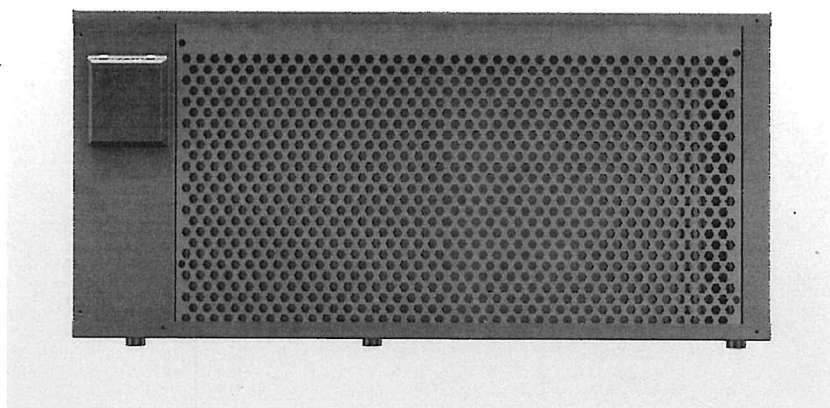




Spa Heat Pump User and Service Manual



Thank you for using our heat pump for the heating of your spa, it will heat your spa water and keep a constant temperature when the ambient air temperature is at -20~43℃

⚠ ATTENTION: This manual includes all the necessary information about the use and the installation of your heat pump.

The installer must read the manual and attentively follow the instructions of implementation and maintenance.

The installer is responsible for the installation of the product and should follow all the instructions of the manufacturer and the regulations in application. Incorrect installation against the manual implies the exclusion of the entire guarantee.

The manufacturer declines any responsibility for the damage caused by people, objects and errors due to the installation against the manual. Any use that isn't in accordance with the origin of its manufacturing will be regarded as dangerous.

WARNING:

Do not use means to accelerate the defrosting process, other than those recommended by the manufacturer.

The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater.)

Do not pierce or burn.

Be aware that refrigerants may not contain an odour.

This heat pump shall be installed, operated and stored in a open room larger than 3 m³.

Note the manufacturer may provide other suitable examples or may provide additional information about the refrigerant odour.

WARNING: If you power off heat pump, please empty the water in heat pump always during winter time or when the ambient temperature drops below 0℃, or else the titanium heat exchanger will be damaged because of being frozen, in such case, your warranty will be lost.

WARNING: Please always cut the power supply if you want to open the cabinet to reach inside the heat pump, because there is high voltage electricity inside.

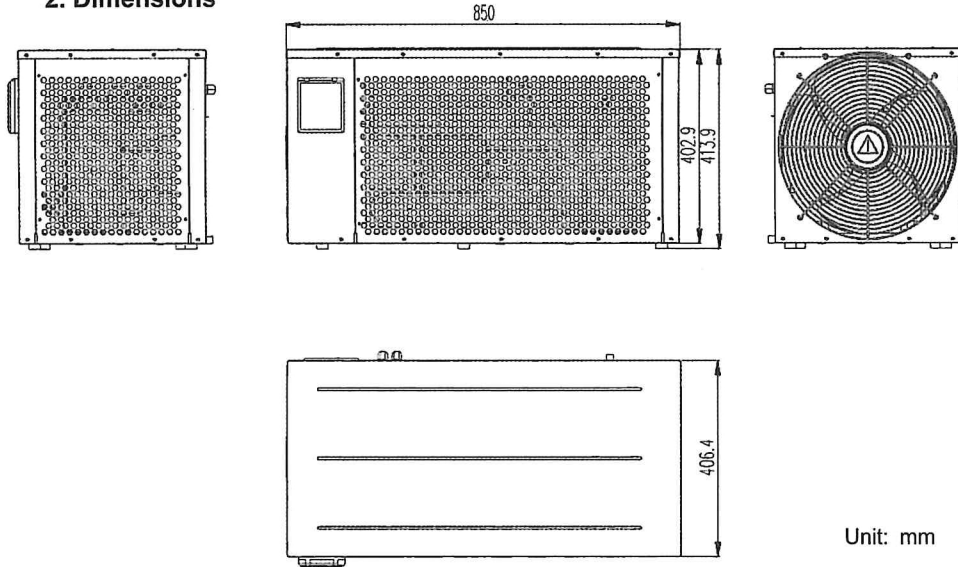
WARNING: Please keep the display controller in a dry area, or close the insulation cover to protect the display controller from being damaged by humidity.

