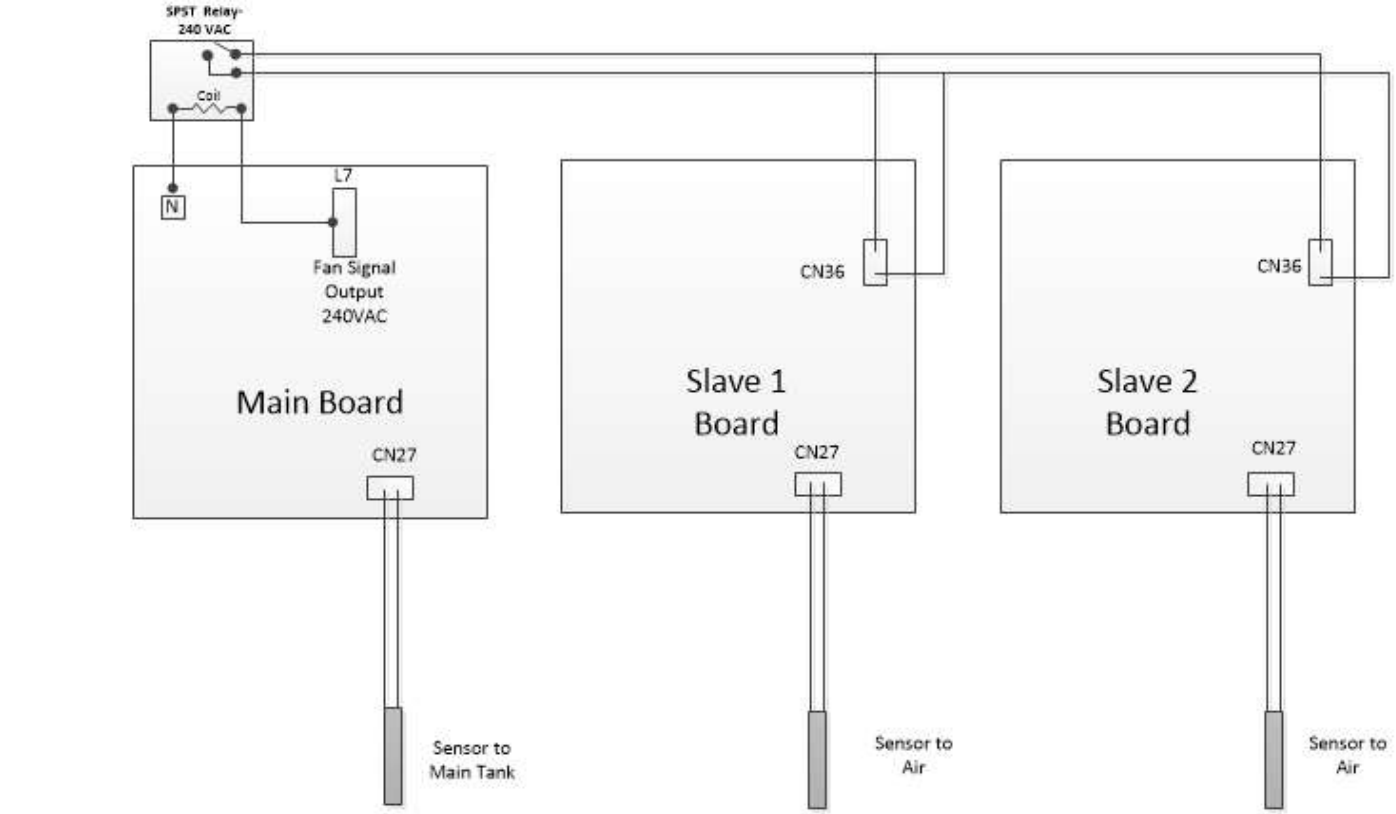


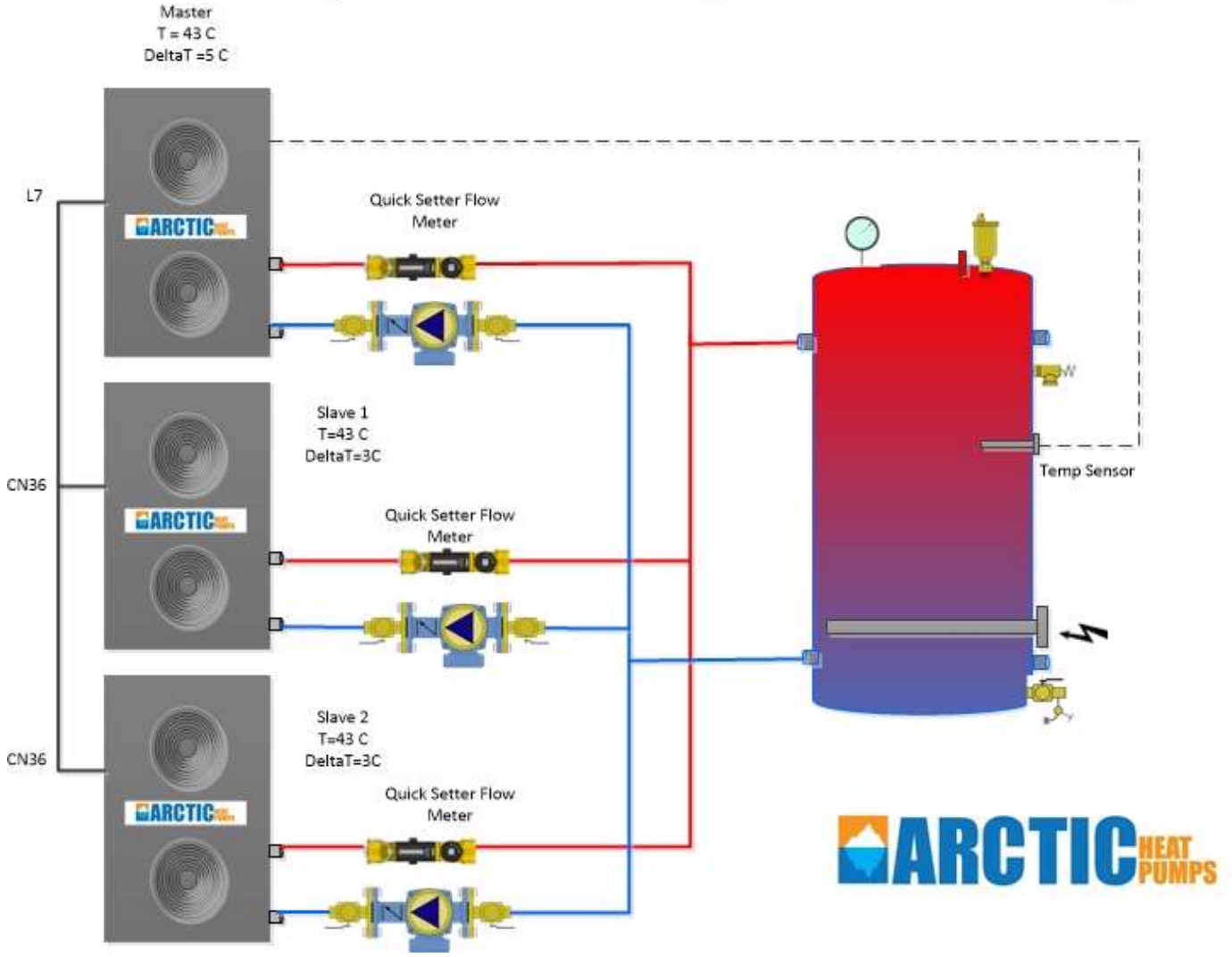
Multiple Heat Pumps

Larger power requirements can be accommodated adding multiple heat pumps in parallel. One heat pump becomes the **master** and the other are **the slaves**. When adding multiple units pipe sizing should be increased at the common home run pipe to accommodate the added flow of more than one pump. Example if there are three units with 1" piping each. After the header, the piping to the tank should be 1 ¼"-1 ½" (consult a plumber for more technical specifications).

To use multiple heat pumps we activate them using the CN36/Emergency on/off switch on the slave units. **A relay is added to the master heater.** The relay 240 VAC coil is connected to L07 terminal on the main board. This is the main fan contact coil. When the main unit turn on and fan(s) are activated it will then activate the relay switch and close the terminals connected to the CN36 on the remote units. This causes them to turn on.

