# INVERPAC Commercial Swimming Pool Heat Pump Manual



## Regulation (EU) n° 517/2014 of 16/04/14 on fluorinated greenhouse gases and repealing

## Regulation (EC) n° 842/2006

### Leak checks

**1.** Operators of equipment that contains fluorinated greenhouses gases in quantities of 5 tons of CO<sub>2</sub>, equivalent or more and not contained in foams shall ensure that the equipment is checked for leaks.

**2.** For equipment that contains fluorinated greenhouse gases in quantities of 5 tons of  $CO_2$  equivalent or more, but of less than 50 tons of  $CO_2$  equivalent: at least every 12 months.

#### Picture of the equivalence CO<sub>2</sub>

**1.** Load in kg and Tons amounting CO<sub>2</sub>.

Load and Tons amounting CO <sub>2</sub>	Frequency of test
From 2 at 30 kg load = from 5 at 50 Tons	Each year

#### Concerning the Gaz R 410a, 2.39kg amounting at 5 tons of CO<sub>2</sub>, commitment to check each year.

#### Training and certification

**1.** The operator of the relevant application shall ensure that the relevant personnel have obtained the necessary certification, which implies appropriate knowledge of the applicable regulations and standards as well as the necessary competence in emission prevention and recovery of fluorinated greenhouse gases and handling safety the relevant type and size of equipment.

#### **Record keeping**

**1.** Operators of equipment which is required to be checked for leaks, shall establish and maintain records for each piece of such equipment specifying the following information:

a) The quantity and type of fluorinated greenhouse gases installed;

b) The quantities of fluorinated greenhouse gases added during installation, maintenance or servicing or due to leakage;

c) Whether the quantities of installed fluorinated greenhouse gases have been recycled or reclaimed, including the name and address of the recycling or reclamation facility and, where applicable, the certificate number;

d) The quantity of fluorinated greenhouse gases recovered

e) The identity of the undertaking which installed, serviced, maintained and where applicable repaired or decommissioned the equipment, including, where applicable, the number of its certificate;

f) The dates and results of the checks carried out;

g) If the equipment was decommissioned, the measures taken to recover and dispose of the fluorinated greenhouse gases.

2. The operator shall keep the records for at least five years, undertakings carrying out the activities for operators shall keep copies of the records for at least five years.

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Thank you for using Inverter swimming pool heat pump for your pool heating, it will heat your pool water and keep the constant temperature when the air ambient temperature is at -12 to  $43^{\circ}$ C.

**ATTENTION:** This manual includes all the necessary information for the use and the installation of

your heat pump.

- The installer must read the manual and follow the instructions of implementation and maintenance.
- Failure to respect the warnings may cause serious damage to the pool equipment or cause serious injury, even death.
- 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 will invalidate the guarantee.
- The manufacturer declines any responsibility for the damage caused by any third party, object ingression and of the errors due to the installation that do not follow the manual guidelines. Any use that is not as intended by the manufacturer will invalidate the guarantee.
- Keep and pass on these documents for later viewing throughout the appliance's service life.

## AWARNING:

\*Please always empty the water in heat pump during winter time or when the ambient temperature drops below  $0^{\circ}$ C, or else the Titanium exchanger will be damaged because of being frozen, in such case, your warranty will be lost.

\*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.

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

## 1. Dimension

## Model: INVERPAC C660





## Model: INVERPAC C900





## Unit: mm

## 2. Transportation

## 2.1 Delivery of the unit



For the transportation, the heat pumps are fixed on the pallet and covered with a cardboard box.

To protect from any damage, the heat pump must be transferred in its package. It is the responsibility of the addressee to notify of any damage incurred during delivery within 48 hours. No responsibility can be taken once the unit has been signed for.

## 2.2 Stock advice



\* The warehouse should be bright, spacious, open, well ventilated, have ventilation equipment and no fire source.

\* Heat pumps must be stored and transferred in vertical position in its original packaging. If it is not the case, it cannot be operated until a minimum period of 24H has passed before the unit can have the electrical power turned on.

## FORBIDDEN



#### 2.3 Transfer to the final position

\* During the unpacking of the product and the transfer from the pallet to the final place of installation, it is necessary to maintain the heat pump in a vertical position.

\* Smoking and the use of flames are prohibited near R32 machine.

\* Water connection are not to be used as load bearing handles. The manufacturer would not take the responsibility in case of damage to the water pipes.