1. Specifications

Product model			R06SPA
Parameters	Heating*	Heating capacity (kW)	9.3-2.8
		Heating capacity (BTU/h)	31715-9548
		Input power (kW)	1.59-0.21
		COP	5.85-13.3
	Heating**	Heating capacity (kW)	6.9-2.3
		Heating capacity (BTU/h)	23531-7844
		Input power (kW)	1.51-0.32
		COP	4.56-7.19
	Rated current (A)		6.9
	Minimum fuse current (A)		10
	Advised water flow (m³/h)		2.8
	IP Grade (Water proof rate)		IPX4
	Anti-electric shock rate		I
	Noise (dB(A))		52-40
Net weight/Gross weight (kg)		54/66	
Water connection (mm)		φ50	
Standard Configuration	Cabinet material		Galvanized steel (painted in dark gray)
	Body size (W*D*H) (mm)		850*407*414
Standard Configuration	Compressor		Rotary
	Refrigerant		R32
	Power supply		230V/1ph/ 50Hz or 60HZ
	Condenser		Titanium tube in PVC shell
Remark:			
Heating*: Inlet water temperature 26℃, Outlet water temperature 28℃, Dry bulb temperature 26℃, Humidity 80%.			
Heating**: Inlet water temperature 26℃, Outlet water temperature 28℃, Dry bulb temperature 15℃, Humidity 70%.			

* Above data are subjects to modification without notice.

2. Dimensions



3. Installation and connection

3.1 Notes

The factory only supplies the heat pump. All other components must be provided by the user or the installer.

Attention:

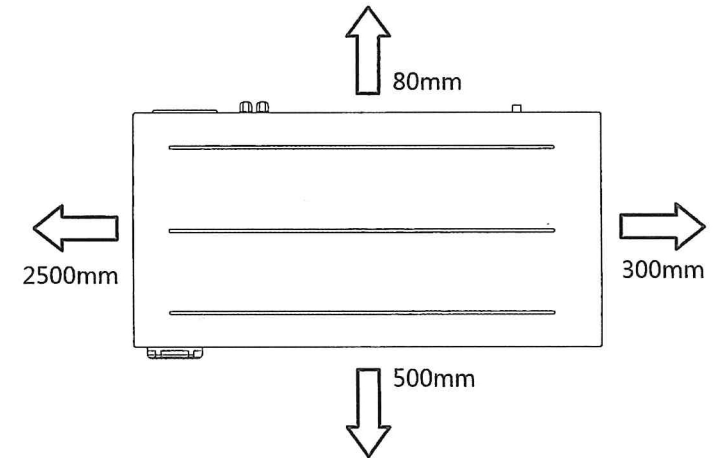
Please observe the following rules when installing the heat pump:

1. Any addition of chemicals must take place in the piping located **downstream** from the heat pump.
2. Always place the heat pump on a solid foundation and use the provided rubber feet to avoid vibration and noise.
3. Always hold the heat pump upright. If the unit has been held at an angle, wait at least 24 hours before starting the heat pump.

3.2 Heat pump's location

Never install the unit in a closed room with a limited air volume in which the air expelled from the unit will be reused, or close to shrubbery that could block the air inlet. Such locations impair the continuous supply of fresh air, resulting in reduced efficiency and possibly preventing sufficient heat output.

