

APOLLO

EVI inverter

WATER-TO-WATER HEAT PUMP



Installation & instruction manual



**WARNING MUST FILL WITH
EXACTLY 20% PROPYLENE GLYCOL.
NON-COMPLIANCE
WILL VOID THE WARRANTY**

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I.Specification

1.1 Parameter of multi-function water to water heatpump

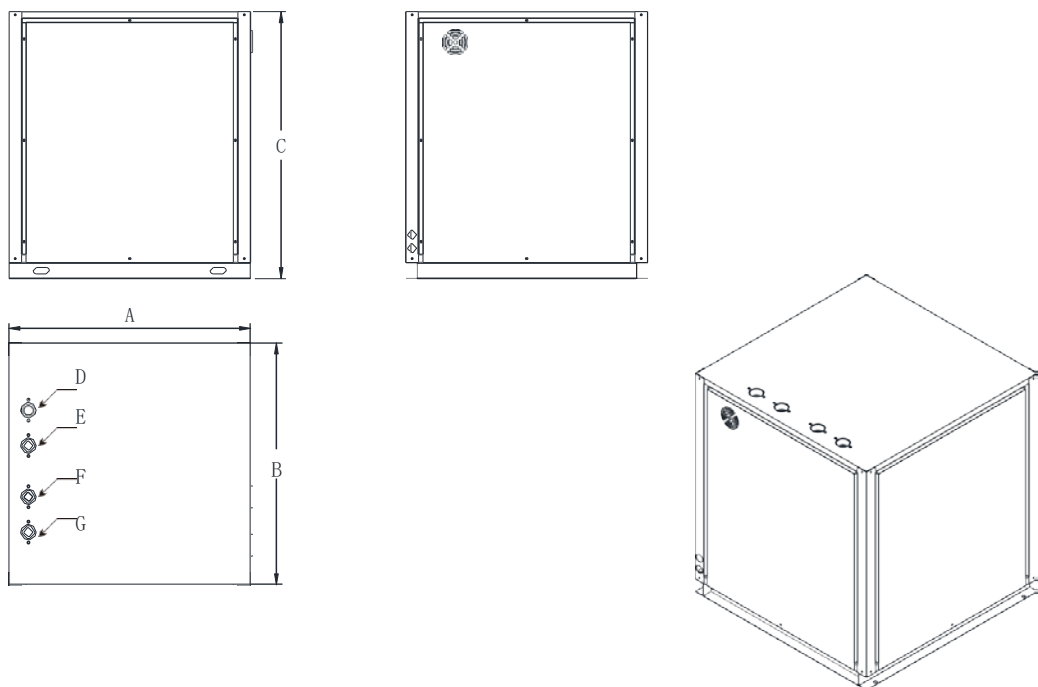
Model		AP-GEO-4T	AP-GEO-6T
Power supply	V/PH/Hz	220/1/60	220/1/60
Heating capacity *1 (water)	KW	14.0	28.1
104°F/113°F; 50°F/41°F	BTU/h	47838.2	95881.2
COP*1	W/W	4.4	4.4
Power input*1	KW	3.2	6.4
Current input*1	A	14.5	28.9
Heating capacity*2 (brine)	KW	12.4	24.6
104°F/113°F; 32°F/23°F	BTU/h	42310.6	83938.7
COP*2	W/W	3.7	3.7
Power input *2	KW	3.4	6.6
Current input*2	A	15.6	30.9
Heating capacity*3 (water)	KW	15.2	32.1
86°F/95°F; 50°F/41°F	BTU/h	51966.9	109529.8
COP*3	W/W	6.7	5.6
Power input*3	KW	2.3	4.7
Current input*3	A	11.0	21.9
Heating capacity *4 (brine)	KW	14.1	28.2
86°F/95°F; 32°F/23°F	BTU/h	48111.2	96222.4
COP *4	W/W	5.2	4.7
Power input *4	KW	2.8	5.5
Current input *4	A	12.7	25.1
Heating capacity *5 (water)	KW	11.2	22.5
122°F/131°F; 50°F/41°F	BTU/h	38216.0	76773.2
COP *5	W/W	3.3	3.2
Power input *5	KW	3.5	7.0
Current input*5	A	14.5	29.1
Heating capacity *6 (brine)	KW	9.8	20.1
122°F/131°F; 32°F/23°F	BTU/h	33439.0	68584.1
COP *4	W/W	2.4	2.6
Power input *4	KW	4.1	7.9
Current input *4	A	13.5	27.2
Cooling capacity (water)	KW	12.1	24.0
54°F/45°F; 86°F/95°F	BTU/h	41269.9	82027.9
COP	W/W	4.2	4.2
Power input	KW	2.9	5.7
Current input	A	13.0	26.0
DC Compressor type		Twin Rotary	Twin Rotary
Compressor quantity		1	1
Sound level	dB(A)	48	52
Water inlet/outlet	inch	1"	1-1/4"
Water flow range	GPM	9GPM~11GPM	14GPM~22GPM
Refrigerant type	R32		
Remarks:			
*1.Heating: Indoor heat exchanger water inlet/outlet: 104°F/113°F, Outdoor heat exchanger water inlet/outlet:50°F/45°F.			
*2.Heating: Indoor heat exchanger water inlet/outlet: 104°F/113°F, Outdoor heat exchanger brine inlet/outlet: 32°F/27°F.			
*3.Heating: Indoor heat exchanger water inlet/outlet: 86°F/95°F, Outdoor heat exchanger water inlet/outlet:50°F/45°F.			
*4.Heating: Indoor heat exchanger water inlet/outlet: 86°F/95°F, Outdoor heat exchanger brine inlet/outlet: 32°F/27°F.			
*5.Heating: Indoor heat exchanger water inlet/outlet: 122°F/131°F, Outdoor heat exchanger water inlet/outlet: 50°F/45°F.			
*6.Heating: Indoor heat exchanger water inlet/outlet: 122°F/131°F, Outdoor heat exchanger brine inlet/outlet: 32°F/27°F.			
*7.Cooling: Indoor heat exchanger water inlet/outlet: 54°F/45°F, Outdoor heat exchanger brine inlet/outlet: 86°F/95°F.			

I. Specification

1.2 Max Heat Water to Water Heat Pump Parameters

Model		4T	6T
Power supply	V/PH/Hz	220/1/60	220/1/60
Heating capacity *1 (water)	KW	14.7	29.5
104°F/113°F; 50°F/41°F	BTU/h	50230.3	100675.1
COP*1	W/W	4.6	4.6
Power input*1	KW	3.2	6.2
Current input*1	A	14.0	27.8
Heating capacity*2 (brine)	KW	13.4	25.8
104°F/113°F; 32°F/23°F	BTU/h	44430.4	88140.7
COP*2	W/W	3.9	3.9
Power input *2	KW	3.3	6.4
Current input*2	A	14.4	29.8
Heating capacity*3 (water)	KW	16.2	33.7
86°F/95°F; 50°F/41°F	BTU/h	54560.3	114950.4
COP*3	W/W	6.8	5.9
Power input*3	KW	2.2	4.2
Current input*3	A	10.0	20.9
Heating capacity *4 (brine)	KW	14.8	28.6
86°F/95°F; 32°F/23°F	BTU/h	50520.2	101015.2
COP *4	W/W	5.5	4.9
Power input *4	KW	2.7	5.3
Current input *4	A	12.1	24.1
Heating capacity *5 (water)	KW	11.2	22.5
122°F/131°F; 50°F/41°F	BTU/h	40130.0	80610.2
COP *5	W/W	3.4	3.7
Power input *5	KW	2.8	6.9
Current input*5	A	14.0	28.2
Heating capacity *6 (brine)	KW	10.3	21.1
122°F/131°F; 32°F/23	BTU/h	35100.0	71480.1
COP *4	W/W	2.6	2.9
Power input *4	KW	3.9	7.6
Current input *4	A	13.0	26.5
Cooling capacity (water)	KW	12.7	25.2
54°F/45°F; 86°F/95°F	BTU/h	43330.	86130.5
COP	W/W	4.4	4.4
Power input	KW	2.7	5.5
Current input	A	12.5	25.0
DC Compressor type		Twin Rotary	Twin Rotary
Compressor quantity		1	1
Sound level	dB(A)	48	52
Water inlet/outlet	inch	1"	1-1/4"
Water flow range	GPM	9GPM~11GPM	14GPM~22GPM
Refrigerant type	R290		
Remarks:			
*1.Heating: Indoor heat exchanger water inlet/outlet: 104°F/113°F, Outdoor heat exchanger water inlet/outlet:50°F/45°F			
*2.Heating: Indoor heat exchanger water inlet/outlet: 104°F/113°F, Outdoor heat exchanger brine inlet/outlet: 32°F/27°F.			
*3.Heating: Indoor heat exchanger water inlet/outlet: 86°F/95°F, Outdoor heat exchanger water inlet/outlet:50°F/45°F.			
*4.Heating: Indoor heat exchanger water inlet/outlet: 86°F/95°F, Outdoor heat exchanger brine inlet/outlet: 32°F/27°F.			
*5.Heating: Indoor heat exchanger water inlet/outlet: 122°F/131°F, Outdoor heat exchanger water inlet/outlet: 50°F/45°F.			
*6.Heating: Indoor heat exchanger water inlet/outlet: 122°F/131°F, Outdoor heat exchanger brine inlet/outlet: 32°F/27°F.			
*7.Cooling: Indoor heat exchanger water inlet/outlet: 54°F/45°F,Outdoor heat exchanger brine inlet/outlet: 86°F/95°F.			