Next set the same heating temperature for all units the same. Example 43 C, then set the Delta T on/off temperature on the remote units lower than the master unit. Example if master has a delta of 5 C then the slave units should be set to 3 C. This is done in the advance programming set up under Item 0 (default is 5 C). Only the master unit will have the tank temperature sensor mounted in the tank, the others will be measuring air temperature.


SPST Relay-
240 VAC
Coil
N
L7
Fan Signal
Output
240VAC
Main Board
CN27
Sensor to
Main Tank
CN36
Slave 1
Board
CN27
Sensor to
Air
CN36
Slave 2
Board
CN27
Sensor to
Air


Master
T = 43 C
DeltaT =5 C
L7
CN36
CN36
Quick Setter Flow
Meter
Slave 1
T=43 C
DeltaT=3C
Quick Setter Flow
Meter
Slave 2
T=43 C
DeltaT=3C
Quick Setter Flow
Meter
Temp Sensor
ARCTIC
HEAT
PUMPS

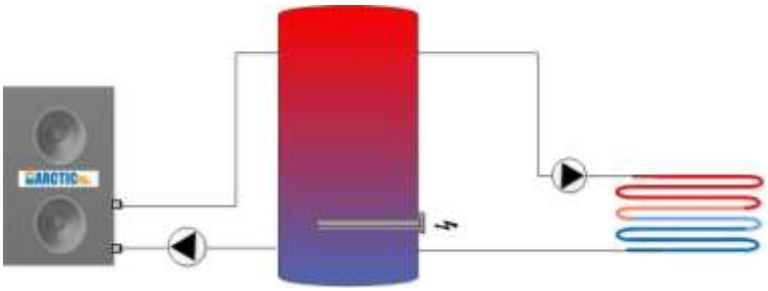
Flow Valves- It is recommended when running units in parallel that you properly balance the flow so that it is equal in each loop. Remember flow will always take the path of least resistance! You can purchase a Quick Setter Flow meter to balance each loop (see below). Alternatively you can use the theory of reverse return to ensure each loop has the same amount of supply and return pipe lengths