See the drawing below for minimum distances.

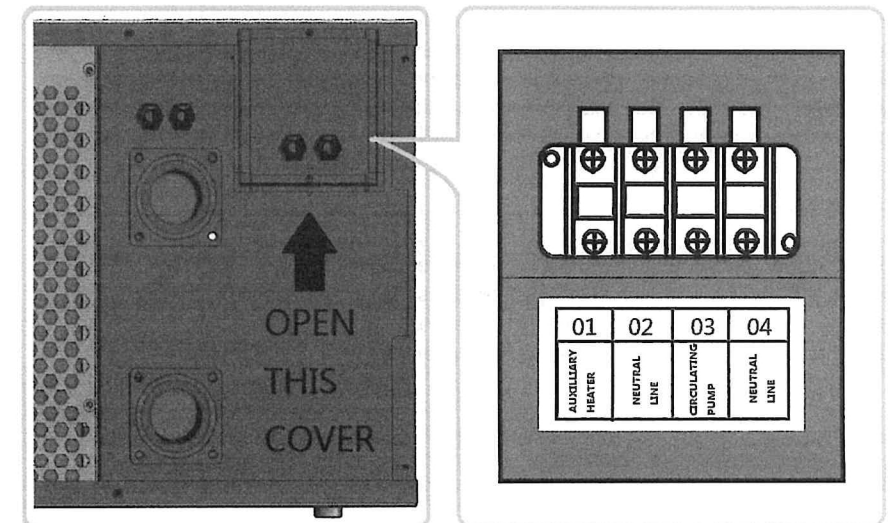


3.3 Electrical connection

Note: Earthing is required for protection against short-circuits inside the unit. Always provide a good earth connection.

Before connecting the unit, verify that the supply voltage matches the required voltage of the heat pump.

It is recommended to connect the heat pump to a circuit with its own fuse or circuit breaker. An auxiliary electric heater and water pump (max. 5 A / 240 V) can be connected to the terminal block below. This allows the water pump or electric heater to be controlled by the heat pump.



3.4 Initial operation

Note: In order to heat the water in the pool (or hot tub), the water pump must be running to cause the water to circulate through the heat pump. The heat pump will not start up if the water is not circulating.

After all connections have been made and checked, carry out the following procedure:

1. Switch on the water pump. Check for leaks and verify that water is flowing from and to the pool.
2. Connect power to the heat pump and press the On/Off button on the electronic control panel. The unit will start up after the time delay expires (see below).
3. After a few minutes, check whether the air blowing out of the unit is cooler.
4. When you turn off the water pump, the unit should also turn off automatically, if not adjust the flow switch.
5. Allow the heat pump and the water pump to run 24 hours a day until the desired water temperature is reached. The heat pump will stop running at this point. After this, it will restart automatically (as long as the water pump is running) whenever the pool water temperature drops 1 degree below the set temperature.

Depending on the initial temperature of the water in the pool and the air temperature, it may take many hours or even more than one day to heat the water to the desired temperature. A good pool cover can dramatically reduce the required length of time.

Water Flow Switch:

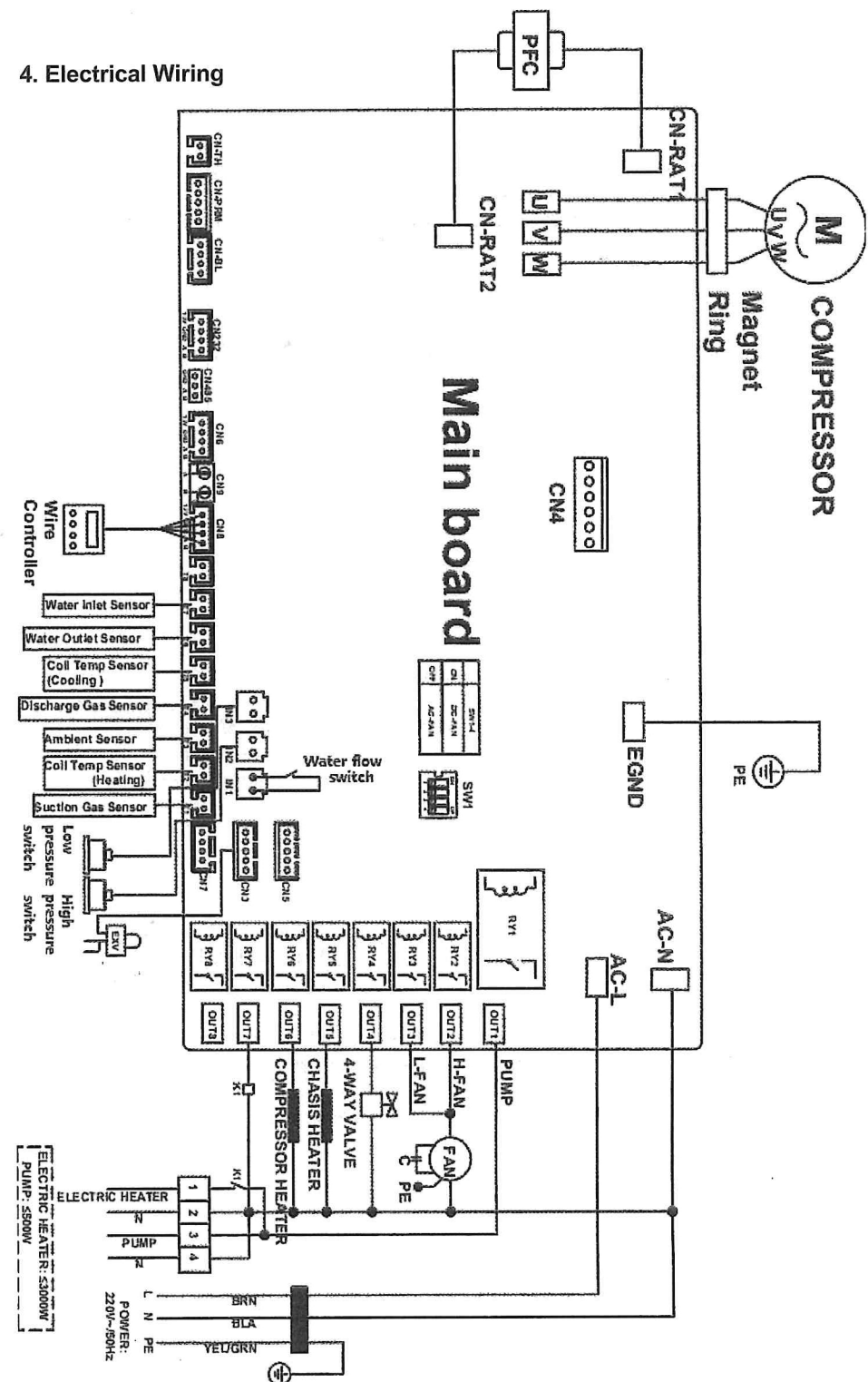
It is equipped with a flow switch to prevent the heat pump of running with inadequate water flow rate. It will turn on when the pool pump runs and shuts off when the pump shuts off. If the pool water level is more than 1m above or below the heat pump's automatic adjustment knob, your dealer may need to adjust its initial startup.

Time delay -The heat pump has a built-in 3-minute start-up delay to protect the circuitry and avoid excessive contact wear. The unit will restart automatically after this time delay expires. Even a brief power interruption will trigger this time delay and prevent the unit from restarting immediately. Additional power interruptions during this delay period do not affect the 3-minute duration of the delay.

3.5 Condensation

The air drawn into the heat pump is strongly cooled by the operation of the heat pump for heating the pool water, which may cause condensation on the fins of the evaporator. The amount of condensation may be as much as several liters per hour at high relative humidity. This is sometimes mistakenly regarded as a water leak.