2. Product appearance and installation dimension

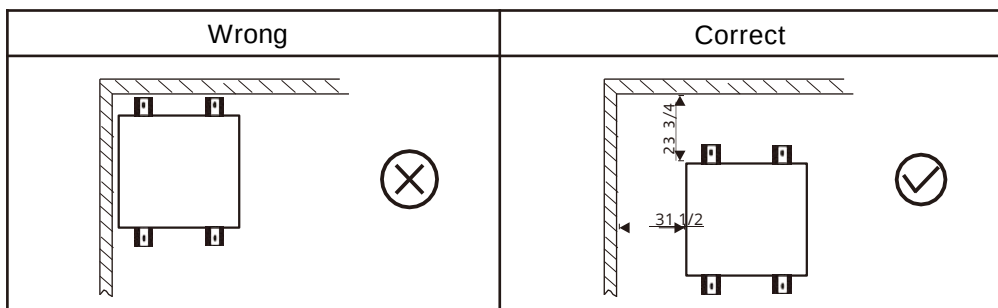


Model	AP-GEO-4T	AP-GEO-6T
Dimensions		
A	29 1/2"	29 1/2"
B	29 1/2"	29 1/2"
C	25 1/2"	32 2/3"
D	Ground side water inlet(1")	Ground side water inlet(1")
E	Ground side water outlet(1")	Ground side water outlet(1")
F	Indoor side water outlet(1")	Indoor side water outlet(1")
G	Indoor side water inlet(1")	Indoor side water inlet(1")

II. Installation

1. Unit installation position

- Please keep enough space around the unit for repair. Correct and wrong means as below:



- The unit can be installed inside floor or any other inside convenient place and reliable load -bearing.
- The installation position can hold the unit without noise and shake.
- No sunlight to the unit.
- The installation position will not be affected by garbage, oil and mist.
- The unit will be damaged under the condition with oil(engine oil), salt(sea area) and sulfide air(near thermal spring and refining factory).

2. water tank(hot water tank and buffer water tank) install location select

- The water tank can be installed in the outdoor with heat pump outdoor unit, such as balconies, roofs, floors, also can be installed in the room.
- Water tank must be standing install, the installation place is a solid foundation, must be bear the weight of the tank when full of water.
- Around the water tank , as well as water pipes and hot water pipes should install a valve.
- Do not install the water tank, where exist pollute and corrosive gases.

3. The unit and water tank installation

- Unit install base is concrete structures, also can be made of steel angle brackets, plus vibration rubber pad placed on the ground or roof, to ensure the unit horizontally.
- Installed base design should in accordance with units and water tanks installed size And operational quality.
- Directly use expansion bolts to fix unit and water tank to the concrete base.
- Around the unit and tank should be drain or outlet.

4. Installation of terminal equipment

1. Indoor terminal equipment installation (such as: fan coil, radiator heater or floor heating), the equipment should be installed in accordance with relevant regulatory requirements.
2. In accordance with the requirements of engineering design drawings, installation and construction.
3. Use a soft connector to connect the unit and fan coil inlet and outlet pipes; install fan coil condensate drain pipe, connect the condensate drain interface, and to ensure smooth drainage of condensate water.

5. The unit and hot water tank, buffer tank and terminal equipments pipe connection (Refer to installation diagram)

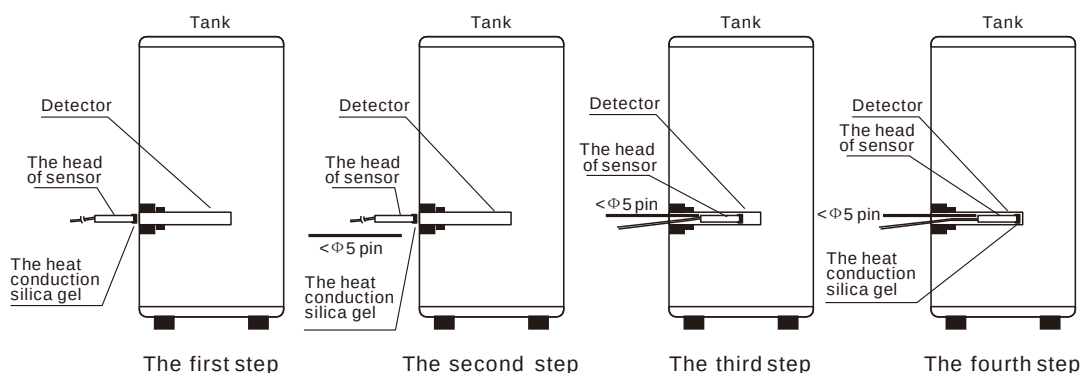
1. Pipe material selection, can be stainless steel pipe, copper pipe, aluminum water pipe, hot water PPR pipes and so on, according with national health and safety standards, heat-resistant, rust-proof, no scaling pipe.
2. The choice of pipe sizes can be used the one which matches the heat pump inlet and outlet main pipe, and, respectively connect to heat pump inlet and outlet, and follow the proper construction of plumbing standards.
3. Water tank outlet pipe and overflow pipe installed in the gutter or outlet position as far as possible, where convenient to drainage.
4. The unit and the junction to the tank must be installed valve or demolition loose joint, for maintenance use.
5. Water pipes are arranged reasonably to minimize bending and reduce the pressure loss of water system
6. The unit air-conditioning side and the hot water side circle inlet must be installed a above 50 mesh water filter to reduce the water system resistance loss.
7. The unit air-conditioning side and the hot water side which connect to running water must be installed a one-way valve, filter and pressure relief devices (pressure relief devices used on the closed water tank, water tank accessories in general, the parameter value $\leq 0.7\text{MPa}$), in accordance with the flow and valve arrow direction, to avoid flow be obstructed.
8. The unit hot water side circle outlet connect to tank circle inlet, and the host hot water side circle inlet connect to tank circle outlet, tank hot water supply connect to hot water pipe.
9. Air-conditioning side buffer tank in series installed on the outlet of the main pipe.
10. After hot water side and air-conditioning side water system pipes, circulated pipes, hot water supply pipes connected, it must be pipe connection rigorous testing, plus 0.7Mpa pressure testing 24 hours, system pipes connector no leakage and clean and sewage pipes, to ensure that the system clean, no debris. No leakage after the test, then pack the pipe and valve with insulation (including the replenishment pipes and valves).
11. In order to discharge the water system air clean, avoid air trapping in the pipeline, the water supply return pipe highest point should be set up a automatically exhaust valve.
12. The water system expansion tank, automatic water valve and stop valve should be installed indoors, to prevent water pipes and valves crack when not use in the winter.
13. The metal pipe must be used above 50mm thickness of glass fiber or high-density fire retardant PE for thermal insulation and moisture, PPR water pipe can be used 30mm thickness of glass fiber or high-density fire retardant PE for thermal insulation and moisture to prevent cold, heat loss and condensation.

14. The unit water inlet and outlet must install a thermometer, water pressure gage, to facilitate inspection when operate.

Note:

- 1) Tubing pipeline should be separate test pressure, must not test with hot water unit or tanks.
- 2) The water system working pressure: 0.2-0.7 Mpa.
- 3) The water system operating temperature: 5-75°C.
- 4) Water can drain from the pressure relief device drainage pipe, and the pipe keep open to atmosphere.
- 5) The pressure relief device regularly move to remove the calcium carbonate, and prove that the device is not plugged.
- 6) Installation of one-way valves, filters and pressure relief device, valve body arrow as same as flow direction.
- 7) The pressure relief device discharge pipe should be installed in the frost-free environment in A continuous downway.

6. Installation of the temp detector



1. The first step: Daub the heat conduction silica gel spreads in the front of sensor, and insert into the detector.
2. The second step: use $< \Phi 5$ pin to push the detector into the end of the detector against the end of the sensor, and marks on level of the pin and the detector.
3. The third step: putout the pin, the position of mark to be at the same level with the inlet of detector, check whether the sensor is inserted to the pipe terminal.
4. The fourth step: the inlet of the detector is sealed with the glass silica gel, and keep the inlet of the detector upwards and uprightness about an hour.

7. Installation of load side terminal equipment

1. load side terminal equipment installation (such as: fan coil, radiator heater or floor heating), the equipment should be installed in accordance with relevant regulatory requirements.
2. In accordance with the requirements of engineering design drawings, installation and construction.
3. Use a soft connector to connect the unit and fan coil inlet and outlet pipes; install fan coil condensate drain pipe, connect the condensate drain interface, and to ensure smooth drainage of condensate water.

8. Geothermal Loop Types

Factors Affecting Installation Choice:

The optimal installation method depends on several factors:

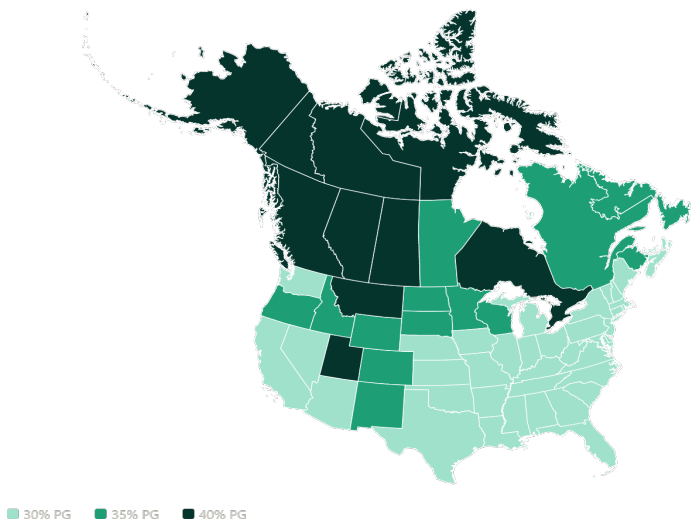
- **Land Availability:** Horizontal systems require more land space, while vertical systems are suitable for smaller properties.
- **Ground Conditions:** Soil type and groundwater levels can influence the feasibility of both horizontal and vertical systems.
- **Local Regulations:** Building codes and zoning laws may restrict certain installation methods.
- **Cost:** Vertical systems are generally more expensive due to the drilling costs. Pond Loop systems offer an efficient solution for heating and cooling buildings in areas with access to suitable water bodies.
- **Environmental Impact:** Consider the potential impact on local ecosystems, especially for pond/pool systems.

