



Astral Pool Residential Heat Pump



Rainbow Pool Products

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3.INSTALLATION AND CONNECTION

- 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, debugging, discharging and maintenance. Please read this manual carefully before you open or maintain the unit. The manufacture of this product will not be held responsible if someone is injured or the unit is damaged as a result of improper installation, debugging, or unnecessary maintenance. It is vital that the instructions within this manual are adhered to at all times. The unit must be installed by qualified personnel.
- The unit can only be repaired by qualified installer center 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.
- Swimming Pool Heat Pump Unit heats the swimming pool water and keeps the temperature constant. For split type unit, the indoor unit can be Discretely hidden or semi-hidden to suit a luxury house.

Our heat pump has following characteristics:

1 Durable

The heat exchanger is made of PVC & Titanium tube which can withstand prolonged exposure to swimming pool water.

2 Installation flexibility

The unit can be installed outdoors or indoors.

3 Quiet operation

The unit comprises an efficient rotary/ scroll compressor and a low-noise fan motor, which guarantees its quiet operation.

4 Advanced controlling

The unit includes micro-computer controlling, allowing all operation parameters to be set. Operation status can be displayed on the LED wire controller. Remote controller can be chosen as future option.

INTRODUCTION

Congratulations on the purchase of an Astral Pool Heat Pump, Pool and Spa Heater. Proper installation and service of your new heating system and correct chemical maintenance of the water will ensure many years of service. It is equipped with features that take advantage of new technology developed exclusively by Astral Pool.

This unit can safely be connected to PVC pipe. In addition, the unit is equipped with an accurate electronic thermostat to ensure ease of use and accurate temperature control. The electronic display tells at a glance the operational status of the heater.

Your heat pump works by extracting heat from the surrounding air. The heat pump works most efficiently in warm weather. So, it is best to operate the heat pump during the warmest part of the day rather than overnight or early in the morning.

It is important to ensure an adequate supply of air and to avoid recirculation of the cooled air exiting the top of the unit. For this reason, the heat pump should not be installed in confined spaces and must have a minimum of 1500 mm clearance above it and 500 mm clearance to the sides and rear. A clearance of 1000mm is required to the front of the unit to allow access to the controls and service panel.

Although the unit is weatherproof, it is recommended some protection from the harsh effects of direct exposure to the elements be provided.

The heat pump **must** be installed outdoors on a level concrete pad.

In most circumstances where heating is required, the heat pump will need to run longer than the filtration. For the most effective heating it may be necessary to install a small pump to circulate water through the heat pump independent of the filtration system. Since the heat pump uses electricity so efficiently, it is a pity to waste electricity running an oversized pump. For this reason, the small added cost of a dedicated pump can be recouped and a great deal of energy saved over the life of the heater.

Note:

The appliance is not intended for use by young children or infirm person without supervision. Please ensure that young children are supervised to ensure that they do not play with the appliance.

NOTICE TO INSTALLERS

Heat Pump must be located outdoors with sufficient ventilation as explained on page 6.

This appliance must be installed by an authorized person.

This appliance must be installed in accordance with the installation instructions, the National Wiring Rules and any other relevant statutory authorities.

Refer to data plate for details of operating voltage and current.

A multi-pole isolating switch must be installed that operates in all live conductors so that it isolates the entire equipment from the supply.

SAFETY RULES

1. Spa or hot tub water temperature should never exceed 40°C.
2. Drinking of alcoholic beverages before or during spa or hot tub use can cause drowsiness which could lead to unconsciousness and subsequently result in drowning.
3. Pregnant women beware! Soaking in water above 38°C can cause foetal damage during the first three months of pregnancy.
4. Before entering the spa or hot tub, the user should check the water temperature with an accurate thermometer, spa or hot tub thermostats may be inaccurate by as much as 2°C.
5. Persons with a medical history of heart disease, circulatory problems, diabetes or blood pressure problems should obtain their physician's advice before using spas or hot tubs.
6. Persons taking medications which induce drowsiness, such as tranquillisers, antihistamines or anticoagulants, should not use spas or hot tubs. If in doubt seek medical advice.

Phase rotation must be checked on 3 phase units. Incorrect rotation will damage the compressor and void any warranties.

Performance data of Swimming Pool Heat Pump Unit

CHEMICAL BALANCE

It is imperative that correct chemical balance be maintained in your pool and spa water, otherwise corrosion of your heater may occur. **Corrosion due to chemically imbalanced water or excessive sanitiser is detectable and will void warranty.** Your local pool shop specialist or spa retailer can advise correct chemical balance. Your water should be checked and maintained regularly by a pool water professional. As a guide the following parameters may be used.

pH	7.6 to 7.8
Total Alkalinity	80 to 120 ppm
Calcium Hardness	150 ppm

You should test your water chemical balance at least on a weekly basis.

Excessive sanitiser can damage your heater. Chlorine should not exceed 3 ppm and bromine should not exceed 5 ppm. Salt chlorinators, especially when used on spa pools or indoor or covered pools, can easily produce excessive chlorine levels which will damage the heater internals.

WINTER OPERATION

If the pool won't be used for a month or more, turn the heater off at the main isolating switch. For areas where there is no danger of freezing, water should circulate through your heater all year long even though you are not heating your pool.

Where freezing is possible, it is necessary to drain the water from the heater. This may be done by loosening the inlet or outlet barrel union. If the heater is below water level, isolate it from the pool first by closing shut off valves before and after the heater.

CAUTION: If the heater has been drained for freezing conditions, do not turn on until the system is circulating water.