4. Electrical Wiring



NOTE:

- (1)The above electrical wiring diagrams are only for your reference, please subject the heat pump to the posted wiring diagram.
- (2)The heat pump must be earthed well.Earthing the unit is still required to protect you against short circuits inside the unit.

Disconnect: A disconnect (circuit breaker, fused or un-fused switch) should be located within sight of and easily accessible from the unit .This is common practice on commercial and residential heat pumps. It prevents remotely-energizing unattended equipment and permits turning off power to the unit while the unit is being serviced.

5. Controller's Operations

LED Display Controller

5.1 Overview

- ◎ The controller is specially designed for the heat pump, with features as below:
 - Heating and cooling mode;
 - Could show and change the running and setting parameters of the system, easy for user to install and test;
 - With automatic protection and fault warning function;
 - With strong system protection function, like compressor delay protection, high pressure, low pressure, sensor protection,water flow detect, and etc.;
 - The communication distance between the heat pump unit and wire controller should be less than 100 meters. The communication port is RS485;
 - Strong anti-interference, stable performance.

5.2 Basic Model of System Control Chart

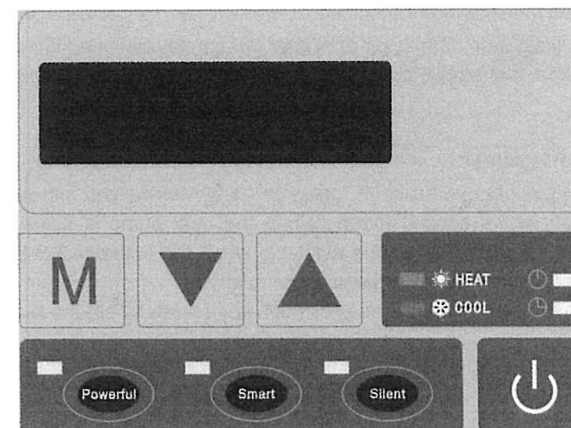
◎ System Chart



◎ Control Principle

- The heat pump runs according to the wire controller's order
- The wire controller could change the running parameters and send the running parameters to the heat pump
- The heat pump could detect the running condition and send the information or fault to the wire controller

5.3 Wire Controller



◎ Basic Icons

1. When it's under heating mode, turns on
 2. When it's under cooling mode, turns on
 3. When it's under defrosting mode, turns on and twinkles
- When it's under off status, the display shows the current time

◎ Key Operating Instruction

1) " "Key On/Off

- When it's in other interface, press this button shortly, it will go back to the main interface.
- In the main interface, press this key to turn on/off.
- In the main interface, press this key for 5 seconds to set the timer, when hour on nixie tube flashes, you can set hour of "Timer on", the corresponding icon of "Timer on" flashes, press ", " to set hour. When finishing setting, press key " " shortly to go to set minute of "Timer on", press ", " to set minute. When finish setting, press key "Mode"to go to set hour of "Timer off", the corresponding icon of "Timer off" flashes, press ", " to set hour. After setting finished, press key " " shortly to go to set minute of "Timer off", press ", " to set minute. After setting, press key " " and return to the main interface, if the relative light is on, it means that the corresponding timer is set successfully.

✓ Timer Cancel

- ◎When the time on"Timer on"and "Timer off" is same, timer is canceled.

- ② At the interface of setting "Timer on" or "Timer off", press key " " for 5seconds, "Timer on"or "Timer off" can be canceled individually.
- ③When the relative light is off, it means this timer is canceled.

2) " " Key Mode

- When the heat pump is on, press this key shortly, you can shift different modes: heating mode, cooling mode (When the heat pump is powered by the spa, the cooling function will only be available when the actual water temperature is lower than set temperature on the spa controller).
- When the heat pump is off, press this key shortly to set the time, 4 nixie tubes are twinkling, at this time, press key " " shortly to set the hour, press key ", "to set the hour. When finishing, press key " " shortly again to set the minute. When finishing, press key " "to return to the main interface.