## 3. Specification

Poolclub model		INVERPAC C450	INVERPAC C660	INVERPAC C900	INVERPAC C1300	
Advised pool volume (with pool cover)	m <sup>3</sup>	110-160	150-260	180-360	220-520	
* Performance at Air 28°	C, Water 28	°C, Humidity 709	%	1		
Turbo Heating capacity	kW	52	60	90	130	
Smart Heating capacity	kW	45	55	77	110	
Power consumption	kW	9.29-2.27	10.71-2.62	15.52-2.85	22-5.24	
C.O.P in Turbo mode		5.6	5.6	5.8	5.9	
C.O.P at 50% capacity		10.3	10.4	10.5	10.5	
* Performance at Air 15°	, Water 26	C, Humidity 70	%			
Turbo Heating capacity	kW	40	45	66	100	
Smart Heating capacity	kW	32	36	52	75	
Power consumption	kW	8.9-2.17	10.47-2.47	13.75-2.38	23.26-5.49	
C.O.P in Turbo mode		4.5	4.5	4.8	4.8	
C.O.P at 50% capacity		7.4	7.5	7.9	7.9	
* General data						
Compressor type			Invertei	r compressor		
Compressor quantity		2	2	2	2	
Voltage			380~415	V / 50Hz /3PH		
Rated current	A	14.50	16.50	28.00	34.5	
Minimum fuse	А	22	25	42	52	
Advised water flux	m³/h	22-30	26-35	37-45	55-65	
Water pressure drop	КРа	30	32	35	38	
Heat exchanger			Titanium e	xchanger in PVC		
Water connection	mm		63		90	
Fan quantity			1		2	
Ventilation type			V	'ertical		
Power input of Fan	kW		750		750*2	
Fan speed	RPM	800-550	800-550	700-500	800-550	
Noise level(10m)	dB(A)	≦42	≦42	≦43	≦44	
Noise level(1m)	dB(A)	43-61	44-62	44-62	46-65	
Refrigerant Type		R410 A				
Dimension/Weight	1		r			
Net weight	kg	230	270	450	530	
Gross weight	kg	258	310	500	600	
Net dimension	mm	865*8	55*1495	1960*	945*1565	
Packing dimension	mm	965*9	85*1665	2060*1045*1735		

\* Above data are subjects to modification without notice.

## 4. Accessories and options

## 4.1 Accessories list



## 4.2 The By-Pass Kit (Not provided)

The By-Pass Kit is the essential accessory for the installation of your heat pump, it is also a tool for the optimization of the heating of the water. The valves allows the optimum flow of water using a manometer to make sure the optimized running of the compressor, see paragraph 5.6 controls of the pressure.



### ATTENTION:

Please observe the following rules when installing the heat pump:

- 1. Any addition of chemicals must take place in the piping located <u>downstream</u> from the heat pump.
- 2. Always place the heat pump on a solid foundation and use the included rubber mounts 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.

## 5. Location and connection

## 5.1 Heat pump location

The unit will work properly in any desired location as long as the following 3 items are presented:

1. Fresh air
2. Electricity
3. Swimming pool filters

The unit may installed in virtually any <u>outdoor</u> location as long as the specified minimum distances to other objects are maintained (<u>see drawing below</u>). Please consult your installer for installation with an indoor pool. Installation in a windy location does not present any problem at all, unlike the situation with a gas heater (including pilot flame problems).

**ATTENTION:** 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 dimensions.



### 5.2 Check-valve installation



Note: If automatic dosing equipment for chlorine and acidity (pH) is used, it is essential to protect the heat pump against excessively high chemical concentrations which may corrode the heat exchanger. For this reason, equipment of this sort must always be fitted in the piping on the **downstream** side of the heat pump, and it is recommended to install a check-valve to prevent reverse flow in the absence of water circulation.

Damage to the heat pump caused by failure to observe this instruction is not covered by the warranty.



## 5.3 Typical arrangement



### This arrangement is only an illustrative example.

## 🛦 note

The factory supplies only the heat pump. All other components, including a by-pass if necessary, must be provided by the user or the installer.

#### ATTENTION:

In order to heat the water in the pool (or hot tub), the filter 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.