Quick Setter Flow Balancer

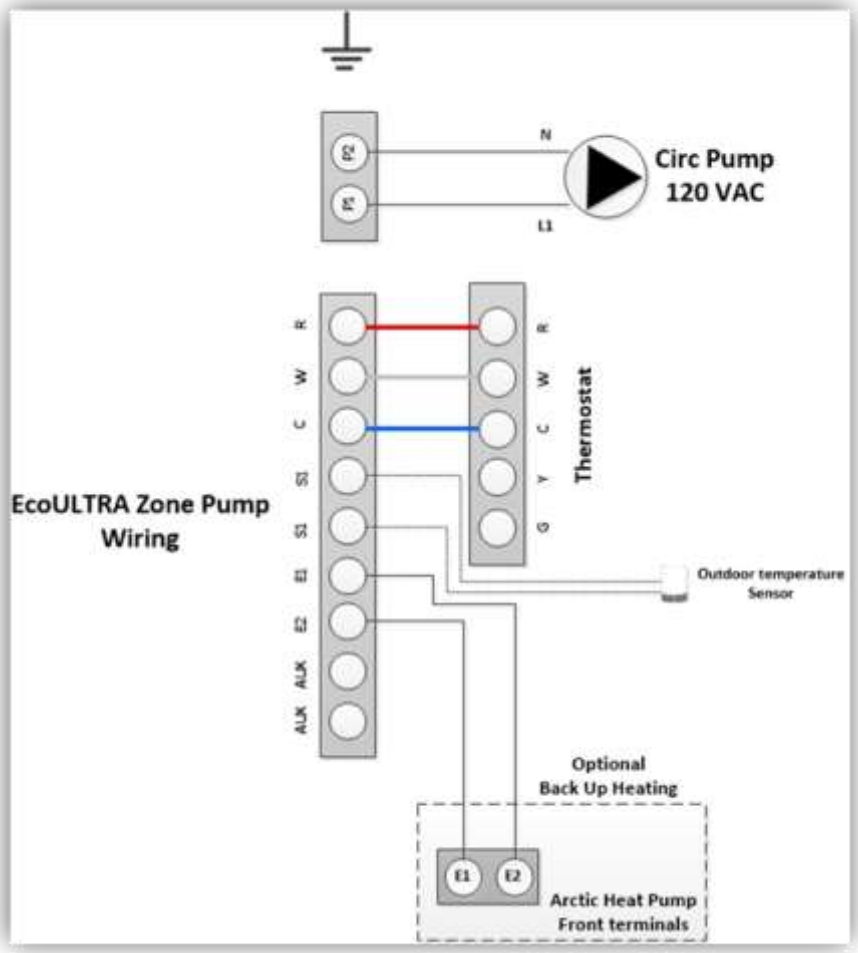
Reverse Return Piping

Wiring Option Appendix

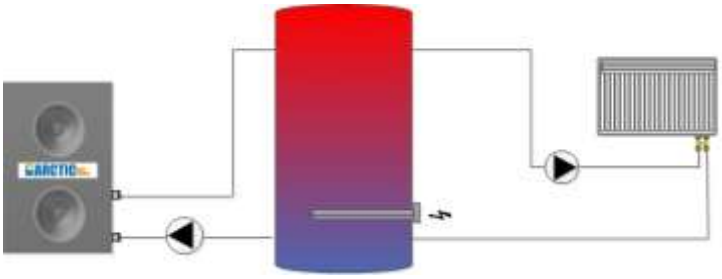
Wiring – HEATING Hydronic Pump (HY)



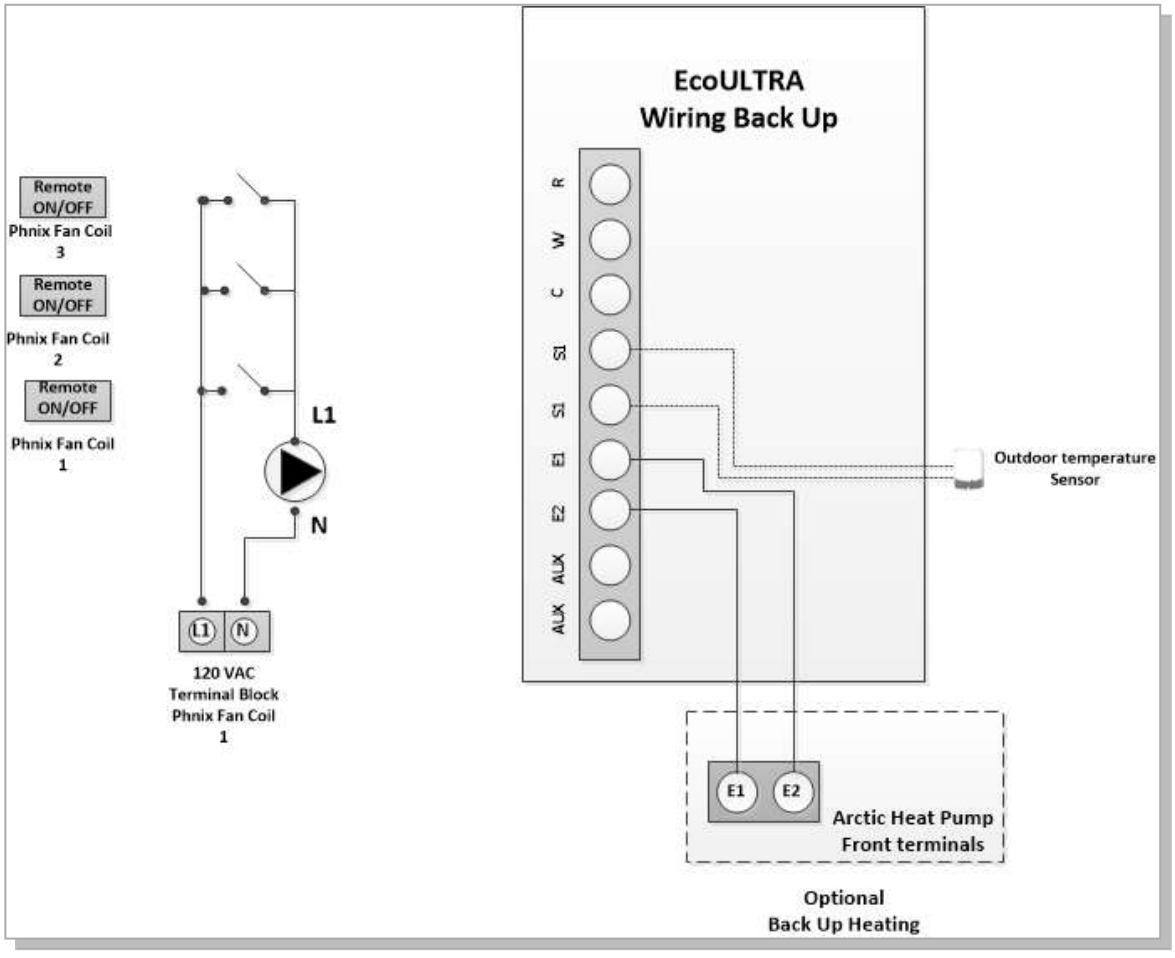
EcoULTRA is a fully functional hydronic heating controller and has the capacity to control a single zone pump as well as calculate the optimal operating temperature via a built-in reset controller. This is done via the S1 and S2 connection with the supplied outdoor temperature sensor. The optional back up heater integration will guarantee the supply of heat can match the load and is highly recommended for a well-balanced system. When the dry contacts on an external room thermostat close, this will signal a heat call to the EcoULTRA and turn on the pump and activate a heating sequence. If the buffer tank temperature is too low the Arctic Heat Pump will call for an auxiliary back up heat via terminals E1 and E2 causing the backup heating element sequence to begin.