3) " " Key Plus

- When the heat pump is on, in the main interface, press this key to increase the setting temperature.
- When it's in manual frequency mode, in the home page, press this key to increase the setting frequency.

4) " " Key Minus

- When the heat pump is on, in the main interface, press this key to decrease the setting temperature.
- When it's in manual frequency mode, in the home page, press this key to decrease the setting frequency.

5) " " Key "POWERFUL"

- When the heat pump is on, press this key shortly to go into powerful mode.

6) " " Key "SMART"

- When the heat pump is on, press this key shortly to go into smart mode
- Under off status, press this key for 5 seconds to change the temperature unit between °C and °F.

7) " " Key "SILENT"

- When the heat pump is on, press this key to go into silent mode.

- Press key " " for 5 seconds, and enter into the unit status parameter inquiry, press key ", " to view the parameters, press key " "to exit parameter query.

Inquiry Code	Description	Display Range
01	Inlet water temp	-20~99℃
02	Outlet water temp	-20~99℃
03	Ambient temp	-20~99℃
04	Discharge temp	0~125℃
05	Suction temp	-20~99℃
06	Outer coil temp	-20~99℃
07	Inner coil temp	-20~99℃
08	Main EEV steps	
09	Assistant EEV steps	/
10(A)	Compressor current	
11(B)	Radiator temp	
12(C)	DC bus voltage	
13(D)	Compressor actual rotate speed	
14(E)	DC fan motor actual rotate speed	

8) Starting Electric Heater Manually

- Press keys " " + " " at the same time for 5 seconds to turn on/off the electric heater manually.

9) Enforced Defrosting

- When the conditions of entering enforced defrosting are met, press " "and" "at the same time for 5 seconds, then it enter into enforced defrosting mode.
- When entering into defrosting, heating mode icon " "appears. When exiting from defrosting, mode icon recover to normal display.

10) Recover to Factory Default

- By button operation: press keys " " + " "at the same time for 5 seconds and enter into user parameters mode, the current parameter is return temperature. Then press keys " " + " "at the same time for 5 seconds and wired controller recovers to factory default. At this time, buzzer will alarm twice continuously, and all parameters recover to factory default.

11) System parameter setting

- Press "  "+" "  " for 5 seconds to enter the password interface for setting the parameters. Then press "  " or "  " to enter the password. Press "  " to change the digit of the password. After finishing the last digit, press "  " to confirm the password.

6. System Parameters:

Parameter Code	Parameter Name	Set Range	Factory Setting
1	Return Difference for Target Water Temp.	1~18℃(2~36°F)	1℃(2°F)
2	Set Temp. in Cooling Mode	8℃~35℃(46~95°F)	27℃(81°F)
3	Set Temp. in Heating Mode	5℃~40℃(41~104°F)	40℃(104°F)
4	Compensation Value of Inlet Water Temp.	-5℃~15℃(-9~30°F)	0℃(0°F)
5	Defrosting Cycle	20MIN~90MIN	45MIN
6	Defrosting Start Temp.	-9℃~-1℃(16~30°F)	-3℃(27°F)
7	Defrosting Time	5MIN~20MIN	8MIN
8	Temp.to Quit Defrosting	1℃~40℃(33~104°F)	20℃(68°F)
9	Difference between Ambient Temp. and Coil Temp. to Start Defrosting	0℃~15℃(0~30°F)	5℃(10°F)
10	Ambient Temp.to Start Defrosting	0℃~20℃(32~68°F)	17℃(63°F)

