POOL HEAT PUMP UNIT SHP48

Chlorine or Salt Pools

Inground / Aboveground

Indoor /Outdoor

Installation & Instruction Manual

CONTENTS

1. PREFACE

- In order to provide our customers with quality, reliability and versatility, this product has been made to strict production standards. This manual includes all the necessary information about installation, trouble shooting, and maintenance. Please read this manual carefully before you install the unit. The manufacturer of this product will not be held responsible if someone is injured or the unit is damaged as a result of improper installation or poor maintenance. These instructions should be followed carefully. The unit must be installed by qualified personnel.
- The unit can only be repaired by qualified personnel or an authorized dealer.
- Maintenance and operation must be carried out according to the recommended time and frequency, as stated in this manual.
- Use genuine standard spare parts only. Failure to comply with these recommendations will invalidate the warranty.
- The Pool Heat Pump Unit heats the swimming pool water and keeps the temperature constant.

The heat pump has the following characteristics:

Flexibility – Heating & Cooling

This unit provides both heating and cooling of a pool or other large water supply. It can maintain a consistent temperature automatically.

Solar-Ready

This unit it designed to operate on solar panels when configured per HotSpot Energy solar heat pump pool heater procedures.

Durability

The heat exchanger is made of PVC & titanium tube which can withstand prolonged exposure to swimming pool water. The housing is a non-metallic, rustproof enclosure.

Installation flexibility- Indoor/outdoor / aboveground/in-ground

This unit can be used for in-ground or aboveground pools, salt or chlorine.

Quiet operation

This unit has an efficient rotary/scroll compressor and a low-noise fan motor, this guarantees its quiet operation.

Advanced controls

This unit is micro-computer controlled, allowing all operational parameters to be set. Operation status can be displayed on the controller's LED display.

2. SPECIFICATIONS

2.1 Performance data of Pool Heat Pump Unit

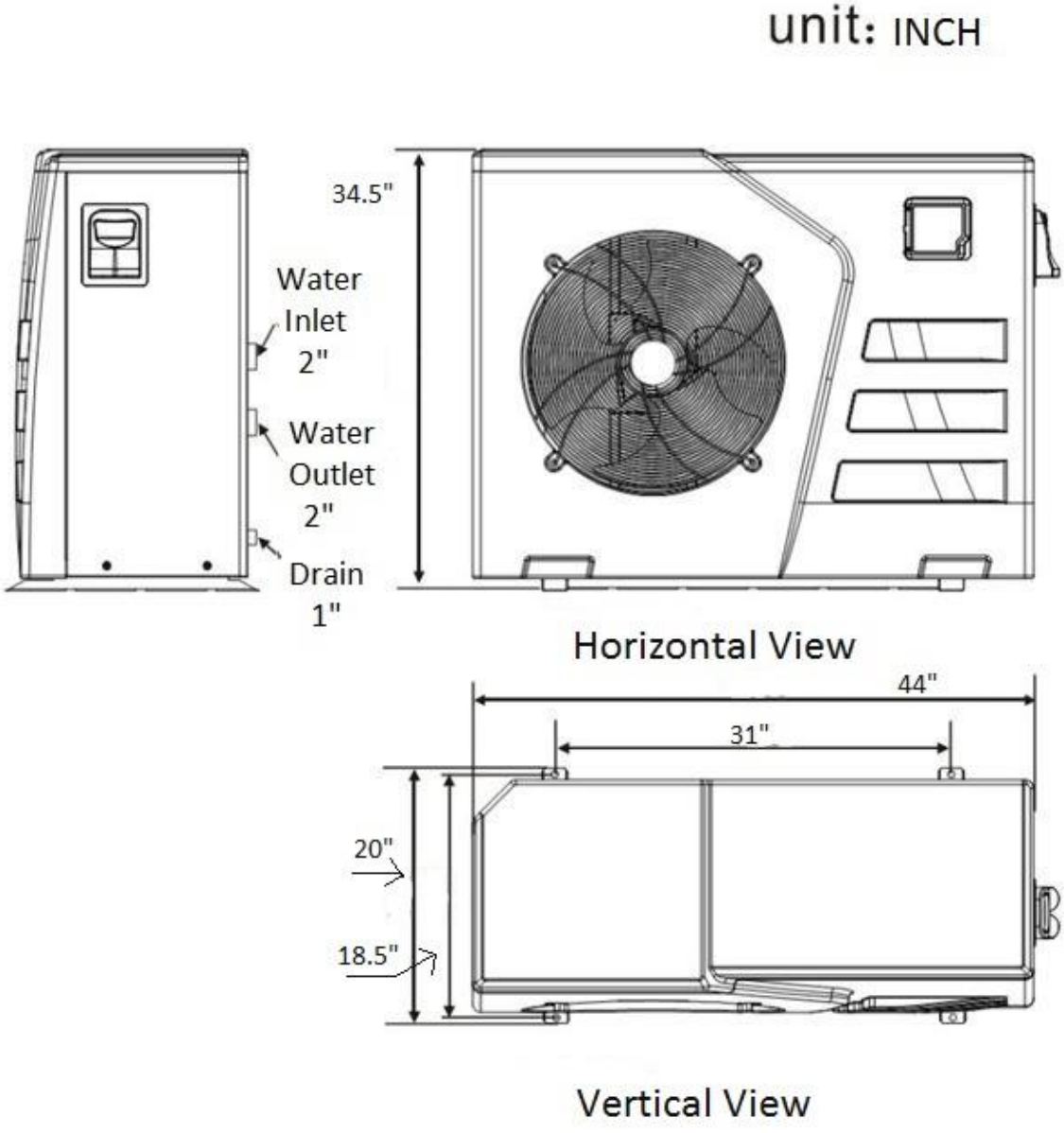
*** REFRIGERANT : R410A

UNIT	Model	SHP48 (PASWR030)
Heating Capacity	kW	14.0
	Btu/h	48000
Heating Power Input	kW	2.45
Running Current	A	8.3
Power Supply		230V~/60Hz
Compressor Quantity		1
Compressor		Rotary
Fan Quantity		1
Fan Power Input	W	120
Fan Rotate Speed	RPM	850
Fan Direction		Horizontal
Noise	dB(A)	56
Water Connection	Inch	1.5”
Water Flow Volume	GPM	22GPM
Water Pressure Drop (max)	Psi	1.45
Unit Net Dimensions (L/W/H)	mm	W44” x D20” x H35”
Unit Shipping Dimensions (L/W/H)	Inch	See nameplate/See package label
Net Weight/Shipping Weight	kg	See nameplate/See package label

