

RESIDENTIAL FULL DC INVERTER SWIMMING POOL HEAT PUMP USER MANUAL

Please read this manual carefully before using and keep it in a safe place.

106-10018-279

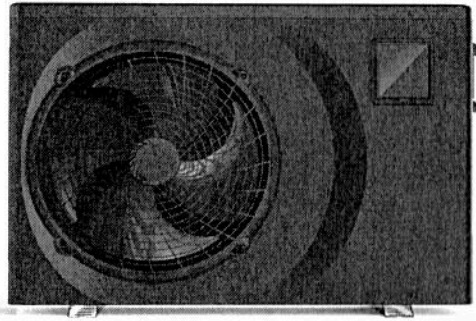


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I. Unit Parameters

1. Appearance



2. Statement

To keep users under safe working condition and property safety, please follow the instructions below.

- Wrong operation may result in injury or damage;
- Please install the unit in compliance with local laws, regulations and standards;
- Confirm power voltage and frequency;
- The unit is only used with grounding sockets;
- Independent switch must be offered with the unit.

3. The following safety factors need to be considered:

- Please read the following warnings before installation;
- Be sure to check the details that need attention, including safety factors;
- After reading the installation instructions, be sure to save them for future reference.

⚠ Warning

- Make sure that the unit is installed safely and reliably.
- If the unit is not secure or not installed, it may cause damage. The minimum support weight required for installation is 21g/mm².
- If the unit was installed in a closed area or limited space, please consider the size of room and ventilation to prevent suffocation caused by refrigerant leakage.

- Use a specific wire and fasten it to terminal block so that the connection will prevent pressure from being applied to parts.

- Wrong wiring will cause fire.

Please connect power wire accurately according to wiring diagram on the manual to avoid burnout of the unit or fire.

- Be sure to use correct material during installing.

Wrong parts or wrong materials may result in fire, electric shock, or falling of the unit.

- Install on the ground safely, please read installation instructions.

Improper installation may result in fire, electric shock, falling of the unit, or water leaking.

- Use professional tools for doing electrical work.

If power supply capacity is insufficient or circuit is not completed, it may cause fire or electric shock.

- The unit must have grounding device.

If power supply does not have grounding device, be sure not to connect the unit.

- The unit should be only removed and repaired by professional technician.

Improper movement or maintenance of the unit may cause water leakage, electric shock, or fire.

Please find a professional technician to do.

- Don't unplug or plug power during operation. It may cause fire or electric shock.

- Don't touch or operate the unit when your hands are wet. It may cause fire or electric shock.

- Don't place heaters or other electrical appliances near the power wire. It may cause fire or electric shock.

- The water must not be poured directly from the unit. Do not let water to permeate into the electrical components.

4. ⚠ Warning

➤ **Do not install the unit in a location where there may be flammable gas.**

➤ **If there is flammable gas around the unit, it will cause explosion.**

According to the instruction to carry out drainage system and pipeline work. If drainage system or pipeline is defective, water leakage will occur. And it should be disposed immediately to prevent other household products from getting wet and damage.

➤ **Do not clean the unit while power is on. Turn off power before cleaning the unit. If not it may result in injury from a high-speed fan or electric shock.**

➤ **Stop operating the unit once there is a problem or an fault code.**

Please turn off power and stop running the unit. Otherwise it may cause electric shock or fire.

➤ **Be careful when the unit is not packed or not installed.**

Pay attention to sharp edges and fins of heat exchanger.

➤ **After installation or repair, please confirm refrigerant is not leaking.**

If refrigerant is not enough, the unit will not work properly.

➤ **The installation of external unit must be flat and firm.**

Avoid abnormal vibration and noise.

➤ **Don't put your fingers into fan and evaporator.**

High speed running fan will result in serious injury.