11	Electronic Expansion Valve's Working Cycle	20S~90S	30S
12	Overheat Degree in Smart/ Powerful Mode	-5℃~10℃(-9~20°F)	Depends on Actual Model
d(13)	Exhaust Gas Temp. of Electronic Expansion Valve	70℃~125℃(158~257°F)	95℃(203°F)
14	Electronic Expansion Valve's Steps during Defrosting (Set Value*10=Actual Steps)	2~45	Depends on Actual Model
15	Electronic Expansion Valve's Min. Steps(Set Value*10=Actual Steps)	5~15	10
16	Electronic Expansion Valve's Working Mode	0 Manual/1 Auto	1
17	Manual Steps of Electronic Expansion Valve (Set Value*10=Actual Steps)	2~45	35

18	Overheat Degree in Cooling Mode	-5℃~10℃(-9~20°F)	Depends on Actual Model
19	Reserved	/	/
20	Electronic Expansion Valve's Working Mode When Cooling	0=Water Temperature 1=Supercooling	1
21	Water Pump's Working Mode When Target Temperature Reached	1= Non Stop/2= Stop 3=Intermittent	3
22	Fan's Working Mode	0=Auto/ 1= Manual	0
23	Fan's Manual Control Speed (Set Value*10=Actual Speed)	0-99 (Set Value*10=Actual Speed)	80 (Set Value*10=Actual Speed)
24	Ambient Temp. to Start Auxiliary Electric Heater	-20℃~20℃(-4~68°F)	-20℃(-4°F)
25	Auxiliary Heating Function in Defrosting Mode	0 Non/1 Yes	1

Note: In the above table, the actual value of the electronic expansion valve and the air speed is 10 times of the parameter displayed value. For example, when the P20 defrost expansion valve opening degree shows 30, the actual value at this time is 300 steps; when P30 fan manual rotation speed shows 80, the actual value at this time is 800. When the value is more than 100, A represents for 10, B represents for 11, C represents for 12, and D represents for 13.

7. Troubleshooting

7.1 System protection/error indication

Error code	Error description	Solutions
Er 03	water flow failure	Check water flow /switch
Er 04	winter anti-freezing	Water pump will run automatically for first grade antifreeze
Er 05	high pressure failure	1. Discharge redundant refrigerant from heat pump gas system 2.Clean the water exchanger or water filter
Er 06	low pressure failure	1.Check if there is any gas leakage ,re-fill the refrigerant 2.Replace the filter or capillary
Er 09	communication failure between Display and PCB	1. Check if the communication connection wire between display and PCB is disconnected or has poor contact. Change the wire or

		mend it if yes. 2. Check if PCB or display is damaged. Change the corresponding part if yes.
Er 10	communication failure of frequency conversion module(alarm when communication between display and PCB are disconnected)	Change PCB.
Er 12	excessive exhaust temp protection	1. Replace the compressor discharge temperature sensor. 2. Reconnect or clean compressor discharge temperature sensor and wrap it with insulation tape. Replace the controller or PC Board.
Er 15	Water inlet temperature failure	Check or change the sensor
Er 16	external coil temperature failure	Check or change the sensor
Er 18	exhaust temperature failure	Check or change the sensor
Er 19	DC Fan motor failure	1. Check if DC fan motor is damaged. Change it if damaged. 2. Check if DC fan motor output port on PCB has output. Change PCB if no output.
Er 20	Abnormal protection of frequency conversion module	Solve it according to the subsidiary error codes in the following table.
Er 21	ambient temperature failure	Check or change the sensor
Er 23	too low cooling outlet water temp protection	Check whether the water flow or water system is jammed or not
Er 27	water outlet temperature failure	Check or change the sensor

Er 29	Return gas temperature failure	Check or change the sensor
Er 32	Too high heating outlet water temperature protection	Check whether the water flow or water system is jammed or not
Er 35	Compressor current protection	1. Check if the incoming voltage supply is too low, if so, repair. 2. Check if the compressor is overloaded and repair. 3. Check whether the thermal relay is damaged, if so, replace.
Er 42	internal coil temperature failure	Check or change the sensor

© E20 fault will display the following error codes at the same time, the error codes will switch every 3 seconds. Among them, error codes 1-128 are display in priority. When error codes 1-128 don't appear, then error codes 257-384 can show. If two or more error codes appear at the same time, then display error codes accumulation. For example, 16 and 32 occur at the same time, display 48.