Heating: Outdoor air temp: 75°F/66°F, Inlet water temp: 79°F

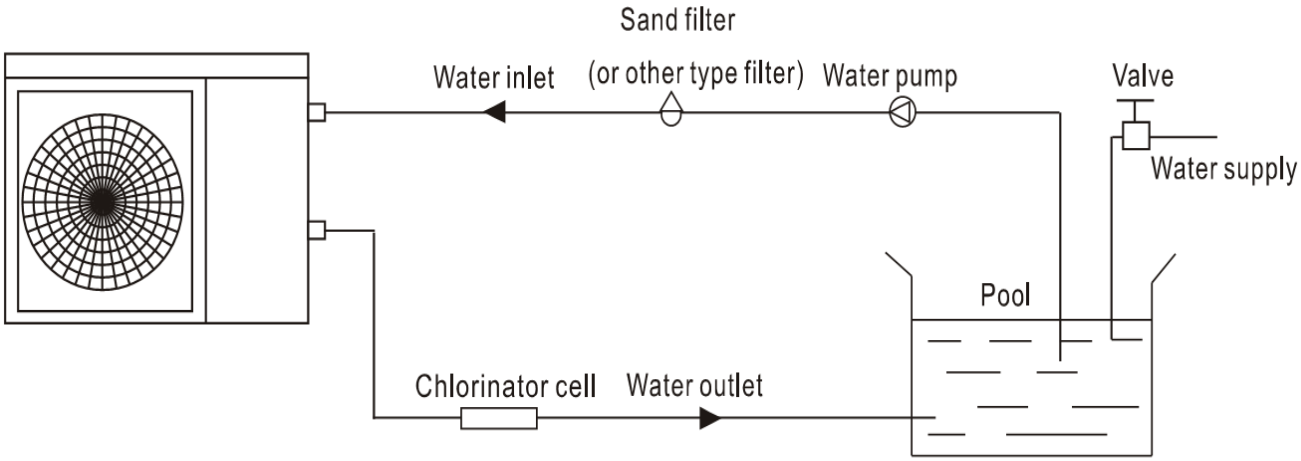
2. SPECIFICATION

2.2 The dimensions for Swimming Pool Heat Pump Unit



3. INSTALLATION AND CONNECTION

3.1 Installation Illustration



Installation items:

The factory only provides the main unit and the water unit; the other items in the illustration are user provided.

Attention:

Please follow these steps when using for the first time:

1. Open valve and charge with water.
2. Make sure that the pump and the water-inlet pipe have been filled with water.
3. Close the valve and start the unit.

3. INSTALLATION AND CONNECTION

3.2 Pool Heat Pump Location

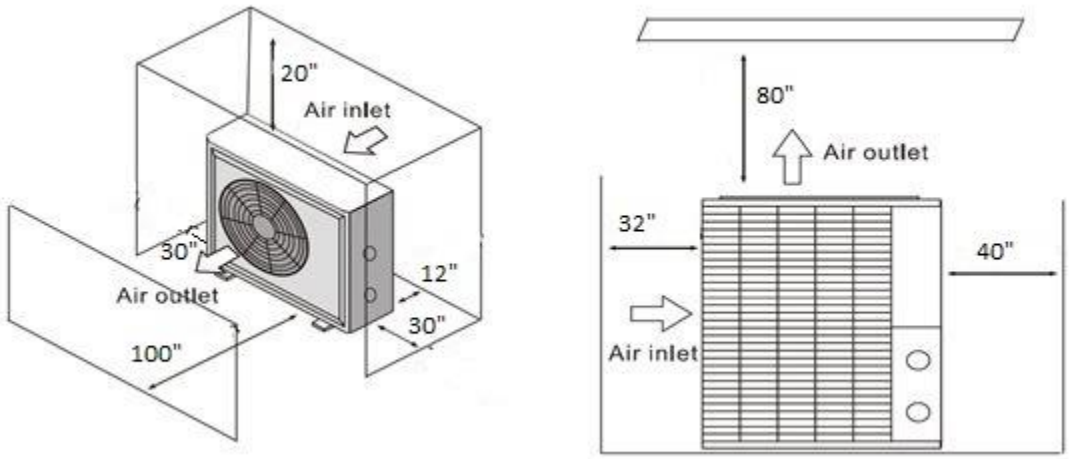
The unit will perform well in any outdoor location provided that the following three factors are present:

1.Fresh Air 2. Electricity 3. Pool filter piping/pumping

The unit may be installed virtually anywhere outdoors. For indoor pools please consult the supplier. Unlike a gas heater, it has no draft or pilot light problems in a windy area.

DO NOT place the unit in an enclosed area with a limited air volume, where the units discharge air will be re-circulated.

DO NOT place the unit near shrubs or other obstacles, which can block air inlet.



3.3 How Close To Your Pool?

Normally, the pool heat pump is installed within 25 feet of the pool. The greater the distance between the pool and the heater, the greater the heat loss from the plumbing. The plumbing is often buried. Therefore, the heat loss is minimal for runs of up to 50 feet (50 feet to and from the pump = 100 feet total), unless the ground is wet or the water table is high. A very rough estimate of heat loss per 100 feet is 0.6kW-hour, (2000BTU) for every 5°F difference in temperature between the pool water and the ground surrounding the pipe, which translates to about 3% to 5% increase in run time.

3. INSTALLATION AND CONNECTION

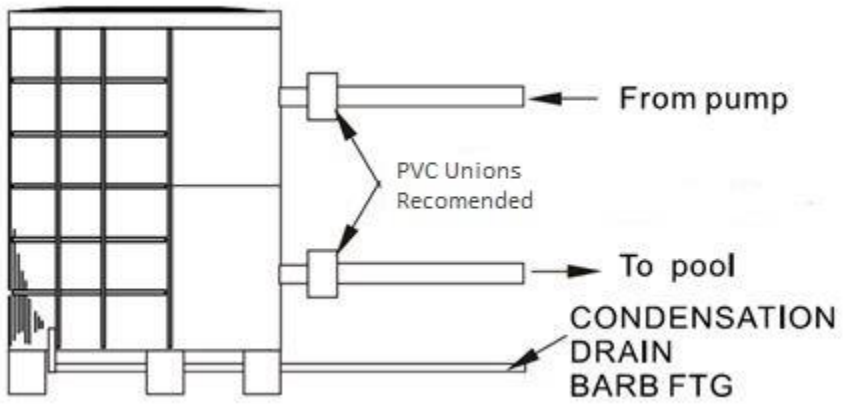
3.4 Swimming Pool Heat Pump Plumbing

The Swimming Pool Heat Pumps exclusive rated flow titanium heat exchanger requires no special plumbing arrangements except a bypass (please set the flow rate according to the nameplate). The water pressure drop is less than 1.45 Psi at max flow rate. Since there is no flame or other high temperatures source, the unit does not need metal plumbing. The PVC pipe can be run straight into the unit.