➤ **This device is not designed for people who is physically or mentally weak (including children) and who does not have experience and knowledge of heating and cooling system. Unless it is used under direction and supervision of professional technician, or has received training on the using of this unit. Children must use it under supervision of an adult to ensure that they use the unit safely. If power wire is damaged, it must be replaced by a professional technician to avoid danger.**

II. System Specification

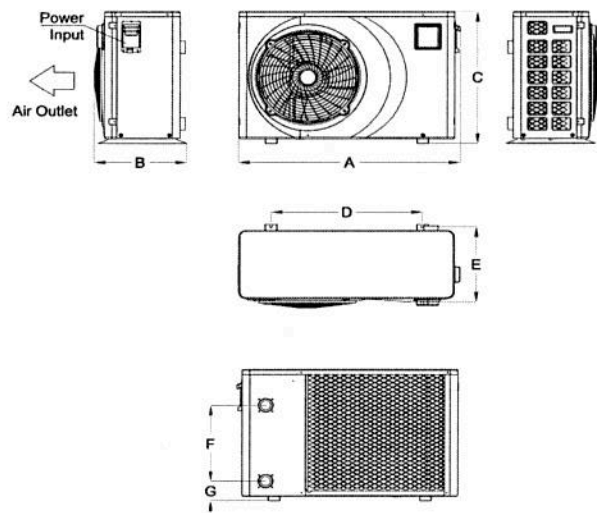
1. Specification

Model	PH-9TF-INV	PH-15TF-INV	PH-25TF-INV
Ambient Temperature: (DB/WB) 27°C/24.3°C; Water Inlet/Outlet Temperature: 26°C/28°C.			
Heating capacity (kW)	1.8~9.1	3.5~15.2	4.78~25.2
Power input (kW)	0.133~1.504	0.269~2.492	0.354~4.235
COP	13.5~6.05	13~6.1	13.5~6.05
Boost mode	Heating capacity (kW)	9.1	15.2
	COP	6.05	6.1
Smart mode	Heating capacity (kW)	7.64	11.32
	COP	7.18	7.33
Silent mode	Heating capacity (kW)	3.43	7.20
	COP	11.65	10.14
Ambient Temperature: (DB/WB) 15°C/12°C; Water Inlet Temperature: 26°C.			
Heating capacity (kW)	1.5~7.3	2.7~10.6	3.8~17.1
Power input (kW)	0.197~1.505	0.355~2.218	0.543~3.526
COP	7.6~4.85	7.6~4.78	7~4.85
Boost mode	Heating capacity (kW)	7.3	10.6
	COP	4.85	4.78
Smart mode	Heating capacity (kW)	5.98	8.48
	COP	5.68	5.46
Silent mode	Heating capacity (kW)	2.45	5.44
	COP	6.61	6.26
Power supply	220-240V~50Hz		380-415V/3N~50Hz
Max power input (kW)	1.75	3.2	4.5
Max current(A)	7.95	14.5	8.5
Heating temperature range	5°C~40°C		
Running temperature range	-10°C~43°C		
Advised swimming pool size (m³)	20~40	30~60	55~90
Refrigerant	R410A		
Compressor	MITSUBISHI ELECTRIC		
Air side heat exchanger	Hydrophilic fin exchanger		
Water side heat exchanger	Titanium tube heat exchanger		
Water flow(m³/h)	4.1	6.6	10.8
Net dimension LxWxH (mm)	910×360×620	1000×405×660	1130×445×775
Water pipe connection	Inlet (mm)	50	
	Outlet (mm)	50	
Net weight (kg)	37	42	73
Noise level dB(A)	33~46	34~48	35~55
Max./Min. Water operating pressure (Mpa)	0.6/0.1		
Max./Min. Water inlet pressure (Mpa)	0.6/0.1		
Fuse specification	65TS/25A/250VAC	65TS/30A/250VAC	65TS/20A/250VAC

The technical specification of our heat pumps is provided for information purpose only. We reserve the right to make change without notice in advance.