Error Code	Name	Descriptions	Solution suggestion
1	IPM Over-current	IPM Module problem	Replace inverter module
2	compressor synchronous abnormal	Compressor failure	Replace compressor
4	reserved	--	--
8	compressor output phase absent	Compressor wiring disconnected or poor contact	Checking compressor input circuit
16	DC bus low voltage	Input too low voltage, PFC module failure,	Inspect the input voltage, replace module
32	DC bus high voltage	Input voltage too high, PFC Module failure	Replace inverter module
64	Radiator over temperature	Main unit fan motor failure, air duct blockage	Inspect fan motor, air duct
128	Radiator temperature error	Radiator sensor short circuit or open circuit fault	Replace inverter module
257	communication failure	Inverter module doesn't receive order from main controller	Inspection the communication wiring= between main controller and inverter module
258	AC Input phase absent	Input phase absent (Three phase module is effective)	Inspection input circuit
260	AC Input over-current	Input three phase imbalance (three phase module is effective)	Inspection input three phase phase voltage
264	AC Input low voltage	Input low voltage	Inspect input voltage
272	Compressor High pressure failure	Compressor high pressure failure (reserved)	
288	IPM too high temperature	Main unit fan motor failure, air duct blocked	Inspect fan motor and air duct
320	Compressor peak current too high	Compressor line current too high, the driver program doesn't match with compressor	Replace inverter module
384	PFC module over-temperature	PFC Module too high temperature	

7.2 Other Malfunctions and Solutions (No display on LED wire controller)

Malfunctions	Observation	Reasons	Solutions
Heat pump is not running	LED wire controller shows no display	No power supply	Check whether cable and circuit breaker are connected
	LED wire controller displays the actual time	Heat pump under standby status	Startup heat pump to run.
	LED wire controller displays the actual water temperature	1. Water temperature is reaching set value, heat pump under constant temperature status 2. Heat pump just starts to run 3. Under defrosting	1. Verify water temperature setting 2. Startup heat pump after a few minutes 3. LED wire controller should display "Defrosting"
Water temperature is cooling when heat pump runs under heating mode	LED wire controller displays actual water temperature and no error code displays	1. Chose the wrong mode 2. Figures show defects 3. Controller defect	1. Adjust the mode 2. Replace the defect LED wire controller, and then check the status after changing the running mode, verifying the water inlet and outlet temperature 3. Replace or repair the heat pump

8. Maintenance

(1) You should check the water supply system regularly to avoid the air entering the system and occurrence of low water flow, because it would reduce the performance and reliability of the heat pump.

(2) Clean your pools and filtration system regularly to avoid the damage of the unit as a result of a dirty or clogged filter.

(3) You should discharge the water from the bottom of the water pump if the heat pump will stop running for a long time (specially during the winter season).

(4) On any other moment, you should check if the unit has enough water before the unit starts to run again.

(5) After the unit is conditioned for the winter season, it is preferred to cover the heat pump with the special winter heat pump cover.

(6) When the unit is running, there is always a little water discharge under the unit.

Short running	LED displays actual water temperature, no error code displays	1. Fan NOT running 2. Not enough air ventilation 3. Not enough refrigerant	1. Check the cable connections between the motor and fan, if necessary, they should be replaced 2. Check the location of the heat pump, and eliminate all obstacles to assure a good air ventilation 3. Replace or repair the heat pump
water stains	Water stains on heat pump unit	1. Concreting 2. Water leakage	1. No action 2. Check the titanium heat exchanger carefully if it shows any defects
Too much ice on evaporator	Too much ice on evaporator		1. Check the location of heat pump, and eliminate all obstacles to assure a good air ventilation 2. Replace or repair the heat pump