Location in plumbing loop: Connect the unit in the pool pump discharge (return) line downstream of all filter and pool pumps, and upstream of any chlorinators, ozonators or chemical pumps. (See illustration)

Standard models have slip glue fittings which accept 1.5" or 50mm PVC pipe for connection to the pool or spa filtration plumbing. By using a 1.5" to 1.5" you can plumb 1.5" PVC pipe.

Give serious consideration to adding a 1.5" PVC sch 40 union (Lowes item #188234) at the unit inlet and outlet to allow easy draining of unit for winterizing and to provide easier access should servicing be required.



Condensation: Since the heat pump cools down the air about 4-5°F, water may condense on the fins of the horseshoe shaped evaporator. If the relative humidity is very high, this could be as much as several liters an hour. The water will run down the fins into the base pan and drain out through the barbed plastic condensation drain fittings on the side of the base pan. This fitting is designed to accept ¾" clear vinyl tubing which can be pushed on by hand and run to a suitable drain. It is easy to mistake the condensation for a water leak inside the unit.

NOTE: A quick way to verify that the water is condensation is to shut off the unit and keep the pool pump running. If the water stops running out of the base pan, it is condensation.

AN EVEN QUICKER WAY, IS TO TEST THE DRAIN WATER FOR CHLORINE - if there is no chlorine present the water is condensation.

3. INSTALLATION AND CONNECTION

3.5 Swimming Pool Heat Pumps Electrical Wiring

NOTE: Although the units heat exchanger is electrically isolated from the rest of the unit, grounding and bonding the unit is still required to protect you against short circuits inside the unit. The unit has a separate molded-in junction box with a standard electrical conduit nipple already in place. Just remove the screws and the front panel, feed your supply lines in through the conduit nipple and connect them to the three conductors already in the junction box (four connections if three phase). The Heat Pump should be connected by electrical conduit, UF cable or other suitable means as specified (as permitted by local electrical authorities) to a dedicated AC power supply branch circuit equipped with the proper circuit breaker, disconnect or time delay fuse protection. When configured for solar usage, the heat pump must be connected to a dedicated breaker in the SPP-supplied Power Manager. See separate instructions for installing and connecting the solar panels.

Disconnect - A disconnect means (circuit breaker, fused or un-fused switch) should be located within sight of and readily accessible from the unit. This is common practice on commercial and residential air conditioners and heat pumps. It prevents remotely-energizing unattended equipment and permits turning off power at the unit while the unit is being serviced. Follow the required standards of the AHJ. When using the SPP solar Power Manager the disconnect is included.

3.6 Initial startup of the unit
NOTE-In order for the unit to heat the pool or spa, the filter pump must be running to circulate water through the heat exchanger.

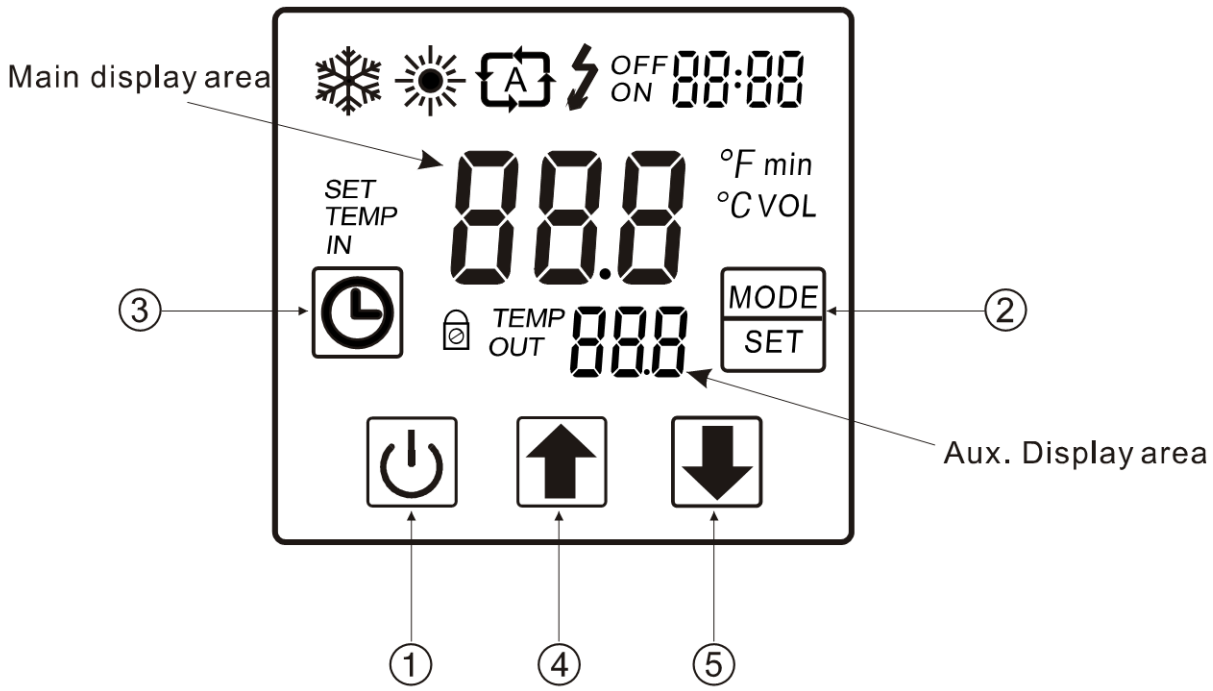
Startup Procedure - After installation is completed:

1. Turn on your filter pump. Check for water leaks and verify flow to and from the pool.
2. Turn on the electrical power supply to the unit, and then press the key ON/OFF of controller. It should start in few seconds.
3. After running a few minutes, make sure the air leaving the top (side) of the unit is cooler. (Between 5-10°F)
4. With the unit operating turn the filter pump off. The unit should also turn off automatically.
5. Allow the unit and pool pump to run 24 hours a day until desired pool water temperature is reached. When the water-in temperature reaches the setting, the unit shuts off. The unit will now automatically restart (as long as your pool pump is running) when the pool temperature drops more than 2°F below set temperature.

Note: Time Delay - The unit is equipped with a 3 minute built-in solid state restart delay included to protect control circuit components and to eliminate restart cycling and contactor chatter. This time delay will automatically restart the unit approximately 3 minutes after each control circuit interruption. Even a brief power interruption will activate the solid state 3 minute restart delay and prevent the unit from starting until the 3 minute countdown is completed. Power interruptions during the delay period will have no effect on the 3 minute countdown.