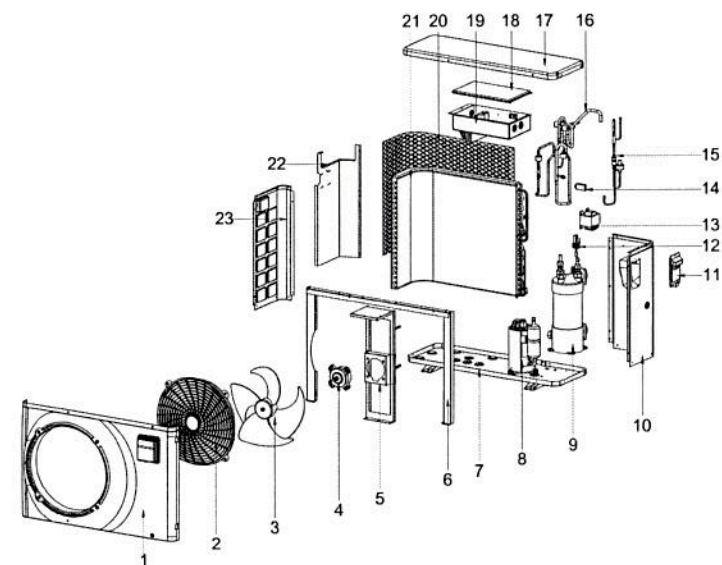
- Noise at 1 m, at 4 m and at 10 m in accordance with Directives EN ISO 3741 and EN ISO 354
- Calculate according to an in-ground private swimming pool covered with bubble

2. Unit Dimensions



Model	A	B	C	D	E	F	G
PH-9TF-INV	910	360	620	590	330	280	98
PH-15TF-INV	1000	405	660	680	375	380	98
PH-25TF-INV	1130	445	775	653	430	470	108

3. Explosion View



1	Front plate	9	Framework	17	Right plate
2	Controller box	10	Compressor	18	Water flow switch
3	Fan motor cover	11	Middle plate	19	Evaporator
4	Fan	12	Four way valve	20	Protection net
5	Motor	13	Throttle valve	21	Inverter PC board
6	Motor support	14	Titanium heat exchanger	22	Electrical box
7	Left plate	15	Handle	23	Top cover
8	Chassis component	16	Cable port		

III. Installation Instructions

WARNING: Installation must be carried out by a qualified engineer.

This section is provided for information purpose only and must be checked and adapted if necessary according to actual installation condition.

1. Pre-Requirements

Needed equipment for installation of heat pump:

Suitable power supply cable for unit's power.

A by-pass kit and an assembly of PVC tube, stripper, PVC adhesive and sandpaper.

A set of wall plug and expansion screw.

We recommend to use flexible PVC pipe in order to reduce transmission of vibration.

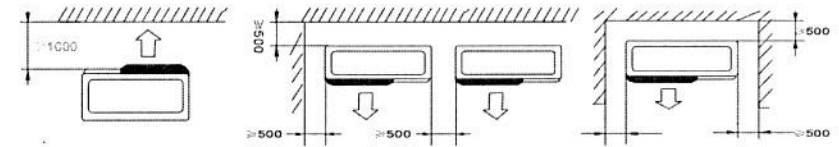
Suitable fastening studs may be used to raise unit.

2. Location

Please comply with the following rules about heat pump location choosing.

1. The unit's location must be convenient for operation and maintenance in the future.
2. It must be installed and fixed on flat concrete floor. The floor is stable to support the weight of the unit.
3. A water drainage device must be provided close to the unit in order to protect the area where it is installed.
4. If necessary, mounting pads could be used to support the weight of unit.
5. Confirm the unit is under well-ventilated condition; air outlet port is not facing to the windows of nearby buildings and the outlet air can not be returned. In addition, provide enough space around the unit for repair and maintenance.
6. The unit must not be installed in an area exposed to oil, flammable gases, corrosive products, sulphurous compounds or close to high frequency equipment.
7. To prevent mud splashes, do not install the unit near road or track.
8. To avoid noise to neighbours, please make sure the unit is installed in less noise sensitivity area or good sound isolation area.
9. Keep the unit as far as possible away from children.
10. Installation space

Unit: mm

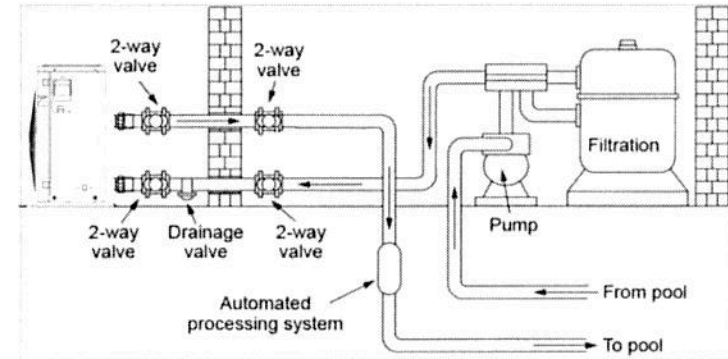


Anything could not be placed within at least 1m in front of heat pump.