SPECIFICATION

Performance data of Swimming Pool Heat Pump Unit

REFRIGERANT :R410A

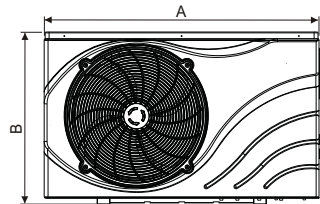
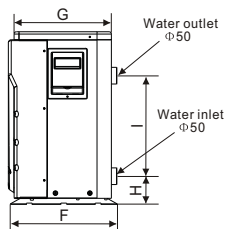
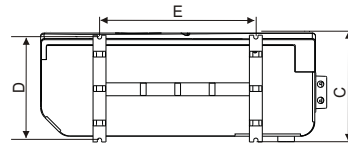
Unit	Model	78540	78541
Heating Capacity	kW	7.9	13.8
	BTU/h	26900	47000
Heating Power Input	kW	1.5	2.1
Running Current	A	6.7	10.4
Power Supply		240V/~50Hz	240V/~50Hz
Compressor Quantity		1	1
Compressor		Ratary	Ratary
Fan Quantity		1	1
Fan Power Input	W	120	120
Fan Rotate Speed	RPM	850	850
Fan Direction		Horizontal	Horizontal
Noise	dB(A)	49	54
Water Connection	mm	50	50
Water Flow Volume	m ³ / h	3	4.5
Water Pressure Drop(max)	kPa	10	10
Unit Net Dimensions(L/W/H)	mm	956×372×600	956×372×600
Unit Shipping Dimensions(L/W/H)	mm	1040×415×615	1040×415×615
Net Weight	kg	51	57
Shipping Weight	kg	59	68

Heating: Outdoor air temp:24°C/19°C, Inlet water temp:26°C

2. SPECIFICATION

2.2 The dimensions for Swimming Pool Heat Pump Unit

Model:78540/78541

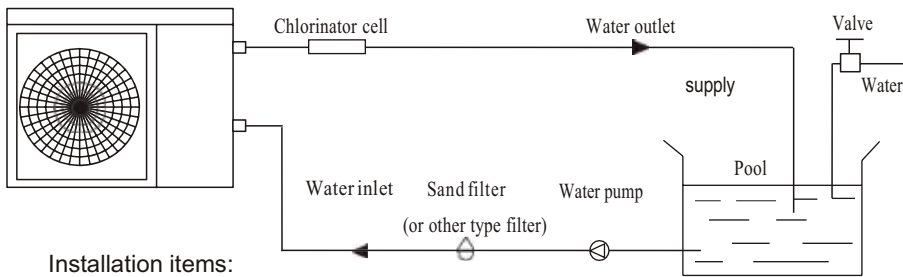


unit: mm

TYPE SIZE	78540/78541
A	956
B	600
C	385
D	360
E	545
F	372
G	340
H	98
I	350

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 necessary spare parts for the water system, that are provided by users or the installer.

Attention:

Please follow these steps when using for the first time 1.Open valve and charge water. 2.Make sure that the pump and the water-in pipe have been filled with water. 3.Close the valve and start the unit.
ATTN: It is necessary that the water-in pipe is higher than the pool surface.

3.2 Swimming Pool Heat Pumps Location

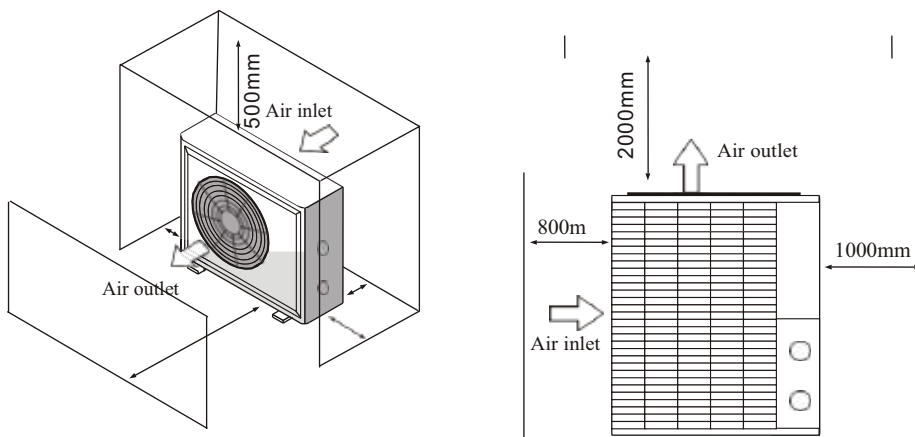
The unit will perform well in any outdoor location provided that the following three factors are presented:

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

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 problem 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 to shrubs which can block air inlet. These locations deny the unit of a continuous source of fresh air which reduces its efficiency and may prevent adequate heat delivery.



3.3 How Close To Your Pool?

Normally, the pool heat pump is installed within 7.5 meters of the pool. The longer the distance from the pool, the greater the heat loss from the piping. For the most part the piping is buried. Therefore, the heat loss is minimal for runs of up to 15 meters (15 meters to and from the pump = 30 meters total), unless the ground is wet or the water table is high. A very rough estimate of heat loss per 30 meters is 0.6 kW-hour, (2000BTU) for every 5 °C 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

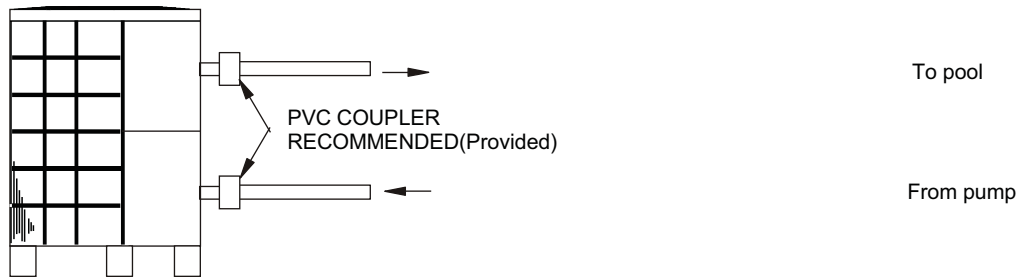
3.4 Swimming Pool Heat Pumps Plumbing

The Swimming Pool Heat Pumps exclusive rated flow titanium heat exchanger requires no special plumbing arrangements except by-pass(please set the flow rate according to the nameplate). The water pressure drop is less than 10kPa at max. Flow rate. Since there is no residual heat or flame Temperatures, The unit does not need copper heat sink piping. PVC pipe can be run straight into the unit.

Location: 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.

Standard model have slip glue fittings which accept 40mm NB PVC pipe for connection to the pool or spa filtration piping. By using a 50 NB to 40NB you can plumb 50NB PVC piping straight into the unit.