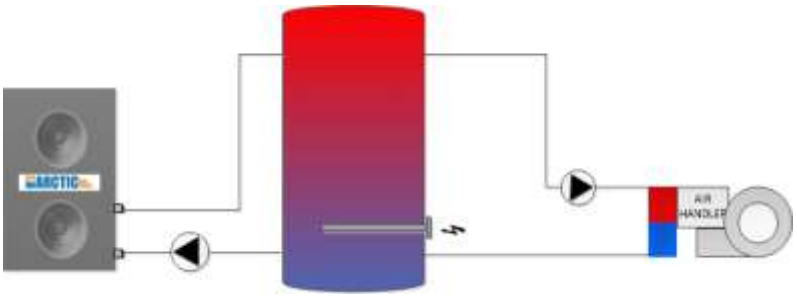
Wiring – HEATING Fan Coils (FC)



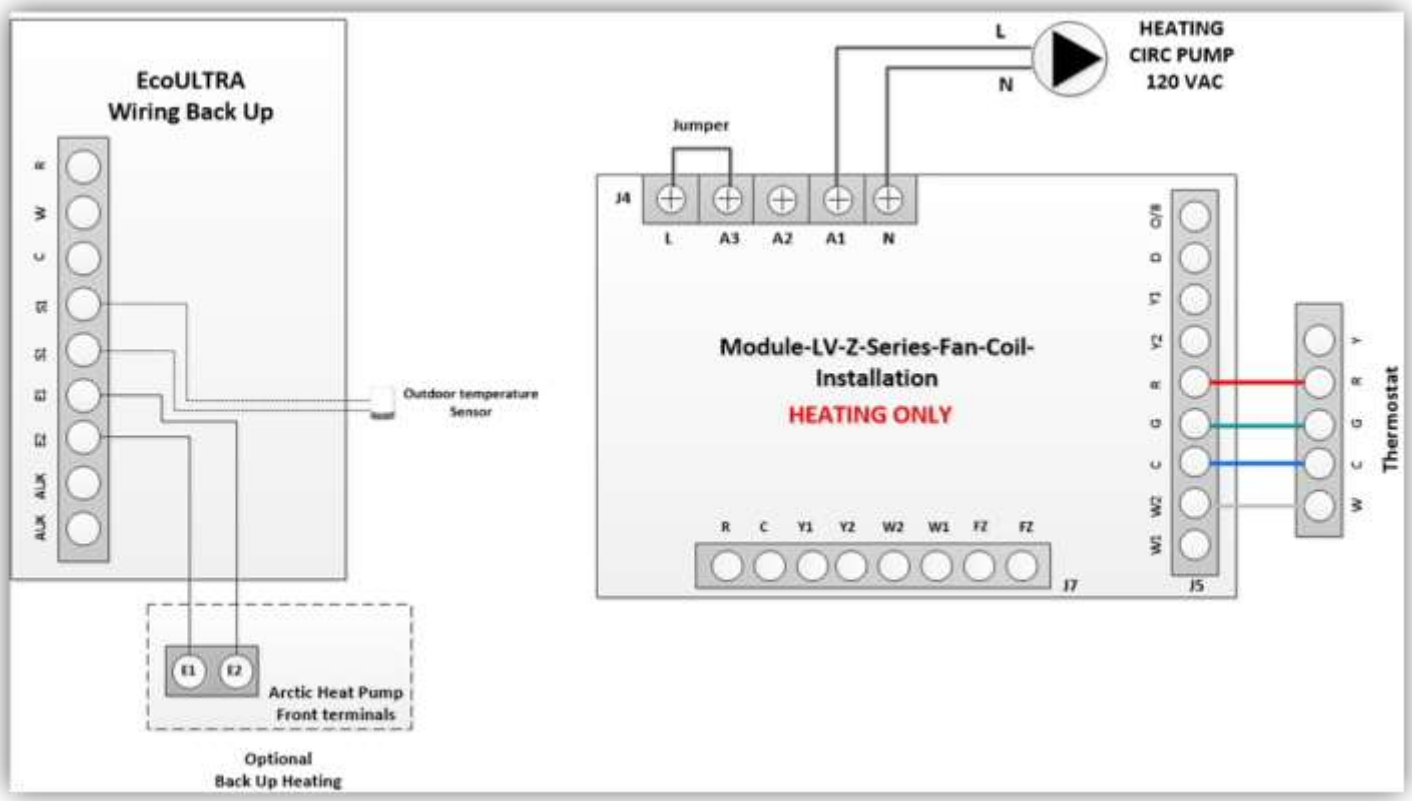
The Fan coils are equipped with their own thermostat mounted on the unit as well as an internal 3-way valve, and pump output activation switch. **The setting of the fan coil should be set to HEATING**. When a heating call is generated by the units, the fan coil will open the internal 3-way valve and close its pump output switch. This **Remote ON/OFF** connection switch will active the variable speed pump. When more than one fan coil is used the variable speed pump will be wired in parallel such that when any single fan coil requires heat it will activate the pump. The variable speed pump should be set to constant pressure such that it will increase and decrease its speed depending on the number of zone that are actively opened. If the buffer tank temperature is too low the Arctic Heat Pump will call for an auxiliary back up heat via terminals E1 and E2 on the Eco ULTRA causing the backup heating elements sequence to begin.