Leave at least 500mm of empty space around the sides and rear of heat pump.

Do not put any stuff on or in front of heat pump!

3. Installation Layout



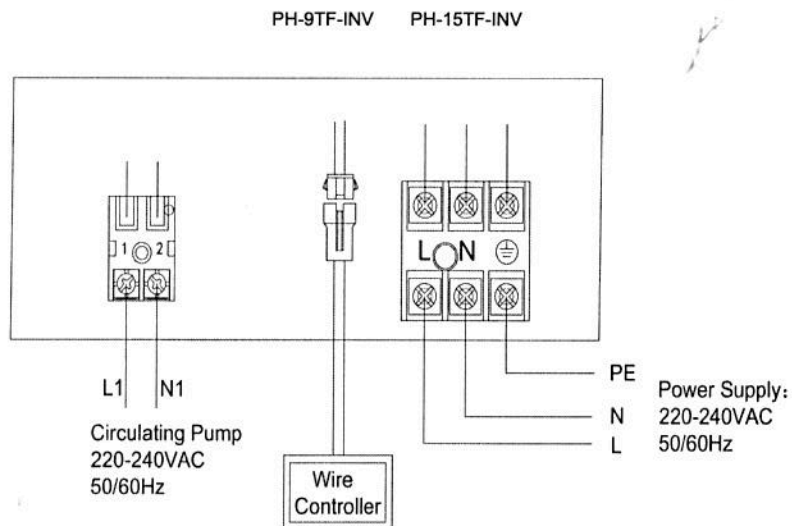
The filter must be cleaned regularly to ensure that water in the system is clean and avoid blocking of filter. It is necessary that drainage valve is fixed on the lower water pipe. If the unit is not running during winter months, please disconnect power supply and let out drain water from unit through drainage valve. If ambient temperature of running unit is below 0°C, please keep water pump running.

4. Electrical Connection

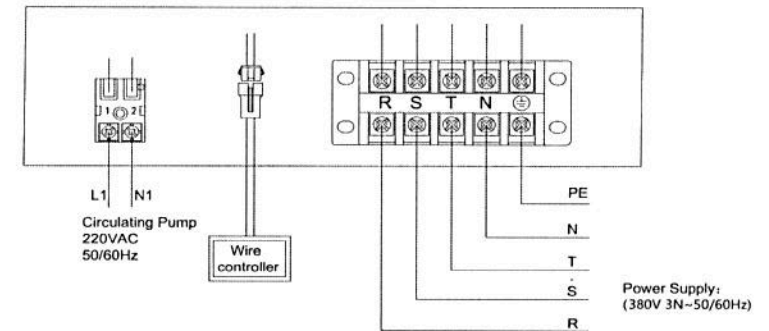
Model	Power Supply Wires		
	Electricity Supply	Cable Diameter	Specification
PH-9TF-INV	220-240V~/50Hz	3×2.5mm ²	AWG 14
PH-15TF-INV		3×2.5mm ²	AWG 14
PH-25TF-INV	380-415V/3N~/50Hz	5×2.5mm ²	AWG 14

⚠ WARNING: Power supply of heat pump must be disconnected before any operation.

- Please comply with the following instruction to connect heat pump.
- **Step 1: Detach electrical side panel by a screwdriver to access electrical terminal block.**
- **Step 2: Insert cable into heat pump unit port.**
- **Step 3: Connect power supply cable to terminal block according to the diagram below.**