#### 5.4 Initial operation

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

- 1. Switch on the filter pump, check for leaks and verify that water is flowing from and to the swimming 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 turn off the filter pump, the unit should also turn off automatically, if not, then adjust the flow switch.
- 5. Allow the heat pump and the filter pump to run 24 hours a day until the desired water temperature is reached. The heat pump will stop running at this point +1°C. After this, it will restart automatically (as long as the filter pump is running) whenever the swimming pool water temperature drops 1 degree below the set temperature.(for example, if you set the temperature 28°C, the heat pump will stop when the temperature at(29°C.While it will restart when the temperature of the water down to 27°C)

Depending on the initial temperature of the water in the swimming pool and the air temperature, it may take several days to heat the water to the desired temperature. A good swimming pool cover can dramatically reduce the required length of time.



#### Water Flow Switch:

It is equipped with a flow switch for protecting the HP unit running with adequate water flow rate. It will turn on when the pool pump runs and shut it off when the pump shuts off. If the pool water level higher than 1 m above or below the heat pump's automatic adjustment knob, your dealer may need to adjust its initial start-up.

6. 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.

### 5.5 Condensation

The air drawn into the heat pump is 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 humidity. The condensate will drain from the bottom of the heat pump. This is sometimes mistakenly regarded as a water leak.

#### 5.6 Pressure gauge display (R410A & R32)

Examine the pressure gauge which indicates the refrigerant gas pressure of the unit, the below table shows the normal value of the gas pressure (R410A & R32) when the machine is in power off or running conditions.

Unit Condition	Power Off				
Ambient (°C)	-5~5	5~15	15~25	25~35	
Water temp ( $^{\circ}\!\!\mathbb{C}$ )	/	/	/	/	
Pressure gauge (Mpa)	0.59~0.85	0.85~1.18	1.18~1.59	1.59~2.1	

Unit Condition	Running				
Ambient (°C)	/	/	/	/	/
Water temp ( $^\circ\!\!\mathbb{C}$ )	10~15	15~20	20~25	25~30	30~35
Pressure gauge (Mpa)	1.1~1.6	1.3~1.8	1.5~2.1	1.7~2.4	1.9~2.7

## 6. Display Controller Operation

## 6.1. Guide for operation

LCD Controller - Operation



## Different symbols meaning



5 Switch button

- (10) Time Setting

## 6.2. Initial starting

Connect the power to the heat pump and press On / Off button on the LCD control panel. The unit will start up after the time delay expires.

Running and standby status to display the Inlet water temperature (See picture below).



## 6.3 The keys and their operations



Press to start or stop the heat pump unit.



#### Water temperature setting:

Press or to set the water temperature directly.

Heating mode and Auto mode setting range: 6-41 °C Cooling mode setting range: 6-35 ℃



and 💟 at the same time will can check water in temperature, water out temperature and setting

Temperature, it will turn back to standby status if no operation within 5s.

lacksquare ATTENTION: The buttons of display will automatically locked if no operation within 30s, press lacksquare and lacksquare at the same time for 5s can unlock it.





Press to change the working modes in Turbo, Smart and Silent. The default mode is Smart Mode.

While you choose the *Turbo*, the word "**Turbo**" will be lit, the heat pump will operate in 'Full output' only. Choose the *Smart*, the word "Smart" will be lit, the heat pump will operate in 'Medium and Full output'. Choose the *Silent*, the word "Silent" will be lit, heat pump will operate in 'Medium and Small output'.

Operation logic of Auto Mode:	T1 = Water inlet temperature ,
	Tset = set temperature = $28^{\circ}$ C.

NO	Condition	Current working Status	Water inlet Temperature	Working mode
	When the heat pump starts	Startup	<b>T1≤27</b> ℃	Heating mode
		Heating mode	T1≥29℃, last for 3 minutes	Standby
1	When the heat pump is running	Standby	T1≥30℃	It switches to cooling mode
		Cooling mode	T1=28 $^\circ \!\!\!\! \mathbb{C}$ , last for 3 minutes	Standby
		Standby	T1≤27℃, last for 3 minutes	It switches to heating mode
	When the heat pump starts	Startup	27℃ <t1≤29℃< td=""><td>Heating mode</td></t1≤29℃<>	Heating mode
	When the heat pump is running	Heating mode	T1≥29℃, last for 3 minutes	Standby
2		Standby	T1≥30℃	It switches to cooling mode
		Cooling mode	T1=28 $^\circ\!\!\!\mathrm{C}$ , last for 3 minutes	Standby
		Standby	T1≤27℃, last for 3 minutes	It switches to heating mode



## Logic of auto mode $\,:\,$ T1=Water inlet temperature /Tset= set temperature=28 $^\circ C$





Select and then press enter to check the parameters D0-DB by press or  $\bigcirc$ .