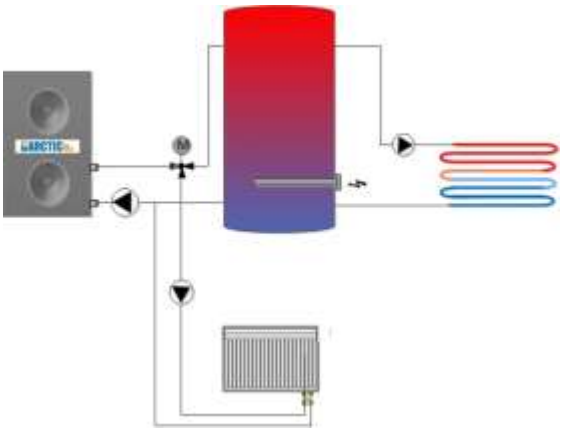
Wiring – HEATING Air Handler (AH)



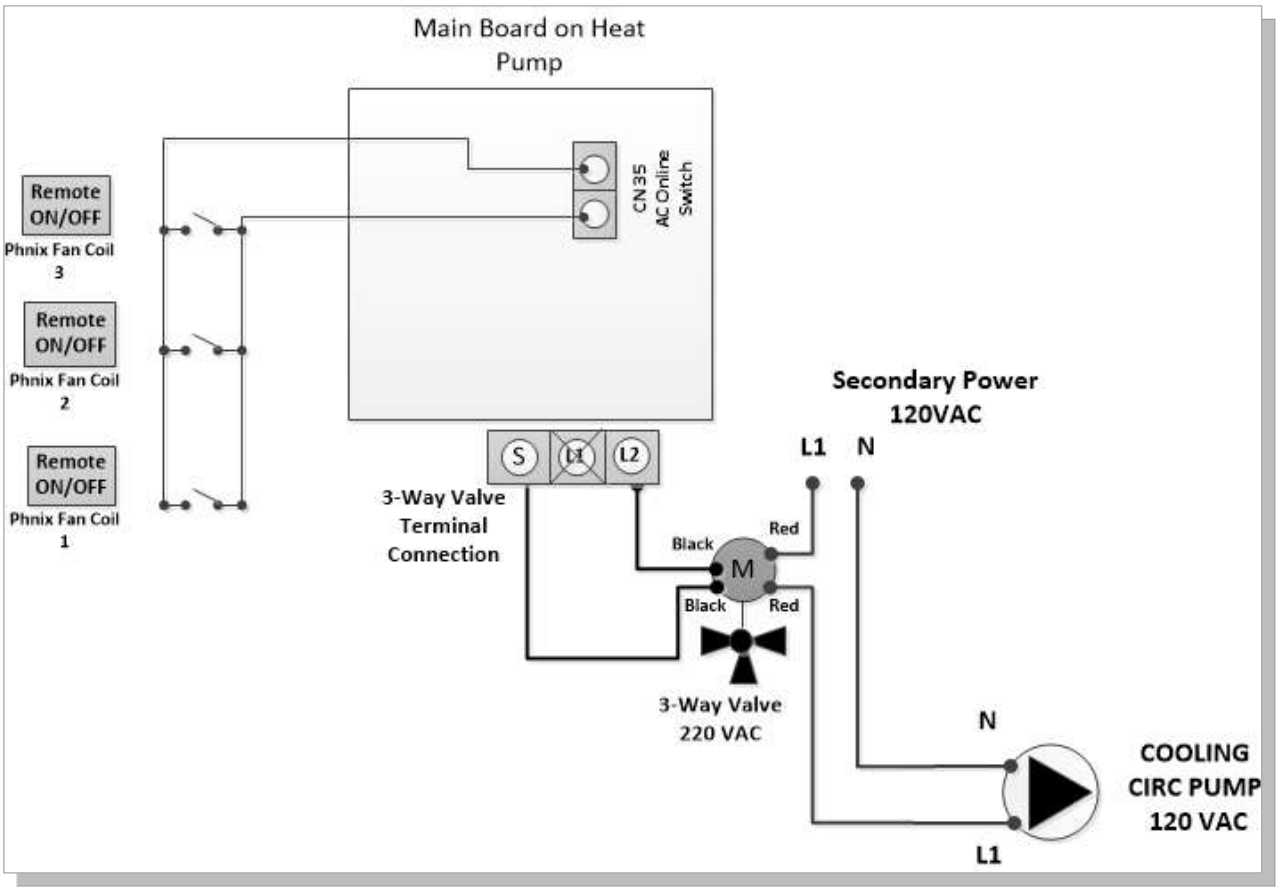
The Arctic Air Handler will optimize the air flow over its oversized heat exchanger when a heating call occurs from an external room thermostat. When a "W " heating heat call is received the control board on the LV-Z will activate an external zone pump causing hot water to flow through the heat exchanger and the fan to turn on to its optimal fan speed. If the buffer tank temperature is too low the Arctic Heat Pump will call for an auxiliary back up heat via terminals E1 and E2 on the Eco ULTRA causing the backup heating elements sequence to begin.