PH-25TF-INV



IV. Running Test

1. Inspection Before Running Test

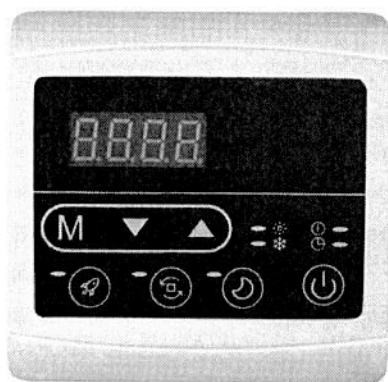
- a. Running test can begin after completing all installation;
- b. Before running test, confirm below items and write √ in block;
 - Correct unit installation
 - Power supply voltage is the same as unit rated voltage
 - Correct piping and wiring
 - Air inlet & outlet port of unit is unblocked
 - Drainage and venting is unblocked and no water leaking
 - Leakage protector is working
 - Piping insulation is working
 - Ground wire is connected correctly
- c. All wiring and piping should be connected well and carefully checked, then fill water tank with water before power is switched on;
- d. Emptying all air within pipes and water tank, press "on-off" button on control panel to run the unit at setting temperature;
- e. Items need to be checked during running test:
 - During the first running, unit current is normal or not;
 - Each function button on control panel is normal or not;
 - Display screen is normal or not;
 - Are there any leakage in the whole heating circulation system;

- Condensate drain is normal or not;
- Are there any abnormal sound or vibration during running?




2. Control Function Description

2.1 Operation Description

➤ Control Panel Diagram






➤ Basic Icons





1. When in heating mode, icon shows .
2. When in Cooling mode, icon shows .
3. When in defrosting mode, twinkling icon shows .

When off status, the display shows the current time


➤ Key Operating Instruction

1) "On/Off Key:"





- When in other interface, press shortly, will go back to the homepage.
- In the homepage, press this key to turn on/off
- In the homepage, press this key for 5 seconds to set the timers, when 'hour' is flashing, you can set hour of "Timer on", the corresponding icon of "Timer on" flashes, press  to set hour. Then, press key  shortly to set minute of "Timer on", press  to set

minute. After finishing setting, press key "Mode" to set hour of "Timer off", the corresponding icon of "Timer off" flashes, press  to change the value. After setting finished, press key  shortly to set minute of "Timer off", press  to set minute. After setting, press key  and return to the homepage, if the relative light is on, it means that the corresponding timer is set successfully.

Timer Cancel

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

2) "M" Mode Key:

- When the heat pump is on, pressing this key shortly can shift different modes: heating mode, cooling mode.
- 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 change the hour. Then press key  shortly again to set the minute. When finishing, press key  to return to the homepage.

3) "Plus Key

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

4) "Minus Key

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

frequency.





5)  "POWERFUL" Key

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

6)  "SMART" Key




- When the heat pump is on, press this key shortly to enter into smart mode

7)  "SILENT" Key

- When the heat pump is on, press this key to enter into silent mode
- Long press key  for 5 seconds, and enter into the unit parameter inquiry interface, press key   to check the parameters, press key  to exit parameter query.

Code	Description	Display Range
01	Water inlet temp.	-30~99°C
02	Water outlet temp.	-30~99°C
03	Ambient temp.	-30~99°C
04	Exhaust temp.	0~125°C
05	Suction temp.	-30~99°C
06	Outer coil temp.	-30~99°C
07	Inner coil temp.	-30~99°C
08	Main EEV opening	0-480
09	EVI EEV opening	0-480
10(A)	Compressor current	
11(B)	Radiator temp.	
12(C)	DC bus voltage	
13(D)	Compressor actual rotate speed	
14(E)	DC fan motor 1 actual rotate speed	
15(F)	DC fan motor 2 actual rotate speed	



8) 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.

9) Manual Electric Heating

- In the main interface, press  and  "simultaneously for 5 seconds to manually turn on/off electric heating.

10) Recover to Factory Default

- By button operation: After entering into user parameters mode, the current parameter is return temperature, 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.

2.2 Trouble shooting

system protection/ error indication

Error code	Error description	Solutions
Er 03	Water flow protection	Check water flow /switch, change the switch if necessary
Er 04	Winter anti-freezing	Water pump will run automatically for first grade antifreeze