Additional Considerations:

- **Professional Installation:** It's crucial to hire a qualified installer to ensure proper design and installation for optimal performance.
- **Maintenance:** Regular maintenance, including cleaning the heat exchanger and checking refrigerant levels, is essential for long-term efficiency.
- **Local Climate:** The climate can influence the energy efficiency of a GSHP. In colder climates, GSHPs can provide both heating and cooling, while in warmer climates, they may be primarily used for cooling.

By carefully considering these factors, you can select the most suitable installation method for your specific needs and maximise the energy efficiency of your home or business.

Average US Soil Temperature (°F)



Data taken from the North Carolina Institute for Climate Studies - 2024

Reference material for installations:

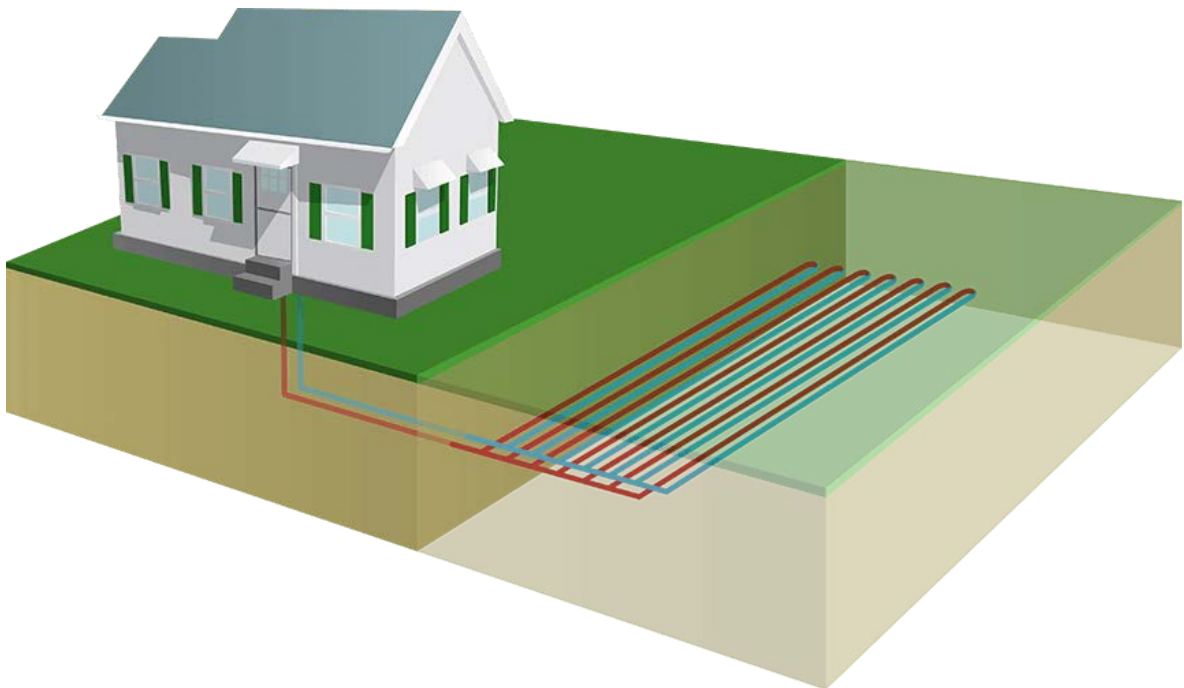
<https://www.energy.gov/energysaver/geothermal-heat-pumps>

Ground Source Heat Pumps (GSHPs) harness the stable temperature of the earth to provide heating and cooling for homes and businesses. The installation method significantly impacts the efficiency and cost of a GSHP system. Here are the primary methods of GSHP installation:

8.1 Horizontal Loop Systems:

- **Overview:** In this method, a network of pipes is buried horizontally in trenches within your property's land. This system is suitable for properties with ample land area. A typical home requires 0.25 to 0.75 of an acre for the trenches to be laid out. This makes the Horizontal loop more suitable to rural or suburban areas.
- **Process:**
 1. **Trenching:** Trenches are dug to a depth of approximately 3-5 feet, typically using specialised machinery, such as a chain trencher. The trenches can be several hundred feet long, depending on the heat load and ground composition.
 2. **Pipe Installation:** The polyethylene pipe network, often referred to as a "slinky," is laid within the trenches.
 3. **Backfilling:** The trenches are then backfilled with soil.

Horizontal Loop GSHP System



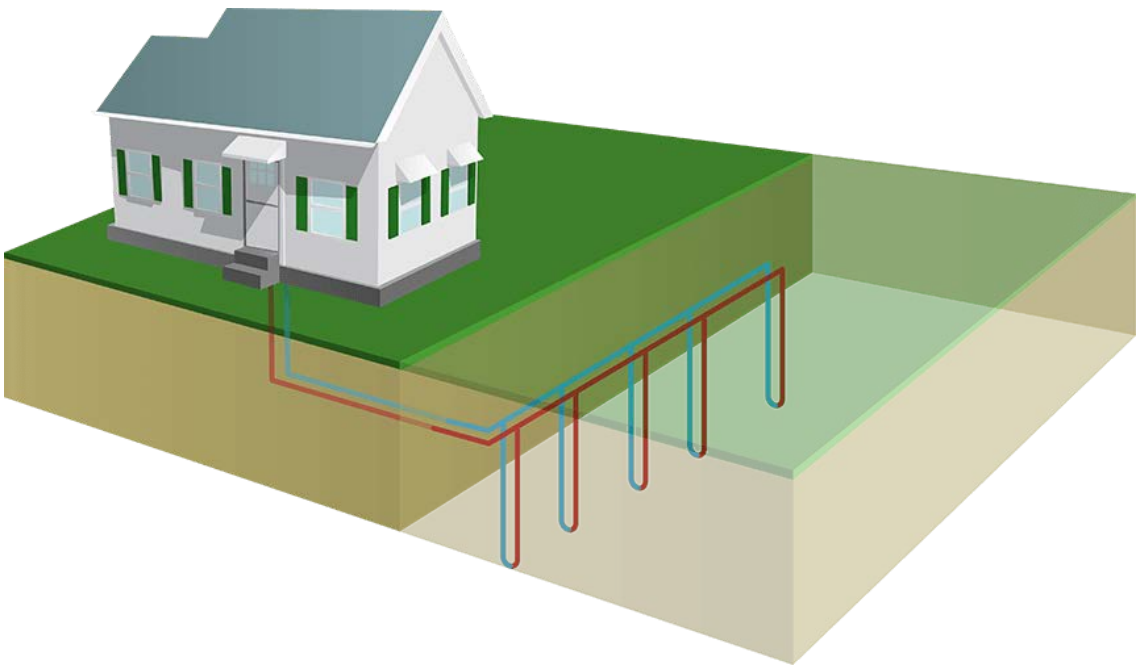
Reference material for installations:

<https://www.energy.gov/energysaver/geothermal-heat-pumps>

8.2 Vertical Loop Systems:

- **Overview:** Vertical loop systems involve drilling boreholes into the ground to install the pipe network. This method is ideal for properties with limited land space, as they can be installed in a space as small as 20 x 20 feet *
- **Process:**
 1. **Borehole Drilling:** Deep boreholes, usually 150-400 feet deep, are drilled into the ground. The boreholes are typically 5-6 inches in diameter, depending on the building's heating and cooling needs.
 2. **Pipe Installation:** The pipe network is inserted into the boreholes. Vertical loops require less piping than horizontal loops because the thermal temperature is more stable deeper underground.
 3. **Sealing:** The boreholes are sealed with grout to prevent groundwater contamination.

Vertical Loop GSHP System



*(depending on heat capacity requirement)

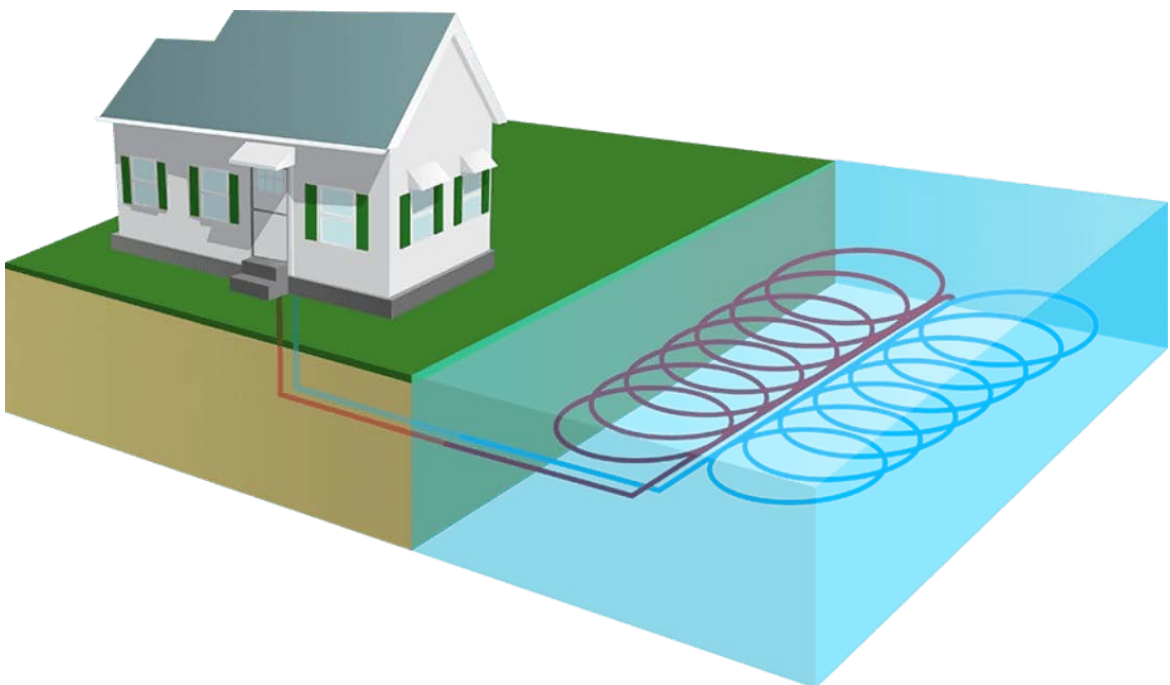
Reference material for installations:

<https://www.energy.gov/energysaver/geothermal-heat-pumps>

8.3 Pond/Pool Systems:

- **Overview:** Pond Loop systems use a body of water, such as a pond or lake, as a heat source or heat sink. This system involves placing a heat exchanger, usually a coil of pipe, at the bottom of the water body. A fluid, typically a mixture of water and antifreeze, is circulated through the coil, exchanging heat with the water. There are considerations to be made before installing a pond loop system:
 - **Water body size and depth:** The water body must be sufficiently large and deep to provide adequate thermal capacity for the heating and cooling needs of the building.
 - **Water Quality:** The water quality should be suitable for heat exchange and should not contain contaminants that could damage the heat exchanger.
 - **Seasonal Variations:** In regions with significant seasonal temperature fluctuations, the performance of the pond loop system may vary. Additional measures, such as supplemental heating or cooling systems, may be necessary during extreme weather conditions.
- **Process:**
 - **Heat Exchanger Installation:** A heat exchanger or coil is submerged in the water body.
 - **Pipe Connection:** Pipes connect the heat exchanger/coil to the GSHP unit.

Pond/Pool GSHP System



Reference material for installations:

<https://www.energy.gov/energysaver/geothermal-heat-pumps>

8.4 Open Loop/Deep Well Systems:

- **Overview:** An open-loop system uses a well to extract groundwater, which is then circulated through the heat pump. This system is more efficient than closed-loop systems, as it doesn't require any piping to be installed. However, it requires a reliable source of water that can supply enough flow to meet the needs of the heat pump system. Additionally, the water must be treated to remove any contaminants before it is returned to the ground.
- **Process:**
 - **Well Drilling:** The depth of the well depends on the specific needs of the building and the local geology. Typically, wells are drilled to a depth of 100 to 400 feet. The diameter of the well is determined by the flow rate required for the system. The well is lined with a protective casing to prevent collapse and contamination.
 - **Pump Installation:** A submersible pump is installed at the bottom of the well to draw water from the aquifer. The pump's capacity is chosen to meet the heating and cooling demands of the building.
 - **Piping & Filtration:** High-density polyethylene (HDPE) piping is used to transport the water from the well to the heat pump. Another set of HDPE pipes carries the water back to the well after it has been used by the heat pump. Filters are installed to remove sediment and other contaminants from the water, protecting the heat pump and ensuring efficient operation.
 - **Water Disposal:** In many cases, a disposal well is drilled to return the used water to the ground. In some areas, it may be permissible to discharge the water into a nearby body of water, such as a lake or river. Local regulations and permits must be obtained for both well drilling and water disposal.

Open Loop/ Deep Well GSHP System:



Reference material for installations:

<https://www.energy.gov/energysaver/geothermal-heat-pumps>

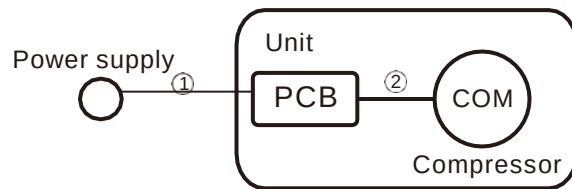
9. Electrical wiring

1. The unit should use dedicated power supply, power supply voltage line corresponding with rated voltage.
2. The unit power cable must use copper cable, the cable diameter must ensure that the unit's maximum starting current requirements.
3. The unit power supply circuit must have a grounding wire, which should connect with a reliable external ground wire, and the external ground wire is effective.
4. Wiring construction must be installed by professional technicians refer to circuit diagram.
5. Power lines and signal line layout should be neat, rational, strong and weak lines separate and can not interfere with each other, while not contacted with the connecting pipe and the valve body.
6. When power lines and control lines parallel, the wires were placed in each tube, also leave appropriate distance between the lines.
7. Unit electric wire connection: take the unit power line, remote control three core lines, electric heater power line, solar circulated water pump control power line, water tank temperature sensing line, solar collector temperature sensor line, terminal equipments connect to unit lines, through the unit wiring hole set into the electrical box, connect to the appropriate terminals according to wiring diagram, and fix it by the pressure line of board in the electrical box.

11.8. Unit control panel Code Mk4001, Fuse specifications: 5A/250V

10. Electrical Wire Selection

10.1 Voltage drop occur may due to the large current draw during compressor starting, and may be result in the compressor is difficult to stat. So we recommend selecting the wire specification from the table below.



10.2. Size Table of Electrical Wire

Starting current (A)	The wiring specifications (inch ²)						
	Markor Mark①(Heat resistance temperature above 140°F)						Mark②(Heat resistance temperature above 248°F)
	within 197"	Within 394"	Within 590"	Within 787"	Within 1181"	Within 1969"	Within 39"
Below 20	0.0031	0.0031	0.0031	0.0054	0.0085	0.0124	0.0031
Below 30	↑	↑	0.0054	0.0085	↑	0.0217	↑
Below 40	↑	0.0054	0.0085	↑	0.0124	↑	↑
Below 50	↑	↑	↑	0.0124	0.0217	0.0341	↑
Below 60	↑	0.0085	↑	↑	↑	↑	↑
Below 70	0.0054	↑	0.0124	0.0217	↑	↑	0.0054
Below 80	↑	↑	↑	↑	0.0341	0.0465	↑
Below 90	↑	↑	0.0217	↑	↑	↑	↑
Below 100	↑	0.0124	↑	↑	↑	0.0589	↑
Below 110	↑	↑	↑	↑	↑	↑	↑
Below 120	0.0085	↑	↑	0.0341	0.0465	↑	↑
Below 140	↑	0.0217	↑	↑	↑	0.0775	0.0085
Below 160	↑	↑	0.0341	↑	↑	↑	↑
Below 180	↑	↑	↑	↑	0.0589	0.0930	0.0124
Below 200	0.0124	↑	↑	0.0465	↑	↑	↑
Below 220	↑	↑	↑	↑	0.0775	0.1240	↑
Below 240	↑	↑	↑	↑	↑	↑	0.0217

Power supply installation condition: The touching space of breaker should be more than 3mm, use copper wire only.

Caution of Ground

The internal motor protector does not protect the compressor against all possible conditions. Please be sure that the system utilizes the ground connection when installed in the field.

Warning: To avoid fire, electric shock and other accidents, keep in mind about these tips:

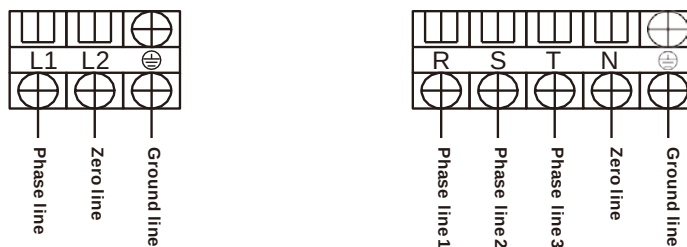
Only use power supply voltage indicated on the label, if you do not know the family of voltage, contact the dealer or local power company.

When you use the unit by the maximum current please view the specifications, so make sure your home's power supply (current, voltage and cable) to meet the machine's normal load requirements.

To protect the power lines. Power lines should be fixed, so that people will not be trip over or the lines damaged by other things. Paying particular attention to plugs, which should be easily plug into the socket, careful the plug position.

Do not overload wall plugs or extension the cable. Line overload can cause fire or electric shock.

To ensure your safety, you must plug the power lines into the socket with a grounded three-phase, and check to ensure your socket is accurate and reliable grounding.

10.3.Power wiring as follows (single unit):

Mode	Host Power	Phase line	Zero line	Ground line	Max.line length (inch)	Signal line	Tem. sensor assistance line	Max.line length (inch)
AP-GEO-4T	220V/1PH/60Hz	12AWG	12AWG	12AWG	590	22AWG	22AWG	1968
AP-GEO-6T		10AWG	10AWG	10AWG	590	22AWG	22AWG	1968

Note:

1. used PVC insulated copper wire for above wiring
2. for installation requires, the line is longer than the maximum line length, please contact the company

11. Trial run

11.1 Check the ground water side, air-conditioning side and solar side of the water system piping and all accessories are installed correctly, heat pumps, water tanks, terminal equipment piping connections are correct. The fill water supply of hot water side, air-conditioning side and solar side are normal, the replenishment port whether installed pressure relief valve, one-way valve, filter and other accessories.

11.2 Open the unit ground water, air-conditioning and solar side hydrating valve, circular inlet and outlet water valve, main pipe backwater valve, floor branch pipe valve, terminal equipment inlet and outlet valve, fill the hot water side water tank, air-conditioning side water tank and solar collector system with water. Check the valves should be open if all open, the valves should be closed if all closed, pipe insulation if complete.

11.3 Open the exhaust valve, hot water valve, drain the pipe air, confirm pipe clean, close the exhaust valve, hot water valve.