4. USAGE AND OPERATION

4.1 Function of controller



1) Button function

NO	Symbol	Name	Function
①		On/Off	Press this button to start up or shut down the unit, cancel the current operation, or go back to the upper interface
②		Mode	Press this button to switch modes or save parameter setting
③		Clock	Press this button to set the clock and timer
④		Up	Press this button to move up or increase parameter value

⑤		Down	Press this button to move down or decrease the parameter value

4. USAGE AND OPERATION

2) Display function

Symbol	Meaning	Function
	Cooling	It is displayed when the unit is in cooling mode.
	Heating	It is displayed when the unit is in heating mode and flashes when in defrost mode.
	Automatic	It is displayed when the unit is in automatic mode.
	Electric-heating	It is displayed when the unit is in electric-heating mode. (Swimming pool unit without this display)
ON	Timer on	It is displayed when the timer is on.
OFF	Timer off	It is displayed when the timer is off.
IN	Inlet water	It is displayed when the main display area gives the inlet water temperature. (measured value)
OUT	Outlet water	It is displayed when the AUX display area gives the outlet water temperature. (measured value)
TEMP	Temperature	It is displayed when the main/AUX display area gives temperature.
VOL	Flow	It is displayed when the main display area gives the water flow value.
min	Minute	It is displayed when the main display area gives minute value.
°F	Fahrenheit	It is displayed when the main/AUX display area gives Fahrenheit value.
°C	Centigrade	It is displayed when the main/AUX display area gives centigrade value.
SET	Parameter setting	It is displayed when the parameter can be set.
	Lock	It is displayed when the keyboard is locked.

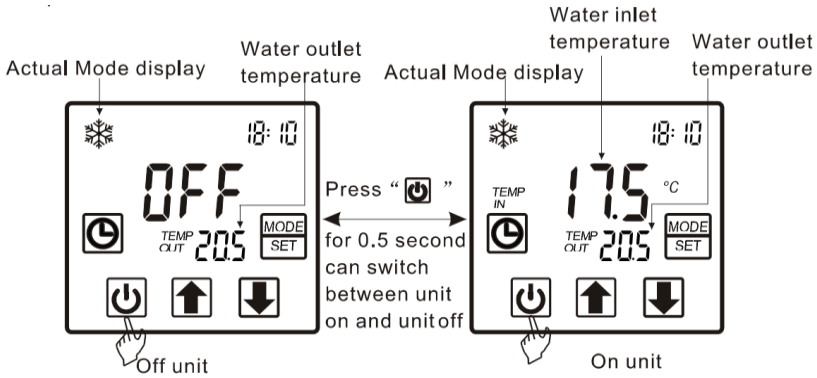
4. USAGE AND OPERATION

4.2 Controller usage

4.2.1 Starting up and shutting down

In the off condition, press “ ” for 0.5s to start up the unit, and the aux display-area shows water outlet temperature; in the running condition, press “” for 0.5s to shut down the unit and the aux display area shows “OFF”.

Attention: The operation of starting up and shutting down can only be done in the main screen. For example:

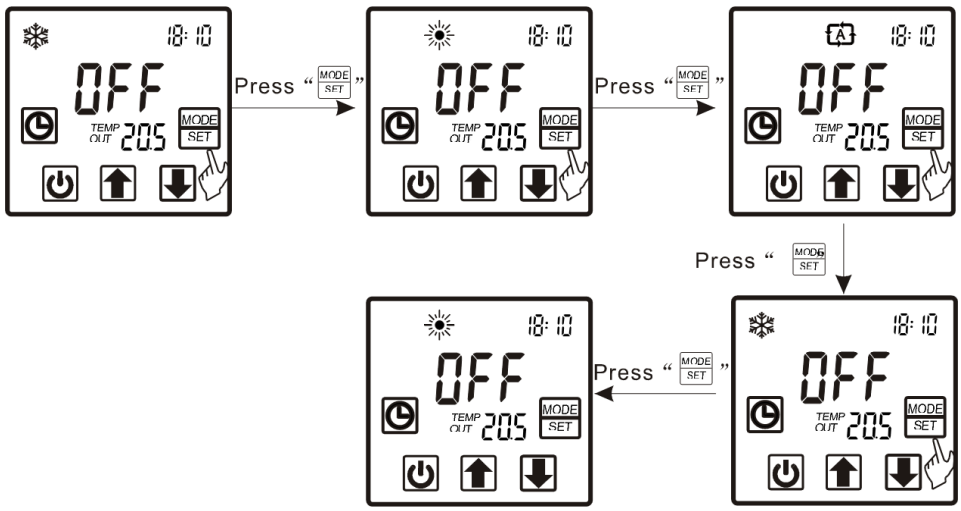


4.2.2 Modes switching

In the main screen, you can switch different modes of cooling, heating, auto mode by pressing “ ”.

Attention: The modes switching is useless if the unit you buy is single-cold/single-heat unit.

For example:

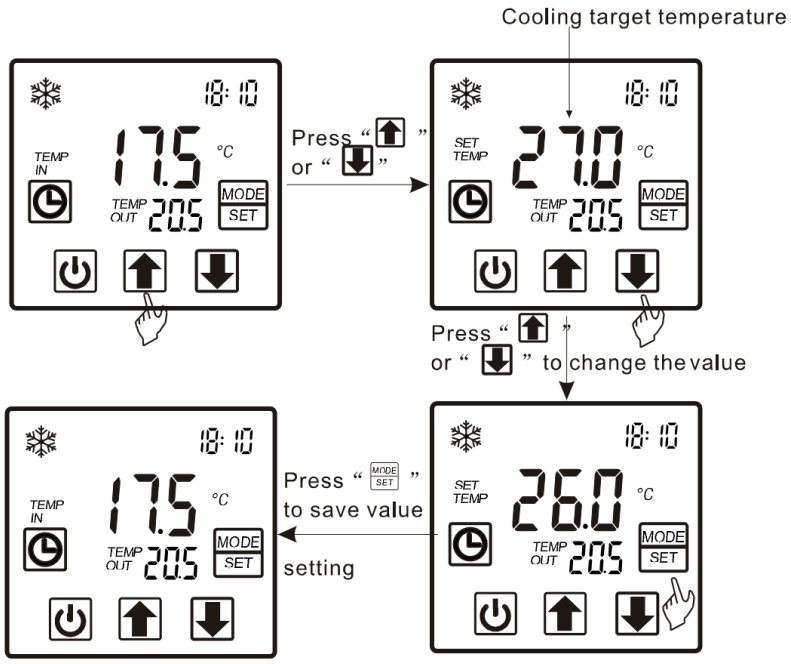


4. USAGE AND OPERATION

4.2.3 Temperature setting

In the main screen, press "▲" or "▼" and the current mode target-temperature flashes, then press "▲" to increase the Value or press "▼" to decrease it.
Press "MODE SET" saves the setting parameter and jumps back to the main screen;
Press "⏻" cannot save the setting parameter but goes back to the main screen;
Attention: if there is no operation for 5s, the system will remember parameter setting back to the main screen.