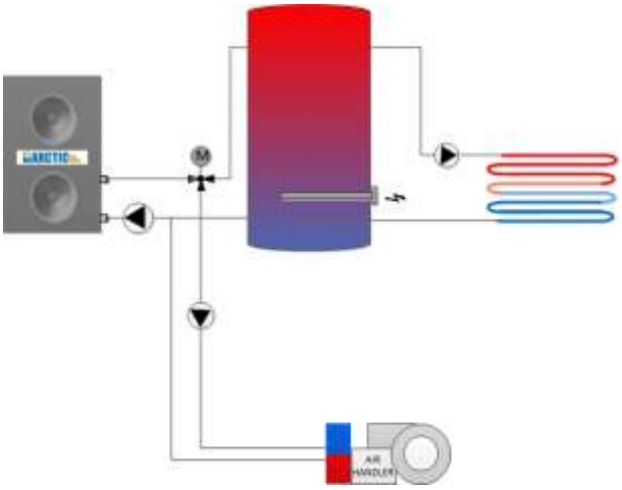
Wiring – COOLING Fan Coil (FC)*



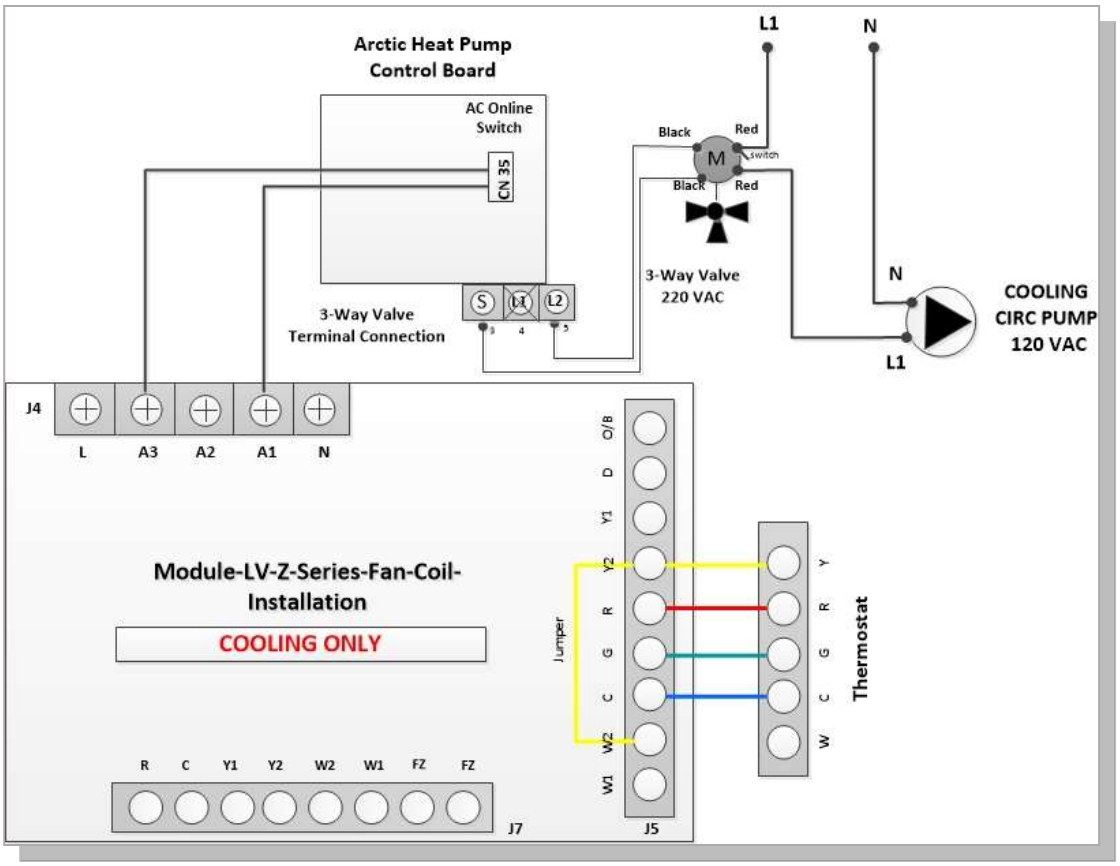
The fan coils are equipped with their own thermostat mounted on the unit as well as an internal 3-way valve, and pump output activation switch. **The setting of the fan coil should be set to Cooling**. When a cooling call is received by the units, the fan coil will open the internal 3-way valve and close its dry contact switch (remote on). This closed Remote ON/OFF connection switch is connected to the AC Online- CN35 switch on the Arctic Heat pump main board. This in turn cause the heat pump to turn on and switch to cooling mode (if hot water call is not present), as well as activate the zone valve to switch water flow direction to the fan coils. When the zone valve is activated its internal switch will be in the closed position and this will then turn on the secondary variable speed cooling zone pump. When more than one fan coil is used the Remote ON/OFF connections will be wired in parallel such that when any single fan coil requires heat it will activate the heat pump's cooling mode. The variable speed pump will should be set to constant pressure such that it will increase and decrease its speed depending on the number of zone that are actively opened.