11.4 Check the power supply if required with the unit power supply on the nameplate, power supply voltage if normal.

11.5 Check all power supply and control wires are all connected in place, whether connect correctly according to the cable wiring diagram, all the terminals are tightened and check the reliability of ground connection.

11.6 Test Hot water side, air-conditioning side, solar side water system to test, first of all, heat pump units connected to power supply, operating the remote controller (refer to the remote controller operation, and enter the water pump testing parameter, turn on the ground water, air-conditioning side, solar side circulating pump by manual, opened the exhaust valve again to drain the pipe air, observe and listen water pump operation, the circulating water flow whether normal. Until the ground water side, air-conditioning side, and solar side circulating water system work completely normal, close the ground water side, air conditioning and solar side circulating pump.

11.7 When a full inspection of the entire system to install correctly and meet the requirements, may carry out the whole test run.

11.8 Operate the unit controller, select the heat pump working mode and setting temperature, back to controller main interface, press “” to start the heat pump.

11.9 First water pump operate 30s, the compressor starts. To determine unit operation if have different sound through hearing, if is, shunt down power immediately and check, only continue running if there is no different sound, at the same time pay attention to system high and low pressure if normal.

11.10 Check again whether the unit input power and current normal, if not, then shut down to check.

11.11 View the unit control operation status display, check and record the unit's output and input status, the value of each point temperature indicated if normal.

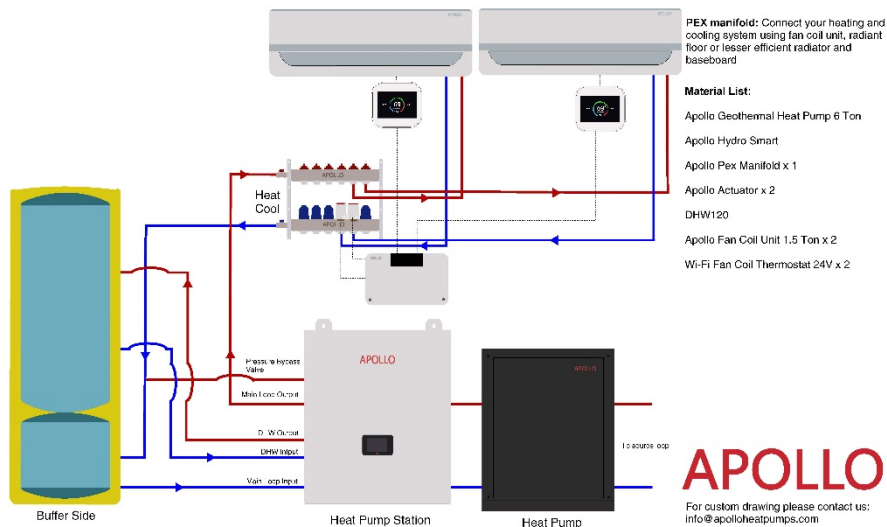
11.12. Operate the unit controller, change the heat pump working mode, check and record the unit's output and input status, the value of each point temperature indicated if normal. Unit put into normal run only after checking all the working modes are normal.

Note:

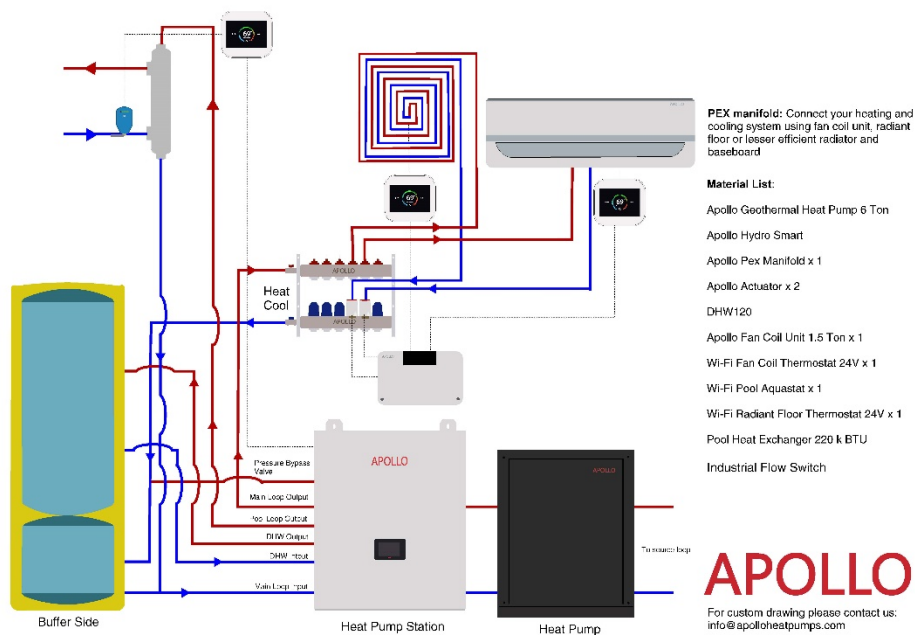
- 1 unit the first time power on without three minutes delay protection, other times there is three minutes delay protection.
- 2 must clean the pipe air when first the unit boot.

12. Installation schemes

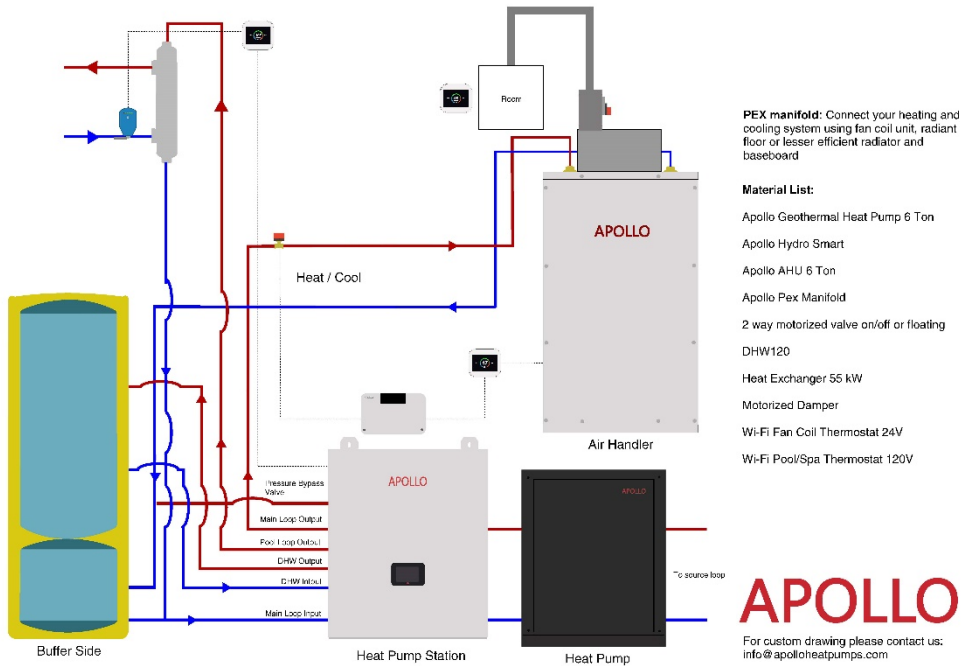
Apollo Heat Pump + FCU + DHW Loop



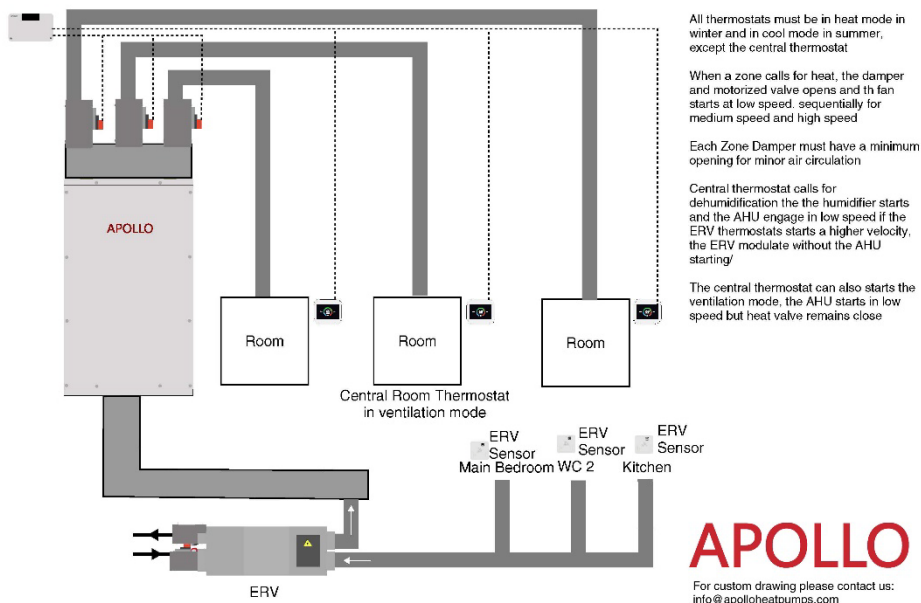
Apollo Heat Pump + FCU + Radiant + DHW Loop + Pool



Apollo Heat Pump + Air Handler + Pool + DHW

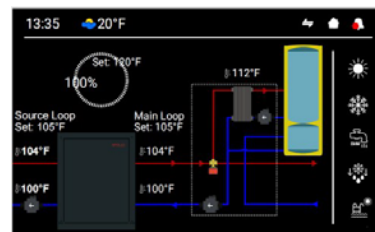


AHU, DHW and Pool



III. USE

1. Unit controller interface displays.



2. Button description



Unit ON/OFF button: press this button to turn on or off the unit.