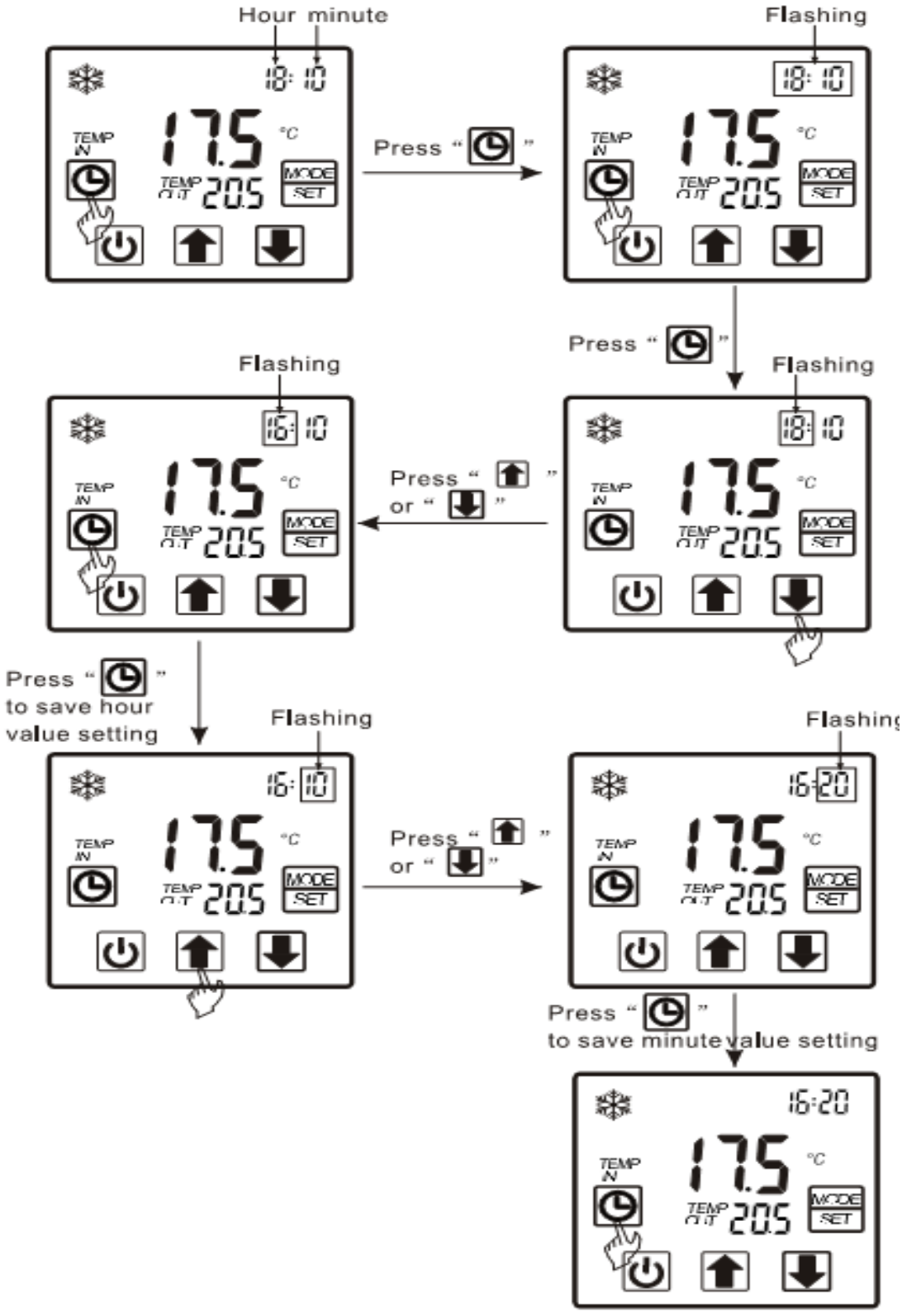
For example:



4.2.4 Clock setting

In the main screen, press "" twice, hours start to flash, and press "" to increase value or press "" to decrease value. Press "" to save setting:
At the same time, minutes start to flash, press "" to increase value or press "" to decrease value and again, press "" to save the setting.
Pressing "", cannot save the setting parameter return back to main screen.
Attention: If there is no operation for 5s system will remember parameter setting and back to the main screen.

For example:



4. USAGE AND OPERATION

4.2.5 Timer setting

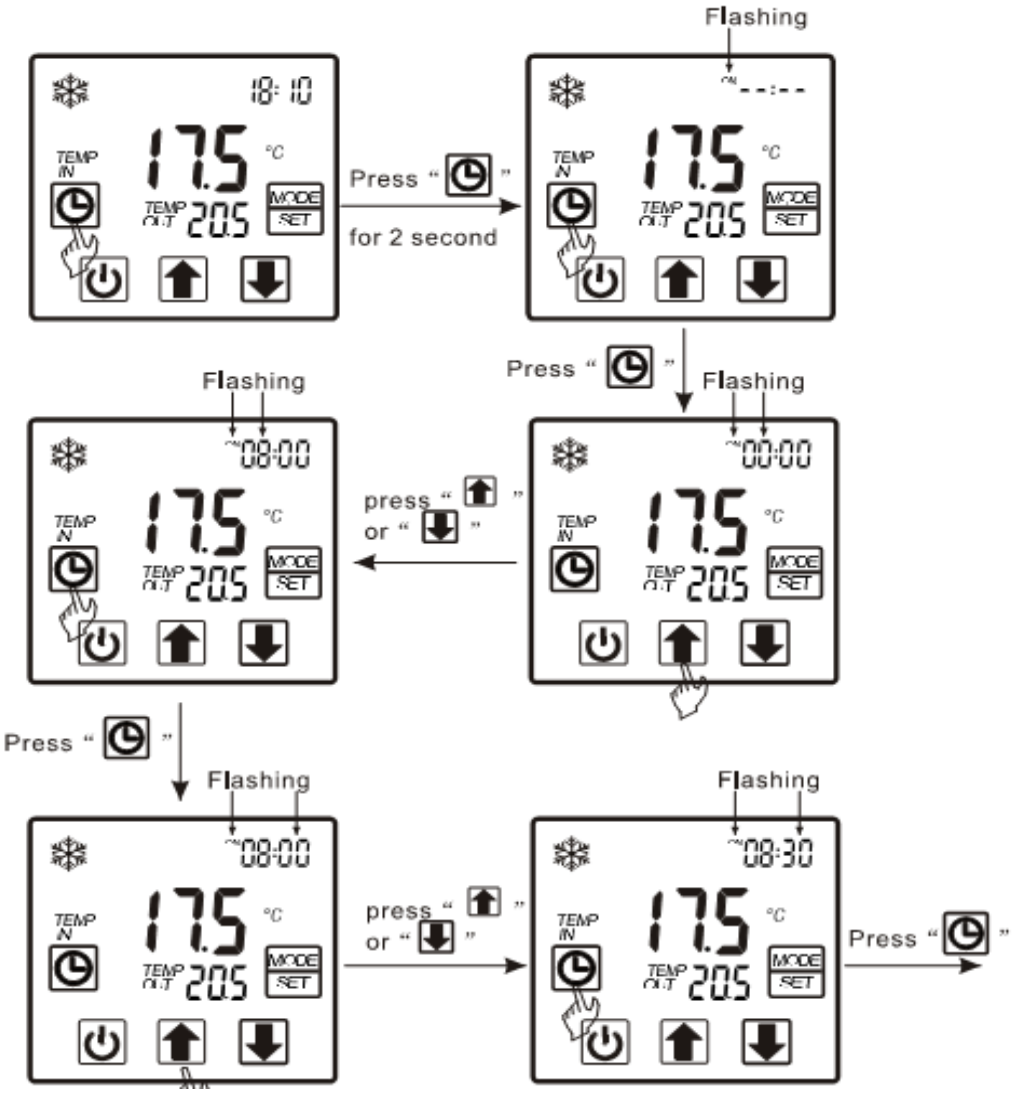
In the main screen, press "⏲" and hold for 2 seconds with "on" flashing, at this time you can set the timer to on (the unit timer is on), then press "⏲" again and hold for 2 seconds and the "off" flashes, you can set the time off (the unit timer is off).