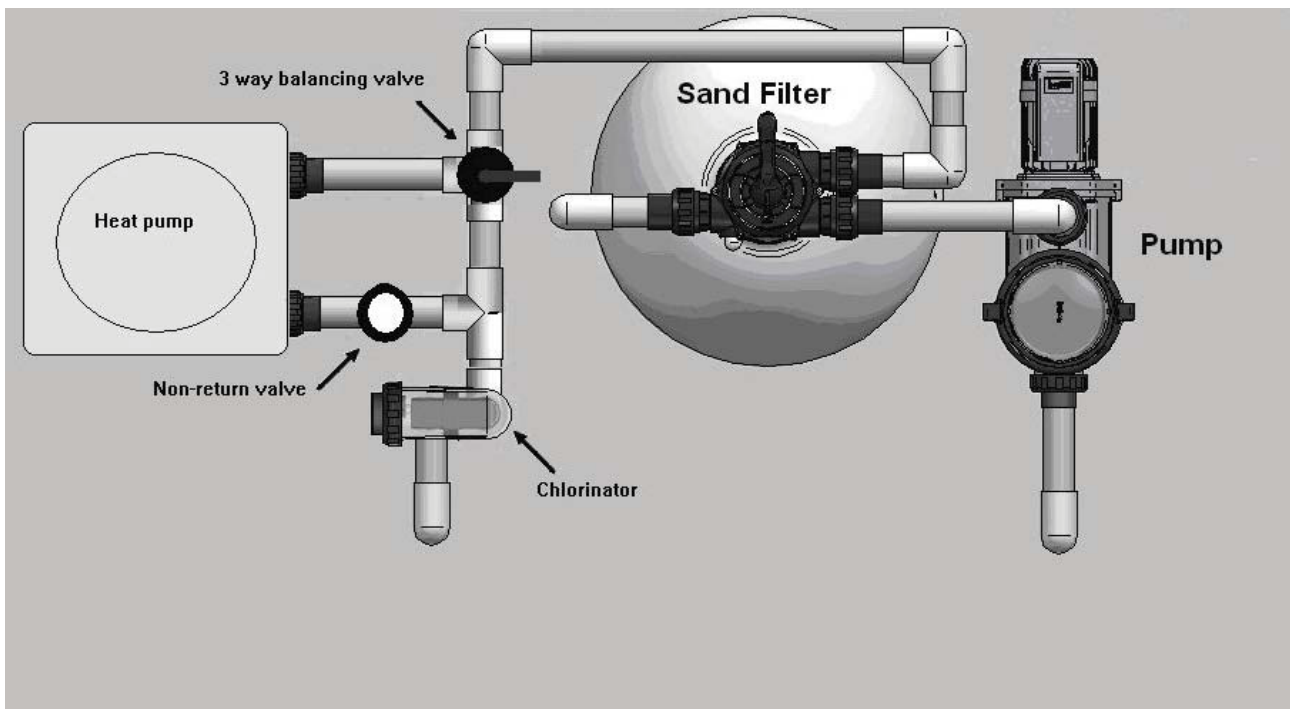
Give serious consideration to adding a quick coupler fitting at the unit inlet and outlet to allow easy draining of unit for winterizing and to provide easier access should servicing be required.



Condensation: Since the Heat pump cools down the air about 4 °C, 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 fitting on the side of the base pan.

This fitting is designed to accept 3/4" 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.

NB: 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, then it's condensation.



3.INSTALLATION AND CONNECTION

WATER CONNECTIONS

Where the heat pump is installed in the filtration circuit, the heater should always be installed after the pump and filter. The water connections are located on the right hand side of the heater. The inlet and outlet are clearly marked. Water connections supplied are for 50mm PVC glue in plumbing.

All automatic sanitising devices must be installed after the heater and in such a way that the sanitiser cannot enter the heater without first mixing with the water in the pool or spa. Sanitisers that are connected prior to the heater will void heater warranty.

The Astral Pool Heat Pump Pool Heater is only suitable for outdoor installation.



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3.INSTALLATION AND CONNECTION

Barrier: A fence or barrier can reduce the level of the Heat Pump's noise heard in neighbouring premises. To do this, the barrier or fence needs to be continuous with few or no gaps and go down to ground level. It must also prevent the Heat Pump from being seen from noise sensitive locations on neighbouring premises. Noise sensitive locations include bedroom and living room windows (including second storey dwellings) and outdoor entertaining/relaxing areas.

Factor for Box 1

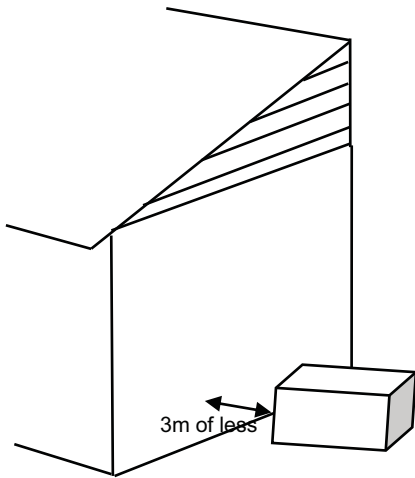
Carefully read through the fence/barrier descriptions below. Select a value that corresponds to the fence/barrier description applicable to your situation. Put this value in Box 2 above.

	Description	Value for Box 1
1	The fence/barrier does not prevent the Heat Pump from being seen from noise sensitive locations on neighbouring properties	0
2	The fence/barrier blocks line of sight but is made of material having large gaps, such as a picket fence, or brick wall with openings or fancy inserts.	0
3	The fence/barrier blocks line of sight of the Heat Pump from noise sensitive location eg: Typical paling fence with small gaps due to warping.	5
4	The fence/barrier blocks line of sight of the Heat Pump from noise sensitive location e.g. "Colorbond" fencing, concrete block/masonry/brick, Fibre cement sheeting	10

Reflection Factor

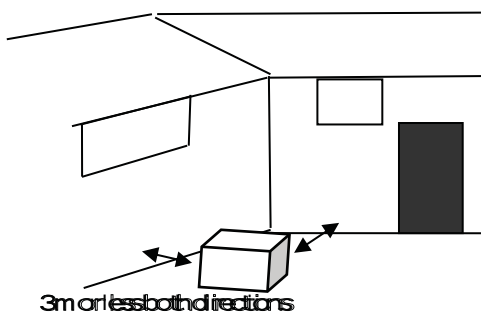
Noise can reflect from walls, roofs, sheds etc. This can have the effect of making the noise seem louder than what it is. Put the corresponding value in Box 3.