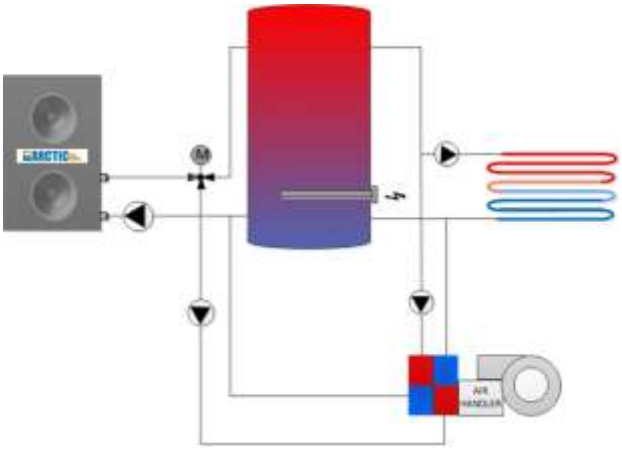
Wiring – COOLING Air Handler (AH)*



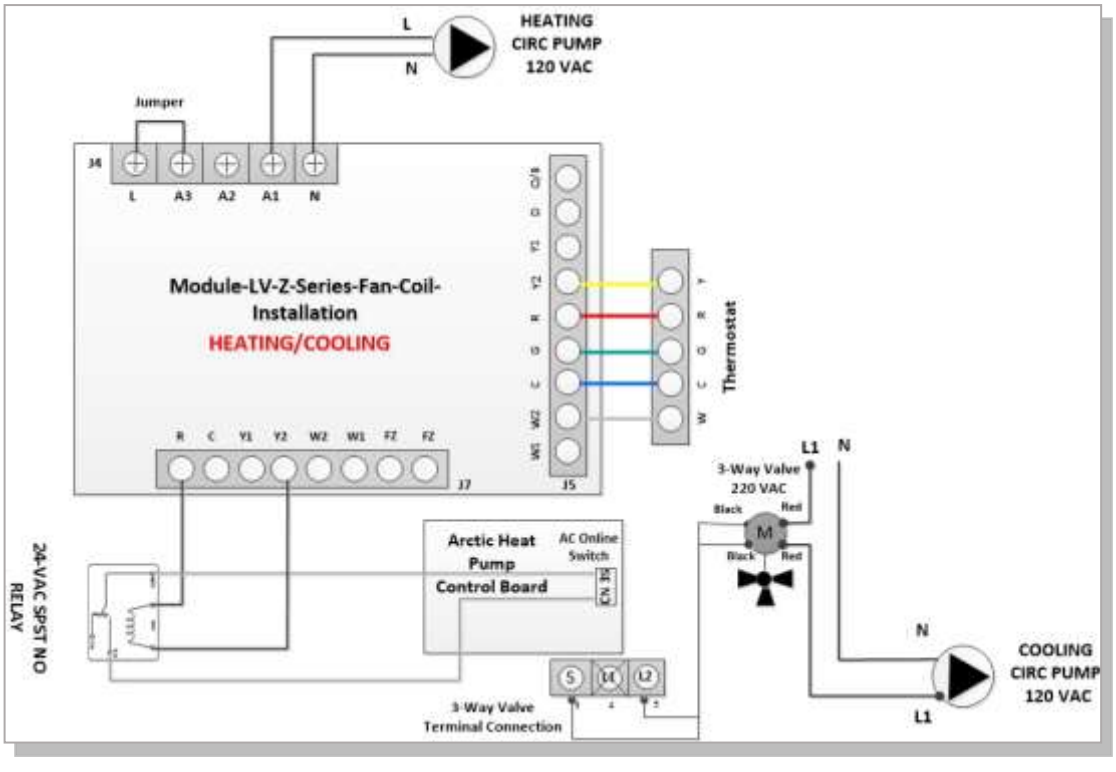
The Air Handlers are equipped with a dry contact relay that is activate in heating call. To activate this in a cooling call we must jumper W2 and Y2. When an external room thermostat calls for cooling it will activate a "Y" cooling call. This in turn will signal the fan coil to optimize its speed for cooling. Because the Y2 and W2 are jumpered, the A3 (common) and A1 connections will close. This closed connection switch is connected to the AC Online connector, CN35 on the Arctic Heat pump main board. This in turn cause the heat pump to turn on and switch to cooling mode (if hot water call is not present), as well as activate the zone valve to switch water flow direction to the fan coils. When the zone valve is activated its internal switch will be in the closed position and this will then turn on the secondary cooling zone pump.



Wiring – COOLING & HEATING Air Handler (AH)*



The Fan coils are equipped with a relay that is activate in heating call. When an external room thermostat calls for heating it will activate a “W” heating call. This in turn will signal the fan coil to optimize its speed for heating. Because the L and A3 are jumpered, the A3 (common) and A1 (L1) connections will be energized at 120 Volts. This connection switch will send power directly the heating fan coil pump and cause hot water to circulate through the internal heating coil.
In cooling mode a “Y” call will be signaled causing the Air Handler to change to cooing mode and optimized its fan speed for cooling. A separate cooling heat exchanger is used separate from the heating HX. A relay coil of a 24 VAC SPST – Normally Open relay is attached to the R and Y2 terminals of the boards output. On a Cooling call 24 V is passed from R to Y2, this in turn will cause the relay contact to close and this contact is connected to the AC Online receptacle, CN35 on the Arctic Heat pump main board. This in turn cause the heat pump to turn on and switch to cooling mode (if hot water call is not present), as well as activate the zone valve to switch water flow direction to the fan coil’s cooling coil. When the zone valve is activated its internal switch will be in the closed position and this will then turn on the secondary cooling zone pump.