Model selection button: press this button to selection the running mode
a: heating mode b: cooling mode c: DHW (domestic hot water) mode
c: cooling+DHW mode d: heating+DHW mode

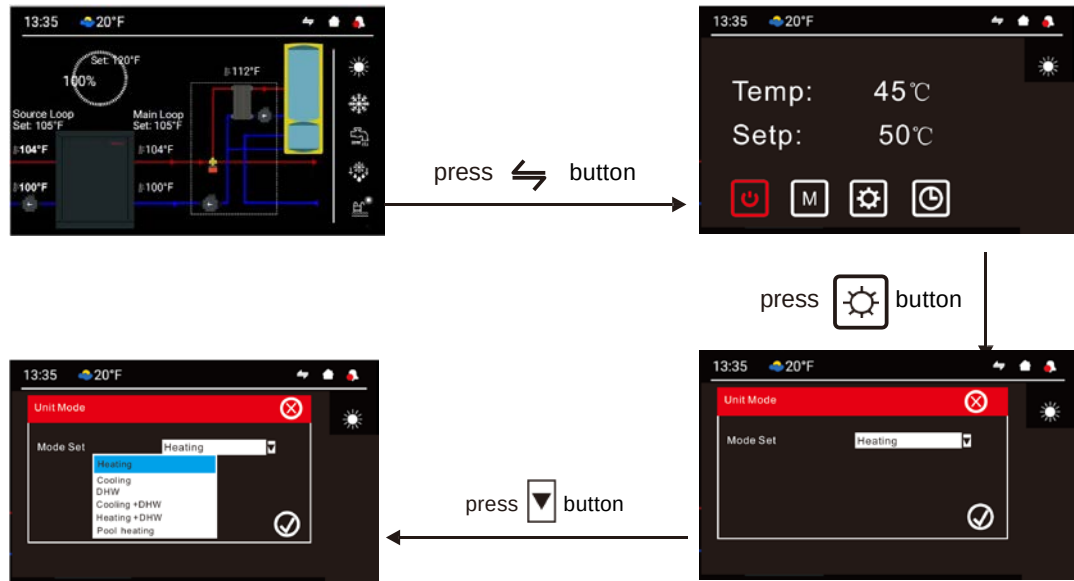


System parameter setting button press this button to enter system parameter setting interface

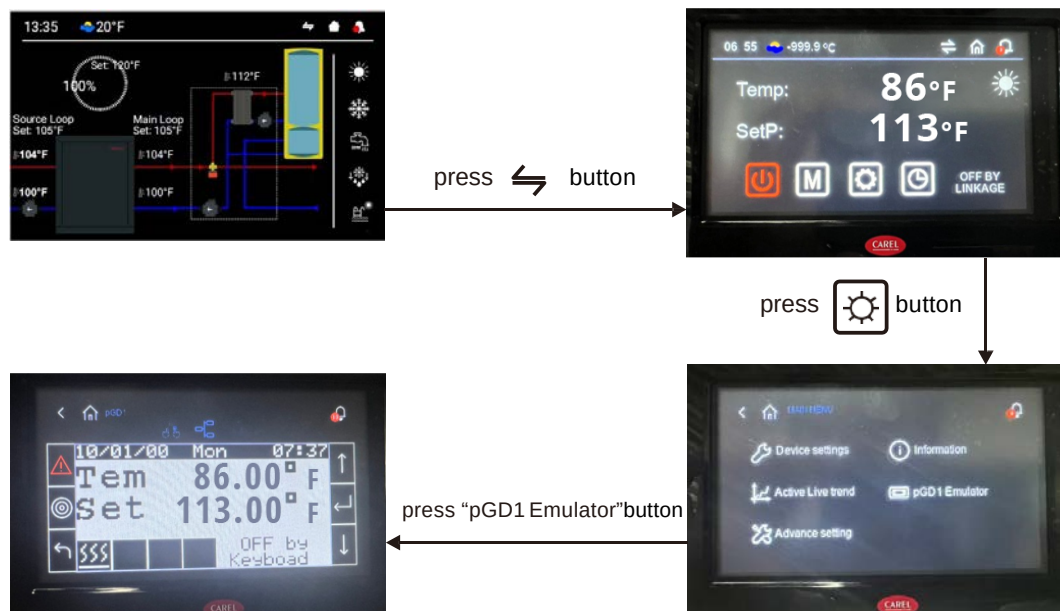


Timer setting button press this button to enter timer setting interface,

3. Mode select

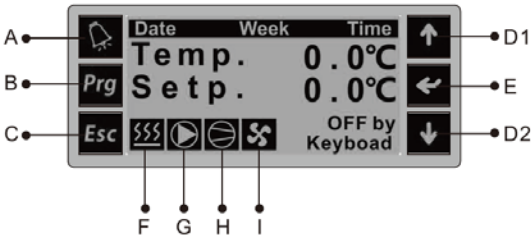


4. Enter the pGD1 Emulator interface



4.1. The pGD1 user interface and function shows as below

symbol	icon	instructions
A		Alarm icon
B		Factory parameters icon
C		Exit icon
D		Select icon
E		Menu & Confirm icon
F		Heating mode icon
G		Pump icon
H		Compressor icon
K		Fan icon
M		Defrost
N		Cooling mode



4.2 Turn on/turn off the unit

Press to access menu, press button to select Unit On/Off, then press to confirm.

Press button to turn on/off, and press to confirm.

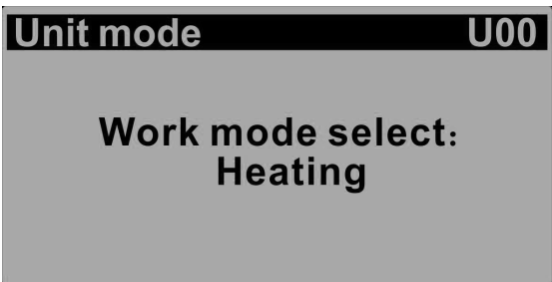


4.3 Mode switching (Heating, Cooling, Hot water, Hot water&Cooling, Hot water&Heat)

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

Press button to switch mode ,and press to confirm, Egc. Mode switching&Temperature setting.

Attention: Only switch mode when the unit is turn off.



4.3 Modify the set temperature

Setpoint	U01
Heating setp.:	45.0°C
Cooling setp.:	12.0°C
Hotwater setp.:	50.0°C

4.3.1 The setting temperature interface is as follows:

Heating setp: heating setting temperature

Cooling setp: cooling setting temperature

Hotwater setp: hot water setting temperature

Setpoint	U02
Hot water set:	°C
Temp.diff.:	°C
Stop temp.diff.:	°C

4.3.2 Set Temp.diff and Stop temp. diff. of hot water:

Temp.diff: The difference between the unit restart temperature and the set temperature after standby.

Stop temp.diff: The difference between the unit's shutdown temperature and the set temperature after reaching the setting temperature.

Setpoint	U03
Cooling and heat mode	
Temp. diff.:	5.0°C
Stop temp. diff.:	2.0°C

4.3.3 Set Temp.diff and Stop temp. diff. of heating and cooling:

Temp.diff: The difference between the unit restart temperature and the set temperature after standby.

Stop temp.diff: The difference between the unit's shutdown temperature and the set temperature after reaching the setting temperature.

Setpoint	U04
PID management	
Kp:	5.0°C
Integral:	200s
Differential:	0s

4.3.4 Set PID

Kp: The larger the value, the faster the heat pump adjustment speed (not recommended to adjust this parameter).

Integral and Differential: (not recommended to adjust this parameter).

4.4 Pump control

4.4.1 Pump work

Normal - the water pump is always on during standby;

Interval, the water pump is on every 3 minutes during standby;

Demand - the water pump stops during standby.

Pump control	U05
Pump work:	Interval
Pump auto:	ENABLE

4.4.2 Pump auto:

ENABLE:the water pump is automatically turned on according to the temperature difference adjustment;

DISABLE:the water pump is automatically turned off according to the temperature difference adjustment.

4.5 User configure

4.5.1 Fan mode

Low speed - economic mode, the heat pump can automatically output capacity as required according to the ambient temperature;

Nigt - night mode, the heat pump has low output capacity from 8 pm to 8 am, and high output at other times;

Daytime - day mode, the compressor outputs according to the maximum capacity;

Pressure - test mode, the heat pump outputs according to the test capacity.

4.5.2 Enable heater:

ALL - both floor heating and hot water mode enable electric heating;

Heating - only start electric heating in heating mode;

Hot water - only enable electric heating in hot water mode;

Disable - disable electric heating.

4.5.3 Enable chassis/crack:

Enable - enable chassis electric heating/crankshaft electric heating;

Disable - disable chassis electric heating/crankshaft electric heating.

User configure U06	
Fan mode:	Daytime
Enable heater:	ALL
Enable chassis/crack heater:	Enable

4.6 Heater control

Comp.delay: The delay time to start the electric heating after the compressor starts, the default is 50 minutes.

Ext.temp.setp: The maximum allowable ambient temperature for starting electric heating, the default is -15 degrees.

Heater control U07	
Comp.delay:	50min
Ext.temp. step.:	-15.0°C

4.7 Delta temp.set:

Variable frequency water pump speed adjustment target value of temperature difference between inlet and outlet water: the default is 5 degrees;

The output of the variable frequency water pump increases when the temperature difference between the inlet and outlet water is greater than 5 degrees, and the output of the variable frequency pump decreases when the temperature difference between the inlet and outlet water is less than 5 degrees.