If you want to cancel the timer off, in the "off" flashing screen, press "⏻" to cancel.

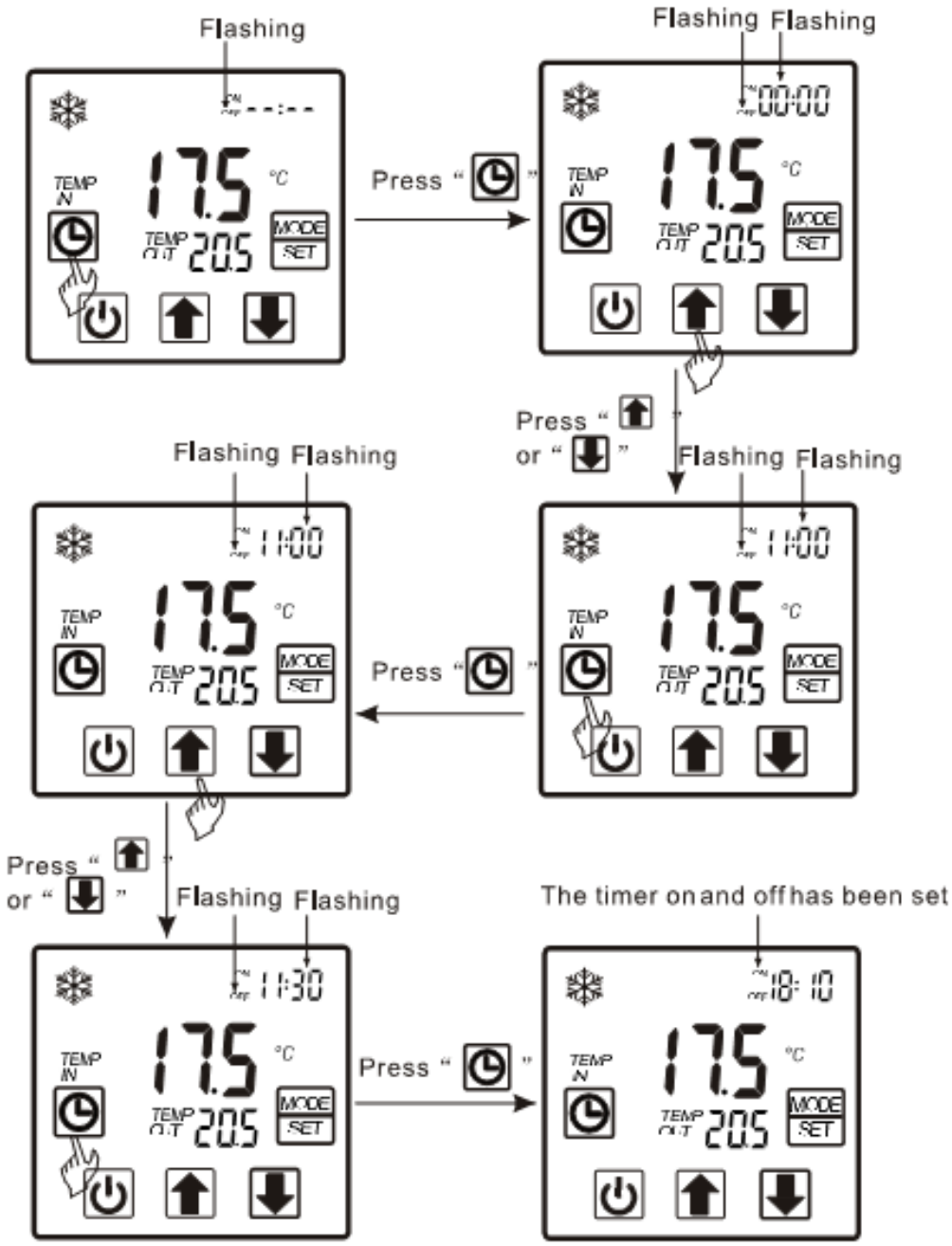
Attention:

1) If there is no operation for 5s, system will remember clock setting and go back to the main screen.

2) By pressing "⏲" until the "off" is flashing, you can set the timer off without timer on.