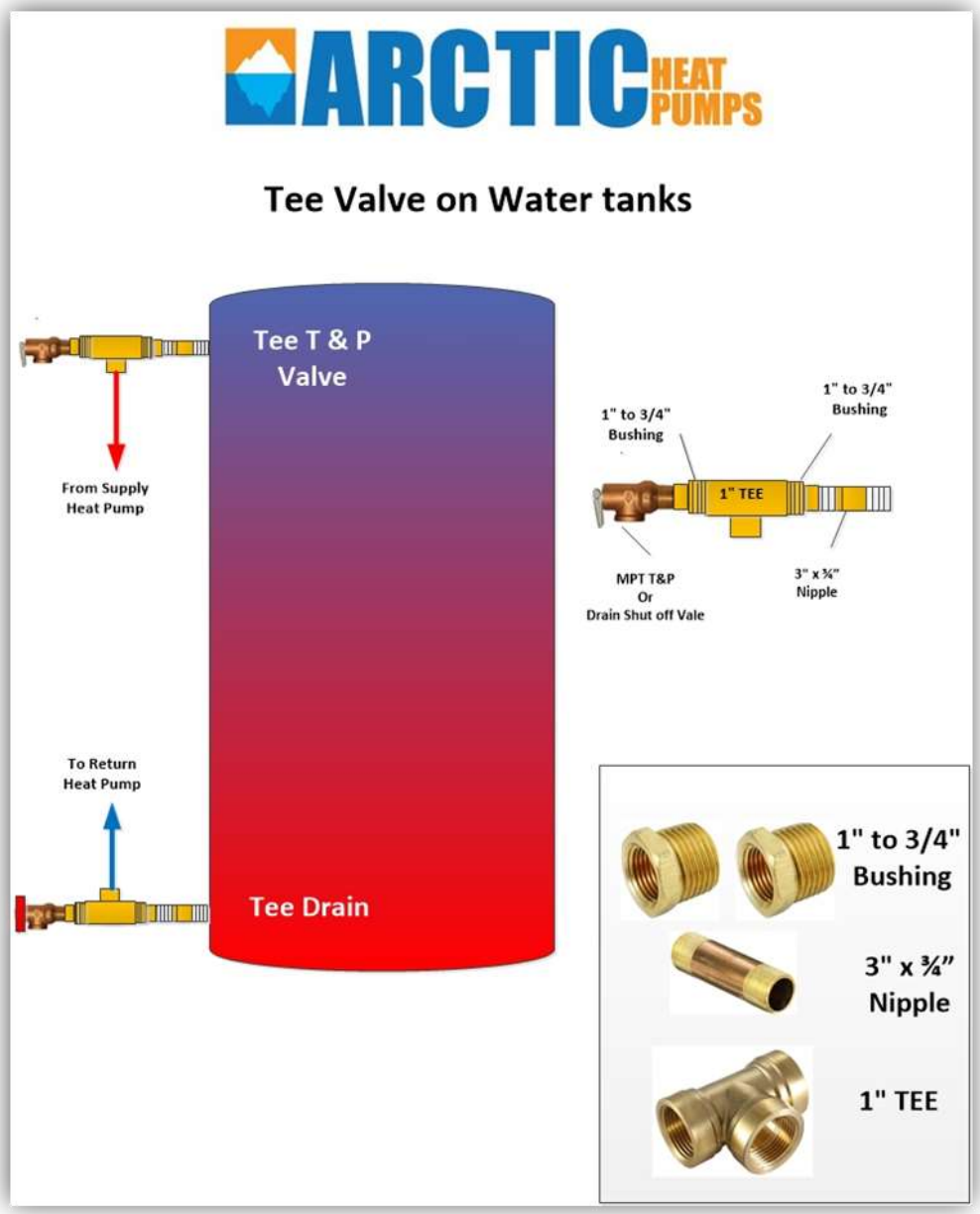


***Note**

In multi-mode such as hot water “and” cooling shown in the layout, the heat pump will always take the hot water mode as priority. As most system designs will use the internal hot water heat exchanger in the EcoULTRA tank, it will require that the hot water tank is first satisfied before activating a cooling call. This will ensure hot water is always present if using the system for on-demand hot water. In the summer month when cooling is preferred over domestic hot water the system can be switched to cooling only to bypass the hot water demand.

Modifying a standard tank to a buffer tank

While we highly recommend the EcoULTRA buffer tank as the primary system storage tank, you can alternatively retrofit an existing off the shelf water tank to be used as a buffer tank. See Below.



WARRANTY

Arctic Heat Pumps are warrantied for the period of 2 years all parts **and electronics and** an extra 3 years (5 years total) for the compressor**. Should a part fail within that period we will expedite you a new replacement part.**

In order to file a warranty we may request digital images of the setup of the system to ensure it has been installed according to the guidelines set above in our installation manual.

Arctic heat pumps will not accept warranties for failures caused by incorrect wiring and incorrect plumbing including failure to use freeze protection such as glycol, in regions prone to freezing temperature. A buffer tank is required to ensure proper design and heat protection.

To initiate a warranty claim please submit you claim to mailto:sales@arcticheatpumps.com along with the initial invoice number and photos to help our warranty representatives identify the failure.

This warranty is non-transferable and only exist to the original owner of the Arctic Heat Pump. Customers assume responsibility for subsequent damage that may occur as a result of a warranty failure. Arctic Heat Pumps will not be responsible for additional damage such as freezing or leaks that may occur because of a malfunction. This warranty is limited to the products manufactured by Arctic Heat Pumps. Other products manufactured by companies other than Arctic Heat Pumps must be dealt with by the original manufacturing company and their own manufacturer's warranty.