Pump control U08	
Delta temp. set:	5.0°C

4.8 Auto start:

Disable - after the heat pump is powered off, the heat pump will not automatically start;

Enable - the heat pump will automatically start after the heat pump is powered off

User configure U09	
Auto start:	Enable

4.9 Ambient switch (auto change heating or cooling mode switch)

Enable switch:

Disable - turn off the auto change heating or cooling mode function

Enable - turn on the auto change heating or cooling mode function

A: When the ambient temperature is high than the

"Ambtemp switch setp: 20°C" the unit is run cooling mode

B: When the ambient temperature is low than the

"Ambtemp switch setp: 20°C" the unit is run heating mode

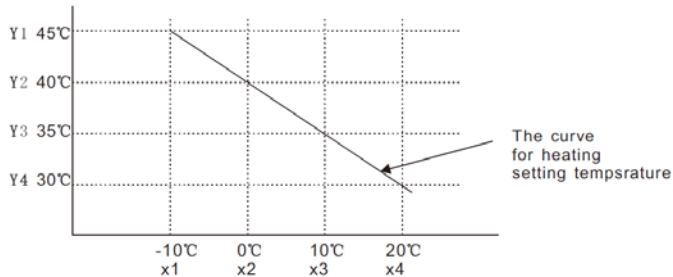
Ambtemp switch U10	
Enable switch:	Disable
Ambtemp switch setp:	20°C
Amb temp. diff:	4°C

4.10 ECO. mode -Heat set compensation

Enable switch:

Disable - turn off the Eco curve mode for heat setting temp.

Enable - turn on the Eco curve mode for heat setting temp.



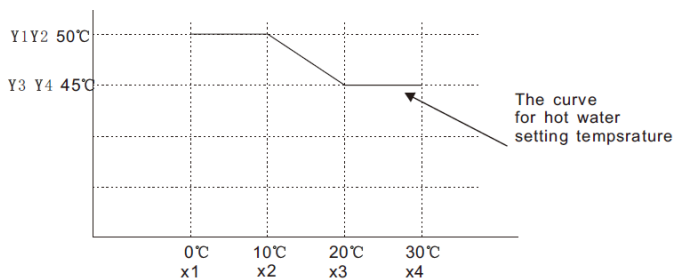
Eco.mode -Heat set compensation		U12
		disssble
mb Temp	Step.	
x1: -10°C	Y1: 45°C	
x2: 0°C	Y2: 40°C	
x3: 10°C	Y3: 35°C	
x4: 20°C	Y4: 30°C	

4.11 ECO. mode -Hot water set compensation

Enable switch:

Disable - turn off the Eco curve mode for hot water setting temp.

Enable - turn on the Eco curve mode for hot water setting temp.



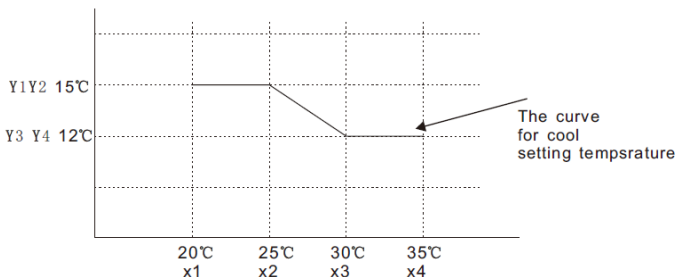
Eco.mode -Hot water set compensation		U13
		disssble
mb Temp	Step.	
x1: 0°C	Y1: 50°C	
x2: 10°C	Y2: 50°C	
x3: 20°C	Y3: 45°C	
x4: 30°C	Y4: 45°C	

4.12 ECO. mode -Cooling set compensation

Enable switch:

Disable - turn off the Eco curve mode for cool setting temp.

Enable - turn on the Eco curve mode for cool setting temp.



Eco.mode -Cool set compensation		
		disssble
mb Temp	Step.	
x1: 20°C	Y1: 15°C	
x2: 25°C	Y2: 15°C	
x3: 30°C	Y3: 12°C	
x4: 35°C	Y4: 12°C	

4.13 Anti-legionella function

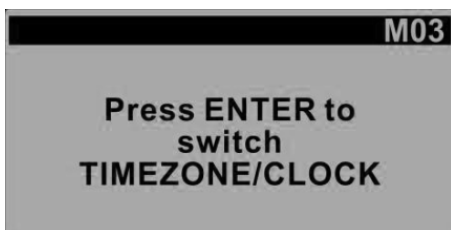
Anti-legionella set enable antileg:

YES: turn on the Anti-legionella function

NO: turn off the Anti-legionella function

4.14 TimeZone/CLOCK

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

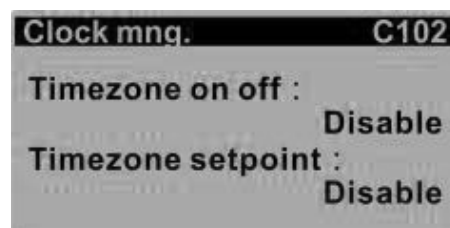


4.15 Timezone on off:

Enable - Turn on the timer switch function, the unit can be set to switch on and off time for one week after it is switched on;
Disable - Turn off the timer switch function.

4.16 Timezone setpoint:

Enable - Turn on the timer temperature setting function, the unit can set different temperatures in four time periods of a day after it is turned on;
Disable - Turn off the timer setting temperature function.



4.17 Timezone on off:

Timing setting interface, under ON is the power-on time, and under OFF is the off-time.

Clock mng. C103		
	ON	OFF
Mon.:	0: 0	0: 0
Tue.:	0: 0	0: 0
Wed.:	0: 0	0: 0
Thu.:	0: 0	0: 0

Clock mng. C104		
	ON	OFF
Fri.:	0: 0	0: 0
Sat.:	0: 0	0: 0
Sun.:	0: 0	0: 0

4.18 Timezone setpoint:Timing setting temperature interface

Timezone1 is the start time of the first time period, Timezone2 is the cut-off time of the first time period and the start time of the second time period, and so on.

Cooling tem, Heating temp, Tank temp - Set the temperature for cooling, heating, and hot water for the corresponding time period.

Clock mng. C105	
Timezone1:	0: 0
Cooling temp.:	0.0°C
Heating temp.:	0.0°C
Tank temp.:	0.0°C

Clock mng. C106	
Timezone2:	0: 0
Cooling temp.:	0.0°C
Heating temp.:	0.0°C
Tank temp.:	0.0°C

Clock mng. C107	
Timezone3:	0: 0
Cooling temp.:	0.0°C
Heating temp.:	0.0°C
Tank temp.:	0.0°C

Clock mng. C108	
Timezone4:	0: 0
Cooling temp.:	0.0°C
Heating temp.:	0.0°C
Tank temp.:	0.0°C

4.19 Input/Output

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

IV. WIFI remote control

1. Hardware installation & connection:

1. The wifi adapter kit is shipped inside the unit for the heat pump and has the following components

Signal line



Power supply



Cable



WIFI module



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



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

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



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

- 1- Connect the **white** wire of the signal line to the **B** port
- 2- Connect the **red** wire of the signal line to the **A** port.
- 3- Connect the **Black/White** wire of the Power Supply Adapter to the **plus (+)** port.
- 4- Connect the **Black** wire of the Power Supply Adapter to the **minus (-)** port.
- 5- Connect the power supply adapter to a 230V power supply plug.

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

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



2. Application download and setup:



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

Go to the application stores of your smart phone and download the **Heat Pump Mate App**.

After downloading Heat Pump's application look for the application icon on your smartphone screen and click on it.

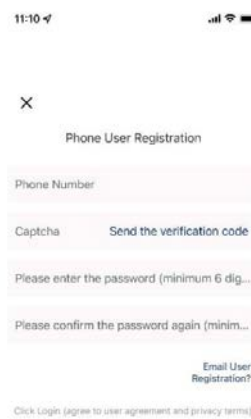
Register your device as shown below:



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

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

We do recommend email registration.



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

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

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



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

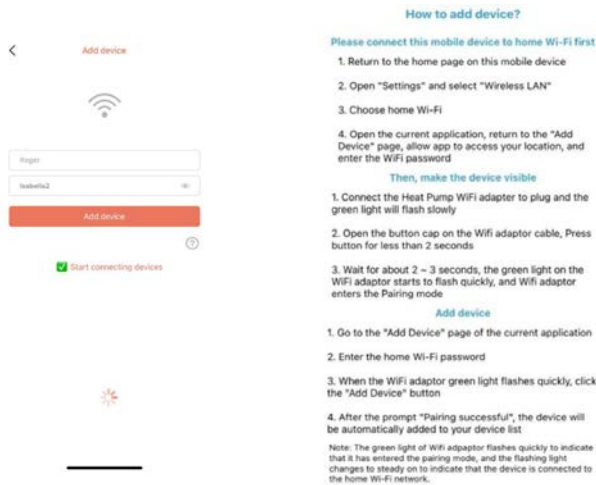


Simply scan the barcode on your heat pump (add by scan option)



Add By WIFI:

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



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

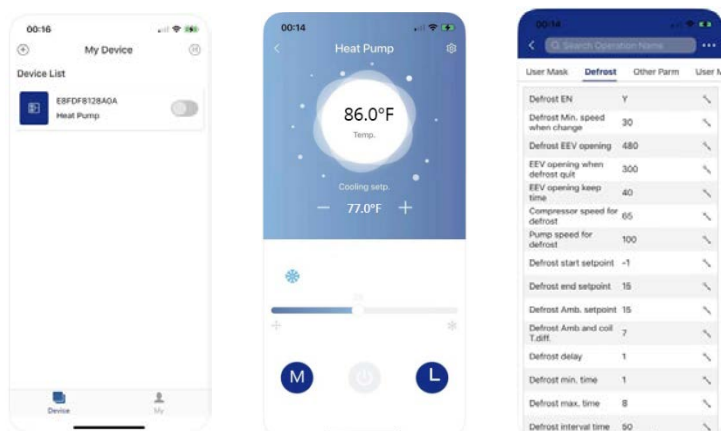


And gently press the button for 2-3 seconds as described on the left instructions.