Factor for Box 2

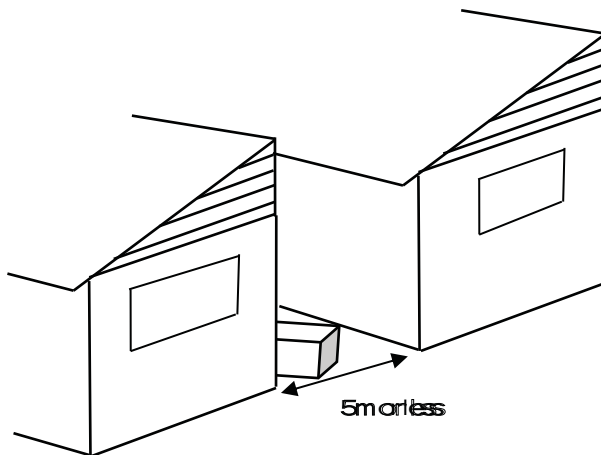


One Reflective Surface
Value for Box 3 = 3

2 reflective surfaces
Value for Box 3 = 6



3m or less both directions



5m or less

3.INSTALLATION AND CONNECTION

Distance Factor

An example may look like this:

A Timber Paling fence that goes right to the ground with some small gaps due to age, is worth a barrier factor of 5.

One reflective surface adjacent to the Heat Pump is worth a factor of 3.

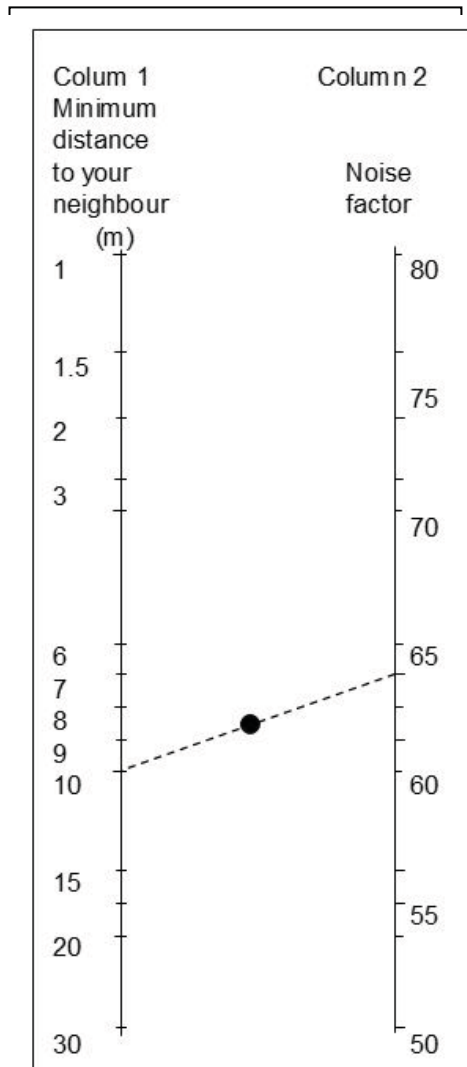
The ASTRAL POOL Heat Pump has a sound power level of 66 db(A).

Therefore your equation will now look like this:

$$\begin{array}{rcccccc} 66(\text{db(A)}) & - & 5 & + & 3 & = & 58 \\ \text{Heat Pump Sound} & & \text{Barrier Factor} & & \text{Reflective Surface} & & \text{Distance Factor} \\ \text{Pressure Level} & & & & \text{Factor} & & \end{array}$$

The distance factor is 58 which should be written in Box 3.

The final step is to mark 64 on Column 2 below and draw a straight line through the middle X to reach Column 1. Column 1 is the minimum distance the Heat Pump should be installed from a noise sensitive area in your neighbour's residence.



With one reflective surface and a timber paling fence with small gaps, the Heat Pump needs to be installed at least 10 metres from a noise sensitive area in your neighbour's property.

This calculation is intended as a guide only and no warranty is made or implied by Astral Pool as to its accuracy. Please consult an Acoustical Consultant or phone your Astral Pool branch office if in any doubt.

3.INSTALLATION AND CONNECTION

Further Guidelines for installation of Heat Pumps

- ASTRAL POOL Heat Pumps must be installed outdoors – never install inside a plant room, garage etc.
- Allow a minimum of 500mm clearance from the sides and rear of the heat pump and a minimum of 1000mm service access from the front of the Heat Pump.
- Ensure an electrical isolation switch is located nearby the Heat Pump.
- On Three Phase models, ensure the phase rotation of the compressor is checked before commissioning of the unit.
- Ensure the water pressure switch operation is checked at least 6 times prior to handing over the Heat Pump.
- Refer to Installation and Operating Instructions for full installation, commissioning and operating procedures.



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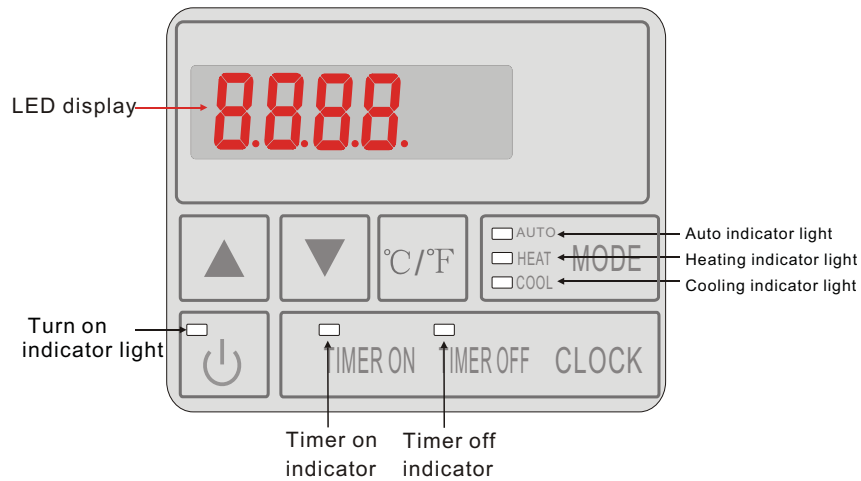
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4. USAGE AND OPERATION