4. USAGE AND OPERATION

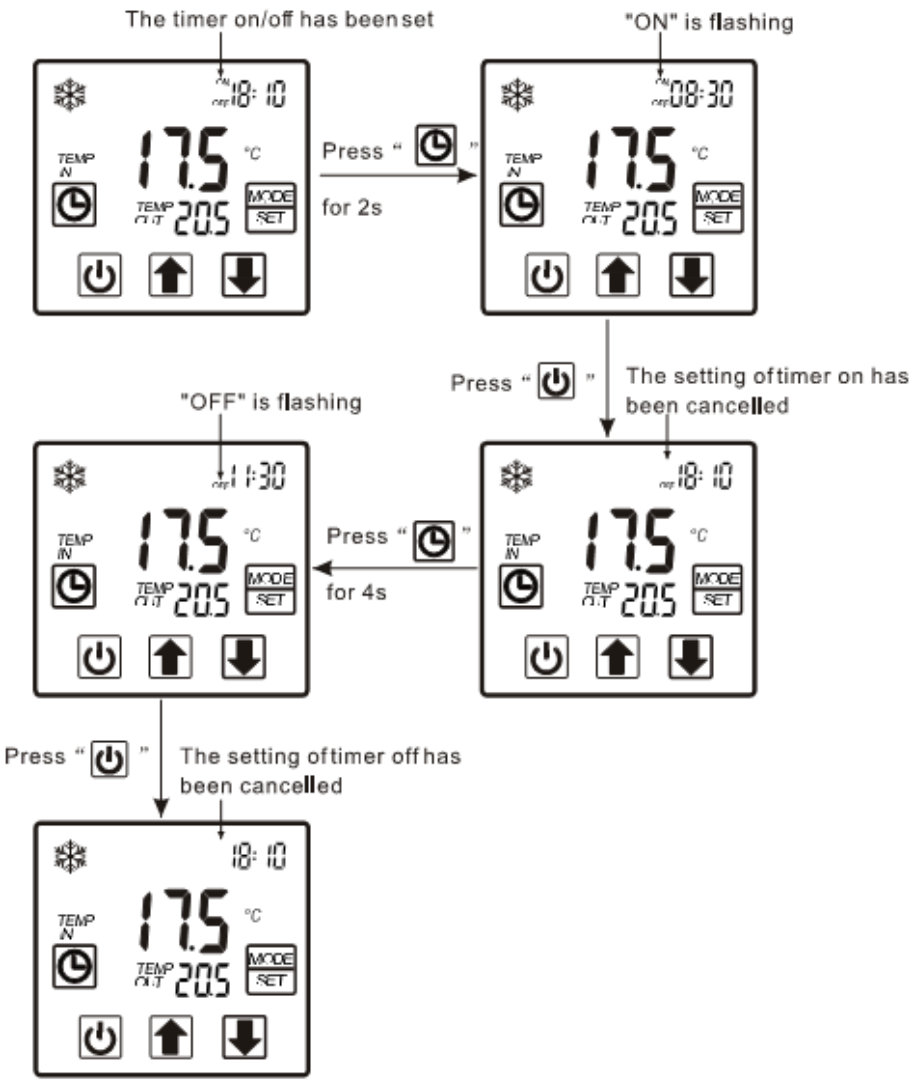


4. USAGE AND OPERATION

4.2.6 Cancel the timer setting

Press “” for 2s and the “ON” is flashing, at this time, press “” to cancel the setting of timer on; it is the same as canceling the setting of timer off.

For example:

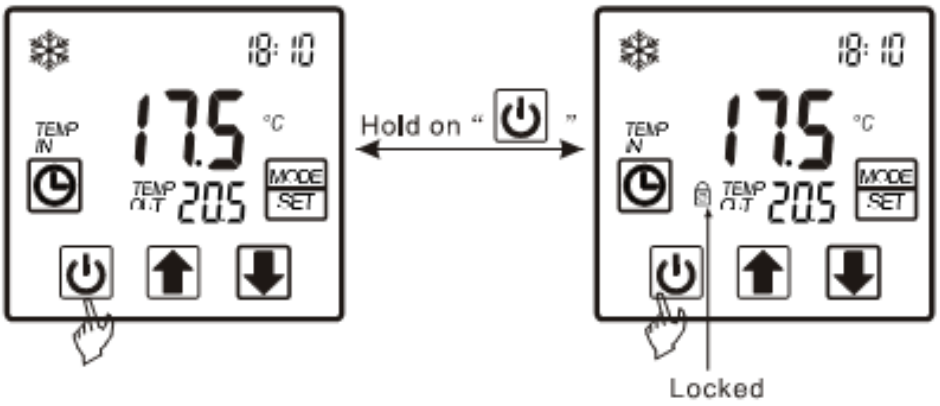


4. USAGE AND OPERATION

4.2.7 Keyboard lock

To avoid unauthorized operation, please lock the controller after parameter setting. At the main screen, press "⏻" for 5 seconds, the keyboard will be locked. When the keyboard is locked, press "⏻" for 5 seconds, the keyboard will be unlocked.

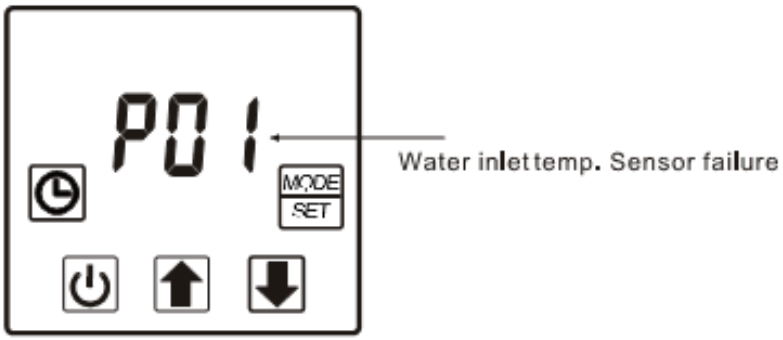
NOTE: When the unit is in alarming state, the key lock can be removed automatically.



4.2.8 Malfunction display

There will be a malfunction code showing on the controller screen when a malfunction occurs. You can refer to the malfunction table (5.2 *Trouble Shooting Guide)* to find out the failure cause and solution.

For example:



4.3 Parameter table

Meaning	Default	Remark
Heating inlet target temp.	81°F	Adjustable
Cooling inlet target temp	81°F	Adjustable

Auto inlet target temp.	81°F	Adjustable

5. MAINTENANCE AND INSPECTION

5.1 Maintenance

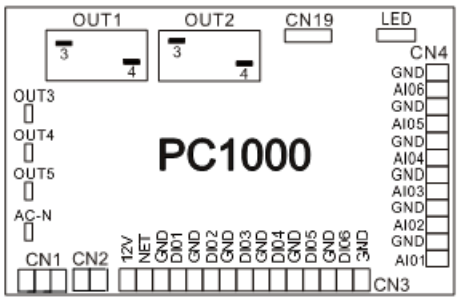
- Check the water supply often. You should avoid the condition of "no water" or air entering into system, as this will affect the unit's performance and reliability. You should clear the pool/spa filter regularly to avoid damage to the unit as a result of the dirty or clogged filter.
- The area around the unit should be dry, clean and well ventilated. Clean the side heating exchanger regularly to conserve efficiency.
- The refrigeration system should only be serviced by a certified technician.
- Check the power supply and cable connection often. Should the unit begin to operate abnormally, you should switch it off and contact a qualified technician for service.
- Drain all water from the water pump and plumbing system, so that freezing of the water in the pump or system does not occur. You should drain the water at the bottom of water pump if the unit will not be used for an extended period of time. You should check the unit thoroughly and fill the system with water fully before using it for the first time after a service or repair.