Er 05	High pressure Protection	<p>Measure the pressure value when heat pump is heating(cooling), if it's higher than 44.0 bar, it means heat pump has got really higher pressure protection:</p> <ol style="list-style-type: none"> 1. Detect EEV step, low pressure and suction temp; 2. Detect the inlet/outlet water temp,; 3. Maybe there is some air in the refrigeration system; 4. Clean the water exchanger or water filter
Er 09	Communication failure between Display and PCB	<ol style="list-style-type: none"> 1. Check if the communication connection wire between display and PCB is well . Change or mend the wire if necessary . 2. Check the PCB or display. If damaged, Change the corresponding part .
Er 10	Communication failure of frequency conversion module(alarm when communication between display and PCB is good)	Change PCB.
Er 12	High exhaust temp protection	<ol style="list-style-type: none"> 1. Replace the compressor exhaust temperature sensor. 2. Reconnect or clean compressor exhaust temperature sensor and wrap it with insulation tape. 3. Replace the controller or PC Board.
Er 15	Water inlet temperature failure	Check the connection, change the sensor if necessary
Er 16	External coil temperature failure	Check the connection, change the sensor if necessary

Er 18	Exhaust temperature failure	Check the connection, change the sensor if necessary
Er 19	DC fan motor failure	<ol style="list-style-type: none"> 1. Check DC fan motor. Change it if damaged. 2. Check output port of DC fan motor on PCB. Change the PCB if there is 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 the connection, change the sensor if necessary
Er 22	DC fan 2 failure	Check the connection, change the sensor if necessary
Er 23	Low outlet water temp protection when cooling	Check the water flow and water system, mend it if necessary
Er 27	Water outlet temperature failure	Check the connection, change the sensor if necessary
Er 28	CT over current protection	
Er 29	Suction temperature failure	Check the connection, change the sensor if necessary
Er 32	High outlet water temperature protection when heating	Check the water flow and water system, mend it if necessary
Er 33	High temp. protection of external coil	
Er 42	Internal coil temperature failure	Check the connection, change the sensor if necessary

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 appear in priority. When error codes 1-128 don't appear, then it will show error codes 257-384 . 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, it will show 48.

Error Code	Name	Description	Solution suggestion
1	IPM over-current	There is something wrong with IPM module	Replace inverter module
2	Compressor synchronization is abnormal	Compressor failure	Replace compressor
4	reserved	--	--
8	Compressor output phase absence	Compressor wiring is disconnected or the connection is poor	Check compressor input wiring
16	Low DC bus voltage	Input voltage is too low , PFC module failure,	Check the input voltage, replace inverter module
32	High DC bus voltage	Input voltage is too high, PFC Module failure	Replace inverter module
64	Radiator over temperature	Fan motor failure, air duct blockage	Check fan motor, air duct
128	Radiator temperature failure	Radiator sensor is damaged	Replace inverter module
257	Communication failure	Inverter module doesn't receive message from main controller	Check the connection between main controller and inverter module
258	AC Input phase absence	Input phase is absent (Three phase module is effective)	Check input circuit
260	AC Input over-current	Input three phase imbalance (three phase module is effective)	Check input three-phase voltage
264	Low voltage of AC Input	Input voltage is too low	Check input voltage
272	High pressure protection	Reserved	

288	IPM over-temperature protection	Fan motor failure, air duct blocked	Check fan motor and air duct
320	High compressor peak current	1.Compressor current is too high. 2.The driver program doesn't match with compressor	Replace inverter module
384	PFC module over-temperature	Temperature of PFC Module is too high	

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

Malfunctions	Observation	Reasons	Solution
Heat pump is not running	LED wire controller shows nothing	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	<ol style="list-style-type: none"> 1. Chose the wrong mode 2. Figures show defects 3. Controller defect 	<ol style="list-style-type: none"> 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
Short running	LED displays actual water temperature, no error code displays	<ol style="list-style-type: none"> 1. Fan NOT running 2. Not enough air ventilation 3. Not enough refrigerant 	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. Concreting 2. Water leakage 	<ol style="list-style-type: none"> 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		<ol style="list-style-type: none"> 1. Check the location of heat pump, and eliminate all obstacles to assure a good air ventilation 2. Replace or repair the heat pump

V. Maintenance

- (1) You should check the water supply system regularly to avoid the air entering into water system and occurrence of low water flow, 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 because of a dirty or clogged filter.
- (3) Discharge the water from the bottom of the water pump if the heat pump will stop running for a long time (specially in winter).
- (4) On any other moment, check the water flow to confirm there is enough water before the unit starts to run again.
- (5) After the unit is conditioned in winter, it is preferred to cover the unit with the special winter heat pump cover.