4.1. Function of the controller





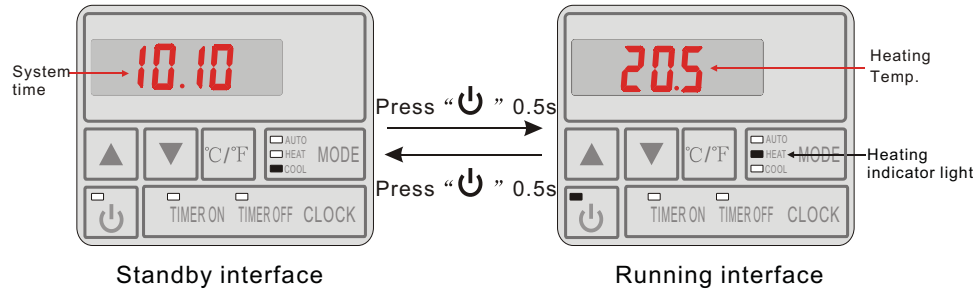
Key	Key name	Key function
	ON/OFF	Press this key to turn on/off the unit
MODE	Mode	Press this key to change the working mode
CLOCK	Timer	Press this key to set system time
°C/°F	Choose key	Press this key to choose the Celsius degree or Fahrenheit degree
TIMER ON	TIMER ON	Press this key to set timer-on
TIMER OFF	TIMER OFF	Press this key to set timer-off
	Up	Press this key to select the upward option or increase the parameter value.
	Down	Press this key to select the downward option or decrease the parameter value.

4. USAGE AND OPERATION

4.2. Usage of wire controller

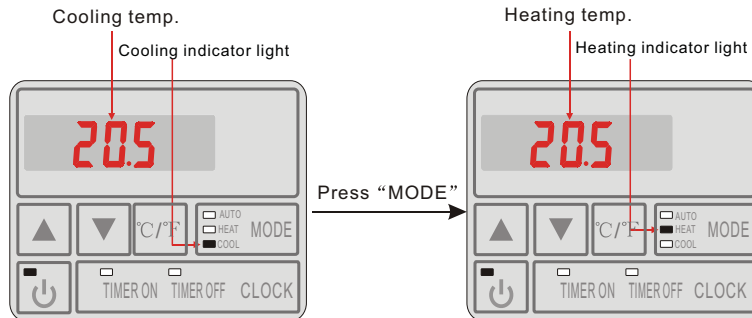
4.2.1 Turn ON/OFF the unit

When the unit is off, press the key “” 0.5s to turned on the unit;
 When the unit is on, press the key “” 0.5s to show down the unit;.



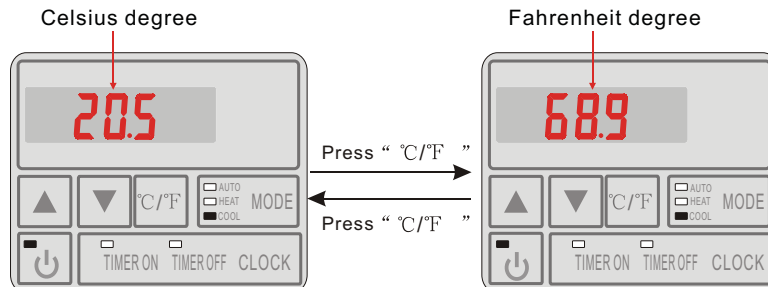
4.2.2 Mode switch

You can choose unit mode.
 In the unit on or off state, you can choose cooling, heating or automatic mode by pressing "MODE" button.
 Attention: if the unit is only for heating/cooling, the mode switching operation is invalid.



4.2.3 Temperature selection

Choose display type of unit temperature, when the unit is on, press mode button °C/°F and choose Celsius degree or Fahrenheit degree freely.



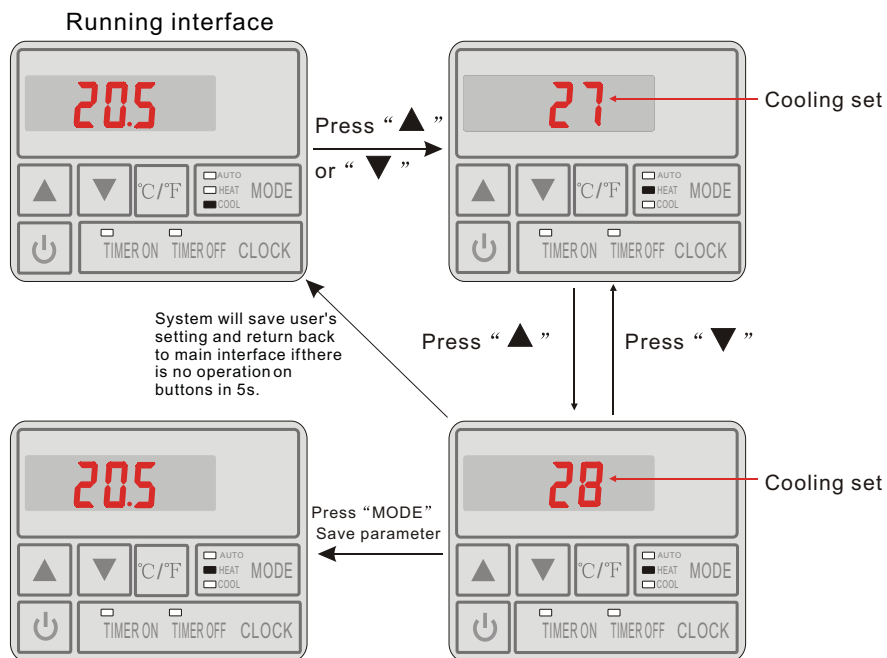
4. USAGE AND OPERATION

4.2.4 Setting temperature

In the main interface, press “▲” or “▼” and the current mode target-temperature flashes, then press “▲” to increase the temp.value, or press “▼” to decrease it. Press “MODE” can save setting parameter and back to the main interface;

Press “⏻” can not save setting parameter but back to the main interface;

Attention: If there is no operation for 5s, system would remember parameter setting and back to the main interface.