5.2 Trouble Shooting Guide

Malfunction	Display	Cause	Solution
Water inlet temp. sensor failure	P01	The water inlet temp sensor is open or short circuit.	Check or change the water inlet temp sensor
Water outlet temp sensor failure	P02	The water outlet temp sensor is open or short circuit.	Check or change the water outlet temp sensor
Ambient temp sensor failure	P04	The ambient temp sensor is open or short circuit.	Check or change the ambient temp sensor
Pipe temp sensor failure	P05	The pipe temp sensor is open or short circuit	Check or change the pipe temp sensor
Evaporator temp sensor failure	P07	The evaporator temp sensor is open or short circuit	Check or change the evaporator temp sensor
High pressure protection	E01	The exhaust pressure is high, high pressure switch activation	Check high pressure switch and cooling return circuit
Low pressure protection	E02	The suction pressure is low, low pressure switch activation	Check low pressure switch and cooling return circuit
Flow switch failure	E03	No water or little water in water system	Check the flow volume, water pump is failure or not
Temp difference between water-inlet and outlet is excessive.	E06	Water flow volume not enough, water system pressure difference is small	Check the flow volume, plumbing system may be blocked.
Anti-freezing under coding mode	E07	Water flow volume not enough	Check the flow volume, water system is jammed or not
The primary anti-freezing protection starts	E19	Ambient temperature is too low	
The second anti-freezing protection starts	E29	Ambient temperature is too low	
Communication failure	E08	Communication failure between remote wire controller and main board	Check the wire connection between remote wire controller and main board

5. MAINTENANCE AND INSPECTION

5.3 Connection of PCB illustration

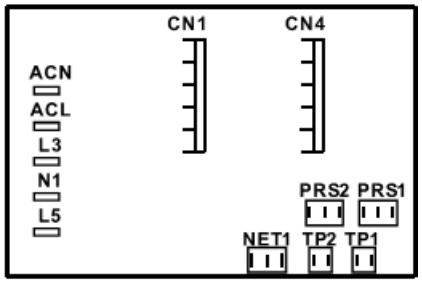


Connections explanation:

No.	Symbol	Meaning
1	OUT1	Compressor of system1 (220-230VAC)
2	OUT2	Water pump (220-230VAC)
3	OUT3	4way valve (220-230VAC)
4	OUT4	High speed of fan motor (220-230VAC)
5	OUT5	Low speed of fan motor (220-230VAC)
6	AC-N	Neutral wire
7	NET GND 12V	Wired controller
8	D|01 GND	On/Off Switch (input) (no use)
9	D|02 GND	Flow switch (input) (normal close)
10	D|03 GND	Low pressure protect
11	D|04 GND	High pressure protect
12	D|05 GND	No use
13	D|06 GND	No use
14	A|01 GND	Suction temp. (input)
15	A|02 GND	Water in temp. (input)
16	A|03 GND	Water out temp. (input)
17	A|04 GND	Temp. of coil (input)
18	A|05 GND	Ambient temp. (input)
19	A|06 GND	No use

5. MAINTENANCE AND INSPECTION

5.4 Connection of PCB illustration



Connections explanation:

No.	Symbol	Meaning
1	ACN	Neutral wire
2	ACL	Power line
3	L3	4way valve (220-230VAC)
4	N1	Neutral wire
5	L5	High speed of fan motor (220-230VAC)
6	CN1	Fan 1 feedback signal
7	CN4	Fan 2 feedback signal
8	PRS1	Pressure sensor 1
9	PRS2	Pressure sensor 2
10	NET1	Wired controller
11	TP1	Ambient temp. (input)
12	TP2	No use

6. APPENDIX

6.1 Recommendations, Cautions & Warnings

1. The unit can only be repaired by an authorized dealer.
2. A light weight pool cover is recommended to limit water evaporation and heat loss. Pool heating requirements and calculations are based on using a cover.
3. The recommended pool heating temperature setting is 82° F.
4. This appliance is not intended for use by persons (including children) with impaired sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.
5. Please make sure that the unit and power connections have an adequate earth ground.
6. If the supply cord is damaged, it must be replaced by the manufacturer or our service agent or similarly qualified person in order to avoid a hazard.
7. Directive 2002/95/EC (RoHs): This product is compliant with directive 2002/95/EC (RoHs) concerning restrictions for the use of harmful substances in electric and electronic devices.
8. The unit CANNOT be installed near flammable gas.
9. Make sure that there is a circuit breaker for the unit, lack of the proper circuit breaker can lead to damage, electrical shock or fire.
10. The heat pump located inside the unit is equipped with an over-load protection system. It does not allow for the unit to start for at least 3 minutes from a previous shutdown.
11. Installation must be performed in accordance with the NEC/CEC by authorized person only.
12. USE SUPPLY WIRES SUITABLE FOR 167°F.
13. Caution: Single wall heat exchanger, not suitable for potable water connection.

6. APPENDIX
6.2 Cable Specification

1. Single phase unit

Nameplate maximum current	Phase line	Earth line	MCB	Leakage protector	Signal line
No more than 13A	2 x 16 AWG	16 AWG	20A	30mA less than 0.1 sec	n x 20 AWG
13~25A	2 x 12 AWG	16 AWG	40A	30mA less than 0.1 sec	
25~30A	2 x 10 AWG	12 AWG	40A	30mA less than 0.1 sec	
30~40A	2 x 8 AWG	10 AWG	63A	30mA less than 0.1 sec	
40~55A	2 x 6 AWG	8 AWG	80A	30mA less than 0.1 sec	
55~70A	2 x 4 AWG	6 AWG	100A	30mA less than 0.1 sec	

2. Three phase unit

Nameplate maximum current	Phase line	Neutral line	Earth line	MCB	Leakage protector	Signal line
No more than 13A	3 x 16 AWG	16 AWG	16 AWG	20A	30mA less than 0.1 sec	n x 20 AWG
13~25A	3 x 12 AWG	12 AWG	16 AWG	40A	30mA less than 0.1 sec	
25~30A	3 x 10 AWG	12 AWG	12 AWG	40A	30mA less than 0.1 sec	
30~40A	3 x 8 AWG	12 AWG	10 AWG	63A	30mA less than 0.1 sec	
40~55A	3 x 6 AWG	12 AWG	8 AWG	80A	30mA less than 0.1 sec	
55~70A	3 x 4 AWG	12 AWG	6 AWG	100A	30mA less than 0.1 sec	

When the unit will be installed at outdoor, please use the cable which can against UV.