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

Device List Windows:

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



Application usage guide:

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

V. Maintenance and repair

1. Note

1. Check whether the exhaust equipment is normal. Avoid cutting of the water supply and or air entering into the system, or it will influence the performance and reliability of the unit. The water filter should be cleaned regularly. Keep the water clean in case of any damage to the unit due to filter's dirty and jam.
2. Keep the unit environment dry, clean and well ventilation. Clean the side air exchanger regularly (once per 1-2 months) in order to maintain high exchange efficiency and save energy.
3. Usually check the performance of all the parts in the unit. Check whether the working pressure of the refrigerant system is normal. Repair and change the parts timely if there's any abnormality.
4. Usually check whether the wiring of the power and electric system is tightened and or electric parts perform abnormally or smells. Repair and change the parts timely if there's any abnormality.
5. Care the unit if the unit stops for a long time. Discharge all the water in the pump and throughout the pipe route in case breakdown to the water pump and pipe caused by frost and freeze. Discharge the water from the water pump and tube exchange Button drain. Check the unit thoroughly and flood water into the system before the unit power on again
6. To check the operation of every process in the unit, the operation pressure of the refrigerant system. You should maintain or change it in time.
7. To check the power supply and cable connection usually, there is abnormal action or bad smell about the electrical component. If there is, please maintain or change it in time.

2. Debugging And Running

1. Preparation Before Debugging

1. Checking-up of the Air Source Heat Pump unit.
 - A. Check to assure that the appearance of the unit and the inner pipe system are not damaged in the transportation process.
 - B. Check if there is air in the water pipes of the unit. If yes, please remove all the air through the vent valve on the water tubes and vent valves on the water pump.
 - C. Check to assure that the blades of the fan do not touch the fixed panel or the protection net of the fan.

1.2 Checking the electric supply system.

- A. Check if the power supply source accords with the power source required in this manual and the nameplate on the unit.
- B. Check if all the electric power supply and control lines are connected properly and confirm that the lines are connected according to the diagram and the grounding is reliable and the heads of all the lines are firm enough.

1.3 Check the pipeline system

- A. Confirm that the system pipe, manometer, valves, and other instruments are correctly installed.
- B. Confirm that the valves in the system are open or closed properly.
- C. Check if the insulation system is in a good condition.

2. Commissioning

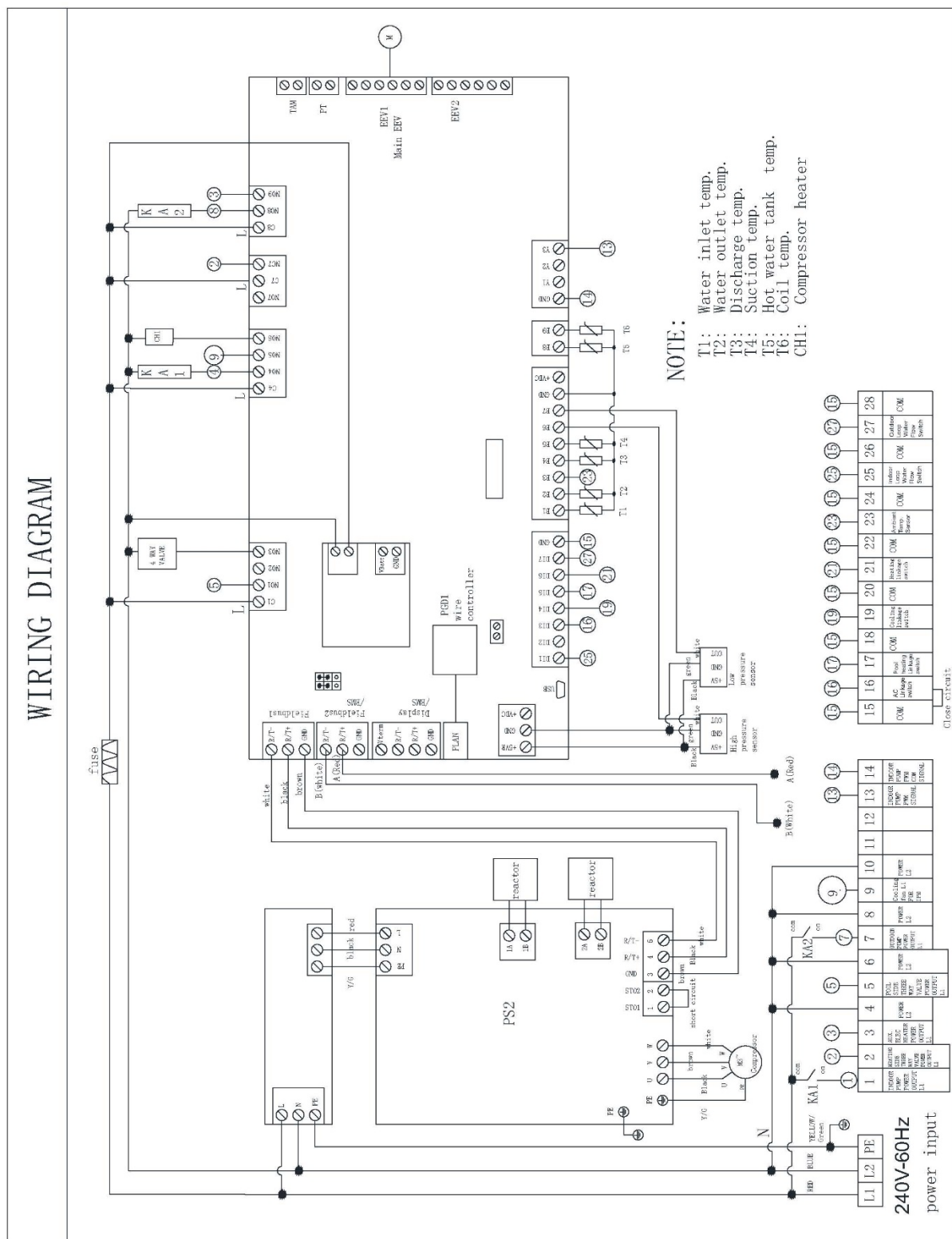
1. The test running of the unit must be operated by a professional engineer !
2. After taking full examination of the whole system, if all parts are confirmed to be according to installation requirements, test running of the entire unit can be done.
3. The unit will turn on automatically 1 minutes later after connecting to the electric source and turning on the Heat Pump.
4. Check if the unit is running in accord with the requirements. Users can use the Air Source Heat Pump after testing properly for at least 8 hours.

3. Determine and solve malfunction by below table:

Malfunction	Reason	Solution
The unit can't run	1. Power failures 2. The unit wire loses 3. The unit power fuse burns out.	1. Shut down and check the power 2. Check the reason and repair 3. Check and change the power fuse
The water pump can run but can't circulate and is noisy	1. The water system is lack of water 2. There's air in the system. 3. The water system valve doesn't open entirely 4. The water filter is dirty and jam	1. Check the water supplement equipment and supply water into the system. 2. Exhaust the air from the water system 3. Clean the water filter or exhaust the air from system 4. Clean the water filter
The cooling capacity is too low and the compressor works continuously without pause.	1. Refrigerant is insufficient 2. Thermal insulation of the water system is poor 3. Thermal discharge of the exchange is poor 4. Water flow volume is insufficient	1. Check the leakage and add refrigerant 2. Enhance the thermal insulation of the pipe route 3. Clean the exchanger and improve the condensation condition 4. Clean the water filter
The compressor exhausted pressure is too high	1. Too much refrigerant 2. Thermal discharge of the exchange is poor	1. Discharge surplus refrigerant 2. Clean the exchanger and improve the condensation condition
The compressor suction pressure is too low	1. Refrigerant is insufficient 2. The filter and or capillary tube jam 3. Water flow volume is insufficient 4. Capillary tube of expansion valve sensor bulb breakdown	1. Check the leakage and add refrigerant 2. Change the capillary tube or filter 3. Clean the exchanger and improve the condensation condition 4. Change the expansion valve
The compressor suction pressure is too low	1. Refrigerant is insufficient 2. The filter and or capillary tube jam 3. Water flow volume is insufficient 4. Capillary tube of expansion valve sensor bulb breakdown	1. Check the leakage and add refrigerant 2. Change the capillary tube or filter 3. Clean the exchanger and improve the condensation condition 4. Change the expansion valve
Compressor can't work	1. Power failure 2. Compressor Control damaged 3. Wire loses 4. Compressor overload protection 5. Return water temperature setting incorrect 6. Water flow volume is insufficient	1. Check the power and solve the malfunction 2. Change Control 3. Check loose reason and repair 4. Compressor overload protection 5. Reset the return water temperature 6. Clean the water filter and exhaust the air from the system
Compressor noisy	1. Refrigerant enter into the compressor 2. Compressor damaged	1. Check the reason and solve the malfunction 2. Change the compressor
Fan can't work	1. Fan relay damaged 2. Motor is burnt out	1. Change the fan relay 2. Change the fan motor
The compressor run but no refrigeration	1. The refrigerant leak out 2. Plate exchanger freezes 3. Compressor failure	1. Check the leakage and add refrigerant 2. Check the reason and change the plate exchanger 3. Change the compressor
Low water temperature protection to the unit	1. Water flow volume is insufficient 2. Temperature Control setting is too low	1. Clean the water filter and exhaust the air from the system 2. Re-set
Few water flow volume protection to the unit	1. Water flow volume is insufficient 2. Flow switch	1. Clean the water filter and exhaust the air from the system 2. Change the flow switch

VI. Wiring diagram

Wiring diagram effective for the mode of :AP-GEO-4T AP-GEO-5T AP-GEO-6T



APOLLO

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