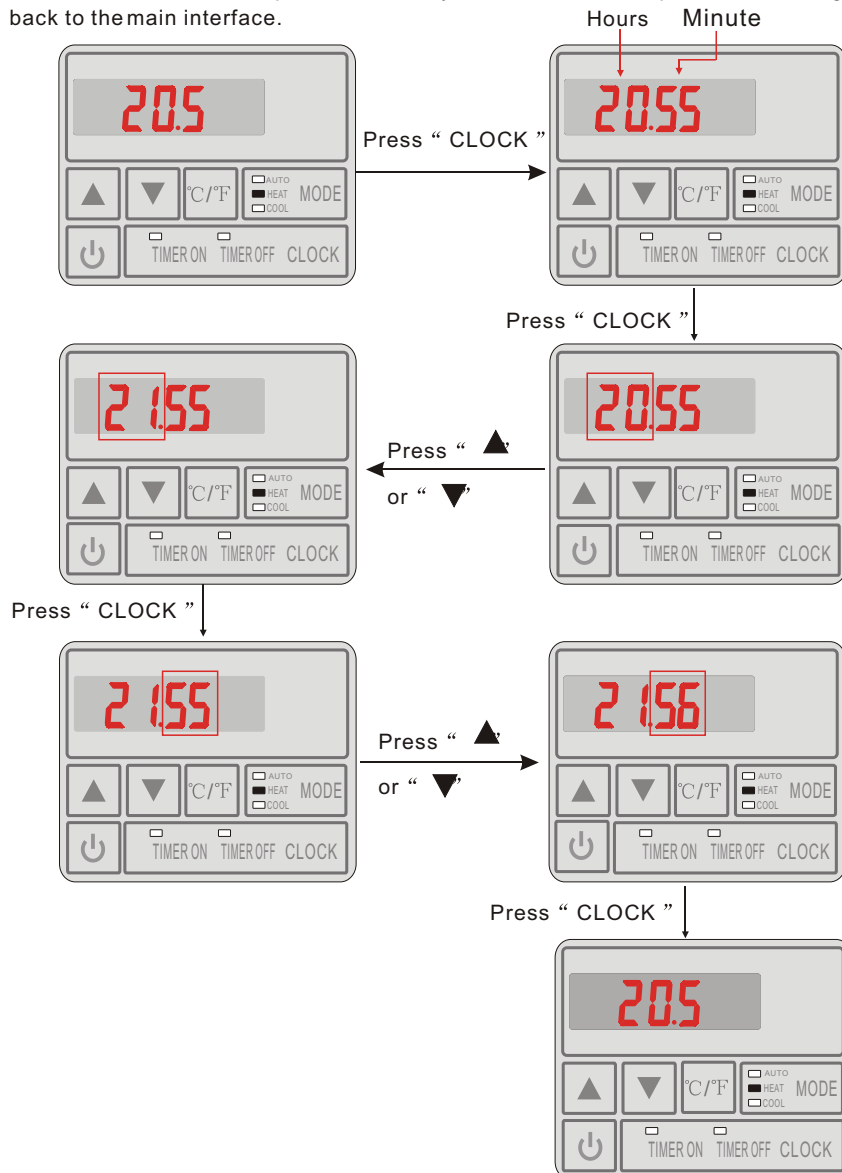
4. USAGE AND OPERATION

4.2.5 Clock setting

In the main interface, press “CLOCK” twice, Hours start to flashing , and press “▲” to increase value or press “▼” to decrease value, and press “CLOCK” to setting; At the same time, minute start to flashing , press “▲” to increase value or press “▼” to decrease value, and press “CLOCK” to save setting.

Press “⏻” can not save setting parameter and back to main interface.

Attention: If there is no operation for 5s system will remember parameter setting and back to the main interface.



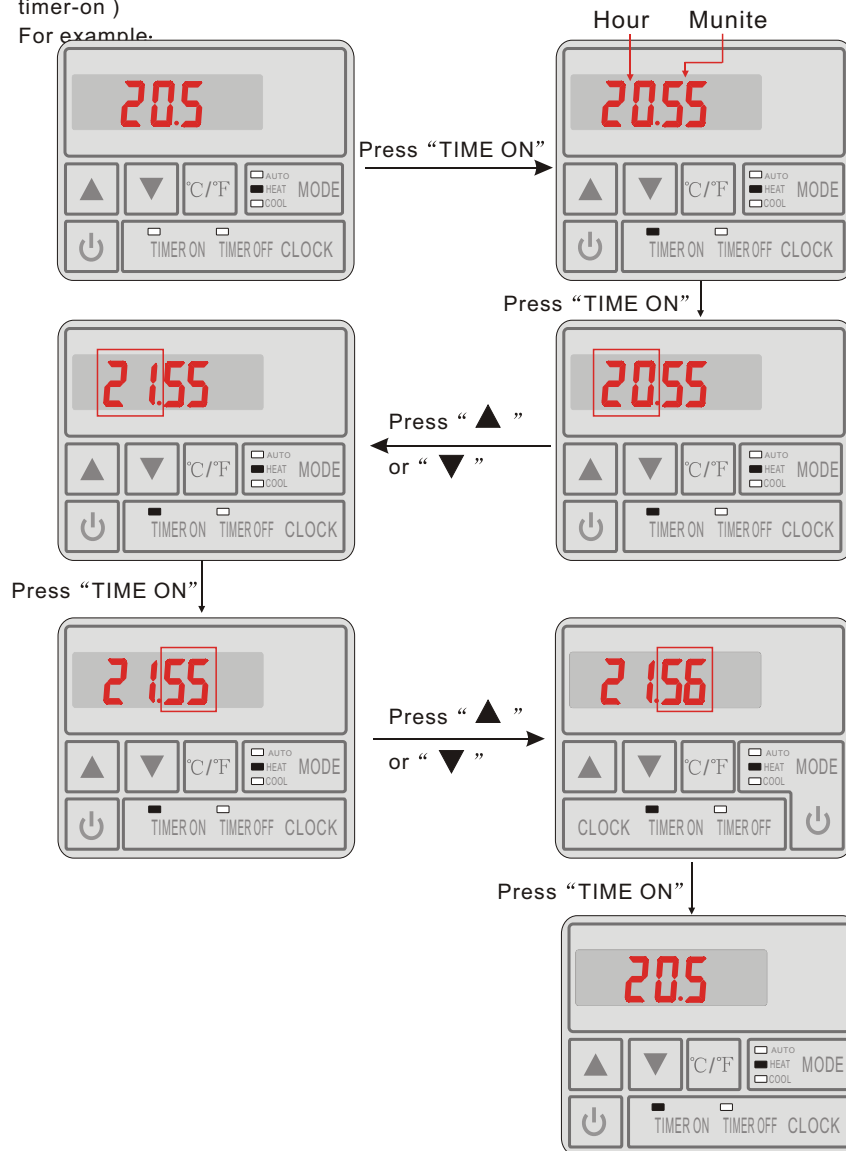
4. USAGE AND OPERATION

4.2.6 Timer setting

(1) You can set the timer of unit on

In the on or off state, Press "TIME ON" to enter timer-on interface, Press "TIME ON" and time-hour-bit flashing, Press "▲" or "▼" to change the hours value, Press "TIME ON" to save hours, At the same time, minutes-bit flashing, Press "▲" or "▼" to change the minute value, Press "TIME ON" to save and exit. At this time, "TIME ON" LED light is on. (The time-off setting is to press "TIME OFF", the other operation is the same as timer-on)

For example:



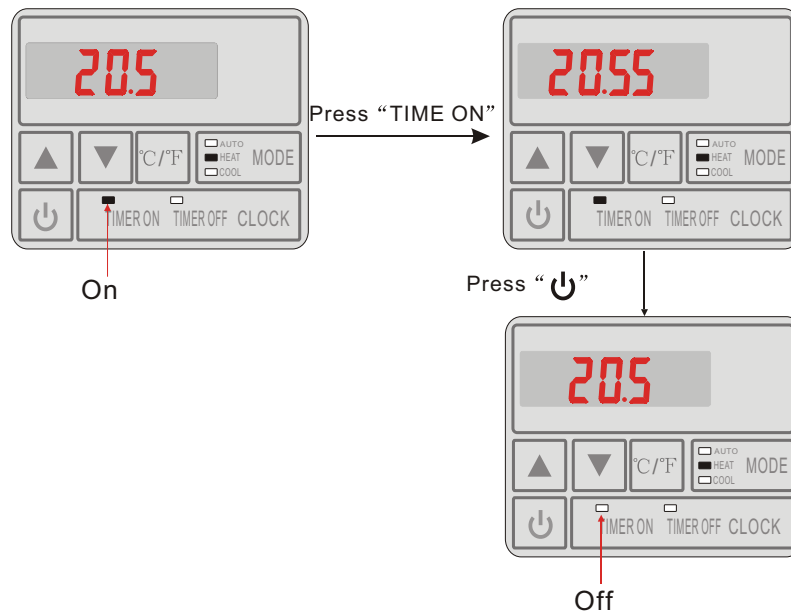
4. USAGE AND OPERATION

(2) The setting of cancelling the timer

If there is no need to set timer on or timer off, the timer setting can be cancelled.

At unit on or off state, press “TIME On” to enter timer-on setting interface, then press “⏻” to cancel the timer-on, at this timer, the timer-on light turn off.

(press “TIME Off” to enter timer-off setting interface, then press “⏻” to cancel the timer-off, at this timer, the timer-off light turn off.



4.2.7 Keyboard lock

To avoid mis-operations, please lock the controller after parameter setting.

At the main interface, pressing “⏻” for 5 seconds, when hearing one sound, the keyboard is locked.:

When the keyboard is locked, pressing “⏻” for 5 seconds, when hearing one sound, the keyboard lock is open.。

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

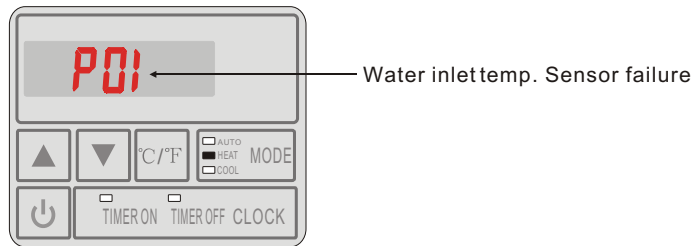
4. USAGE AND OPERATION

4.2.8 Malfunction display

There will be malfunction code showing on the controller screen when relative malfunction occurs.

You can refer to the malfunction table to find out the failure cause and solution.

For example:



4.3. Parameter table

Code	Meaning	Default	Remarks
r01	Set-point of cooling target temp.	27°C	Ajustable
r02	Set-point of heating target temp.	27°C	Ajustable
r03	Set-point of auto mode target temp.	27°C	Ajustable



5. MAINTENANCE AND INSPECTION

5.1 Maintenance

- Check the water supply device and the release often. You should avoid the condition of no water or air entering into system, as this will influence 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 maintain good heat exchange and conserve energy.
 - The operation pressure of the refrigerant system should only be serviced by a certified technician.
 - Check the power supply and cable connection often. Should the unit begin to operate abnormally, switch it off and contact the qualified technician.
 - Discharge all water in the water pump and water system, so that freezing of the water in the pump or water system does not occur. You should discharge the water at the bottom of the 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 prolonged period of no usage.
-

5. MAINTENANCE AND INSPECTION

5.2 .Malfunction Table

The common failure cause and solution.

Malfunction	Display	Canse	Solution
Water inlet temp. Sensor failure	P01	The water inlet temp. Sensor is open or shortcircuit	Check or change the water inlet temp. Sensor
Water outlet temp. Sensor failure	P02	The water outlet temp. sensor is open or shortcircuit	Check or change the water outlet temp. Sensor
Ambient temp. Sensor failure	P04	The ambient temp. sensor is open or shortcircuit	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 shortcircuit	Check or change the evaporator temp. Sensor
High pressure protect	E01	The exhaust pressure is high , high pressure switch action	Check high pressure switch and cooling return circuit
Low pressure protect	E02	The suction pressure is low, Low pressure switch action	Check low pressure switch and cooling return circuit
Flow switch failure	E03	No water or litterwater in water system	Check the flow volume, water pump is failure or not
Temp. is too much different between water-inlet and outlet	E06	Water flow volume not enough, Water system pressure difference is small	Check the flow volume, water system is jammed or not
Antifreezing under cooling mode	E07	Water flow volume not enough	Check the flow volume, water system is jammed or not
The primary anti-freezing protection start.	E19	Ambient temperature is too low	
The second anti-freezing protection start	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



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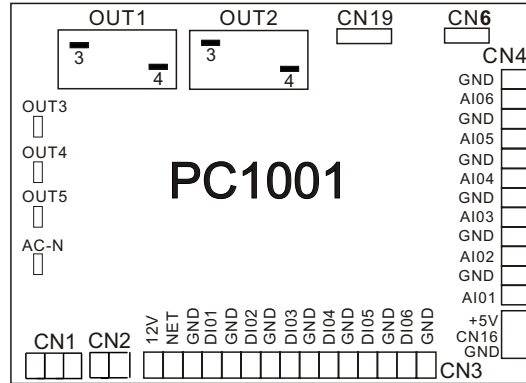
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6. APPENDIX

6.1 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	Wire controller
8	DI01 GND	On/Off Switch(input)(no use)
9	DI02 GND	Flow switch (input)(normal close)
10	DI03 GND	Low pressure protect
11	DI04 GND	High pressure protect
12	DI05 GND	No use
13	DI06 GND	No use
14	AI01 GND	Suction temp.(input)
15	AI02 GND	Water in temp.(input)
16	AI03 GND	Water out temp.(input)
17	AI04 GND	Temp. Of coil (input)
18	AI05 GND	Ambient temp.(input)
19	AI06 GND	No use
20	CN1	Primary transformer
21	CN2	Secondary transformer
22	CN6	Without use
23	CN19	Electronic expansion valve
24	5V CN16 GND	Flow meter

6. APPENDIX

6.2 Caution & Warning

1. The unit can only be repaired by qualified installer centre personnel or an authorised dealer. (for Europe market)
2. This appliance is not intended for use by persons (including children) with reduced physical 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. (for Europe market)
Children should be supervised to ensure that they do not play with the appliance.
3. Please make sure that the unit and power connection have good earthing, otherwise may cause electrical shock.
4. 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.
5. Directive 2002/96/EC (WEEE):
The symbol depicting a crossed-out waste bin that is underneath the appliance indicates that this product, at the end of its useful life, must be handled separately from domestic waste, must be taken to a recycling centre for electric and electronic devices or handed back to the dealer when purchasing an equivalent appliance.
6. 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.
7. The unit CANNOT be installed near the flammable gas. Once there is any leakage of the gas, fire can occur.
8. Make sure that there is circuit breaker for the unit, lack of circuit breaker can lead to electrical shock or fire.
9. 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 stoppage.
10. The unit can only be repaired by the qualified personnel of an installer center or an authorized dealer. (for North America market)
11. Installation must be performed in accordance with the NEC/CEC by authorized person only. (for North America market)
12. USE SUPPLY WIRES SUITABLE FOR 75°C.
13. Caution: Single wall heat exchanger, not suitable for potable water connection.



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6. APPENDIX

6.3 Cable specification

1. Single phase unit

Nameplate maximum current	Phase line	Earth line	MCB	Creepage protector	Signal line
No more than 10A	2×1.5mm ²	1.5mm ²	20A	30mA less than 0.1 sec	n×0.5mm ²
10~16A	2×2.5mm ²	2.5mm ²	32A	30mA less than 0.1 sec	
16~25A	2×4mm ²	4mm ²	40A	30mA less than 0.1 sec	
25~32A	2×6mm ²	6mm ²	40A	30mA less than 0.1 sec	
32~40A	2×10mm ²	10mm ²	63A	30mA less than 0.1 sec	
40~63A	2×16mm ²	16mm ²	80A	30mA less than 0.1 sec	
63~75A	2×25mm ²	25mm ²	100A	30mA less than 0.1 sec	
75~101A	2×25mm ²	25mm ²	125A	30mA less than 0.1 sec	
101~123A	2×35mm ²	35mm ²	160A	30mA less than 0.1 sec	
123~148A	2×50mm ²	50mm ²	225A	30mA less than 0.1 sec	
148~186A	2×70mm ²	70mm ²	250A	30mA less than 0.1 sec	
186~224A	2×95mm ²	95mm ²	280A	30mA less than 0.1 sec	

2. Three phase unit

Nameplate maximum current	Phase line	Earth line	MCB	Creepage protector	Signal line
No more than 10A	3×1.5mm ²	1.5mm ²	20A	30mA less than 0.1 sec	n×0.5mm ²
10~16A	3×2.5mm ²	2.5mm ²	32A	30mA less than 0.1 sec	
16~25A	3×4mm ²	4mm ²	40A	30mA less than 0.1 sec	
25~32A	3×6mm ²	6mm ²	40A	30mA less than 0.1 sec	
32~40A	3×10mm ²	10mm ²	63A	30mA less than 0.1 sec	
40~63A	3×16mm ²	16mm ²	80A	30mA less than 0.1 sec	
63~75A	3×25mm ²	25mm ²	100A	30mA less than 0.1 sec	
75~101A	3×25mm ²	25mm ²	125A	30mA less than 0.1 sec	
101~123A	3×35mm ²	35mm ²	160A	30mA less than 0.1 sec	
123~148A	3×50mm ²	50mm ²	225A	30mA less than 0.1 sec	
148~186A	3×70mm ²	70mm ²	250A	30mA less than 0.1 sec	
186~224A	3×95mm ²	95mm ²	280A	30mA less than 0.1 sec	

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