Code	Condition	Scope	Remark
1d0/2d0	IPM mould temperature	<b>0-120</b> ℃	Real testing value
d1	Inlet water temp.	-9℃~99℃	Real testing value
d2	Outlet water temp.	-9℃~99℃	Real testing value
d3	Ambient temp.	-30°C∼70°C	flash if Real value<-9
1d4/2d4	Frequency limitation code	0,1,2,4,8,16	Real testing value
1d5/2d5	Piping temp.	-30°C~70°C	flash if Real value<-9
1d6/2d6	Gas exhaust temprature	0℃~C5℃ (125℃)	Real testing value
1d7/2d7	Step of EEV	0~470	Real testing value
1d8/2d8	Compressor running frequency	0~99Hz	Real testing value
1d9/2d9	Compressor current	0~30A	Tripe-phase = 00A;
			Single-phase = Real testing value
1dA	Current fan speed	0-1200 (rpm)	Real testing value
244	Current fan chood	0.1200 (rpm)	Real testing value
		0-1200 (IpIII)	(single fan will show 00rpm)
1dB/2dB	Error code for last time	"" or All error codes	Real testing value

Remark:

d4: Frequency limitation code,

0: No frequency limit;

2: Overheating or over-cooling frequency limit; 8:Drive voltage frequency limit;

1:Coil pipe temperature limit; 4:Drive Current frequency limit; 16:Drive high temperature frequency limit

Note : 1dX is for System 1 ; 2dX is for System 2.

6.3.7 Parameter setting

Press enter to choose PO-P21 by press or v, press to enter the setting interface, in which parameter will flash.



Code	Name	Scope	Default	Remark
P00	Mandatory defrosting	0-1	0	0: Default normal operation(auto defrosting) 1: Mandatory defrosting.
P03	Water pump	0-1	0	<ul><li>1:Water pump continues to run after reaching temperature standby.</li><li>0:According to the compressor action, temperature standby does not run the pump.</li></ul>
P07	Water inlet temperature compensation value	-9~9	0	Default setting: 0℃
P08	Debug mode	0-1	0	/
P09	Compressor frequency	18-110	50	/
P10	Step of EEV	0-470	350	/
P11	Fan speed	300-1000	500	/
P14	Restore to factory settings	0-1	0	1-Restore to factory settings, 0- default (restore P0, P1, P2, P3, P5, P6, P7, P8, P9, P10, P11 to factory setting)
P16	Product code	XXXX	/	Depends on the machine
P18	Mode Selection	0-1	0	1—Heating only, 0—Heating/Cooling/Auto mode
P19	Mode setting	0-1	1	1—Turbo (For high frequency), 0—Max (For high frequency)
P20	Environment parameter setting	0-35	7	/
P21	Chinese/English display switch	0-1	0	0=English, 1=Chinese (Restoring the factory parameter setting is invalid for this parameter)

Note: P08,P09,P10,P11,P19,P20 parameters are only for factory setting.



## 6.4 System filtration pilot function

## Option 1; P3=0 Filtration pump is related to heat pump operation to start and stop.

Filtration pump starts 60s before compressor, filtration pump start 30s and then the water flow switch detect flow. Before the heat pump enters into Standby mode, the compressor stops first and after 5 minutes filtration pump stops.

	Condition	Example	Water p	ump working logic
Heating mode	P3=0, T1≥Tset-0.5℃, last for 30 minutes	P3=0, T1≥27.5℃, last for 30 minutes	<ol> <li>Then it enters into standby mode for 1 hour (It will not restart except turn it on manually.)</li> </ol>	<ul> <li>2. After 1 hour, the filtration pump will restart for 5 minutes. If the T1≤27°C, the heat pump will start to work until T1≥27.5°C and last for 30 minutes to go into standby</li> </ul>
Cooling mode	P3=0, T1≤Tset+0.5℃, last for 30 minutes	P3=0, T1≤28.5 ℃, last for 30 minutes	<ol> <li>Then it enters into standby mode for 1 hour (It will not restart except turn it on manually.)</li> </ol>	<ul> <li>2. After 1 hour, the filtration pump will restart for 5 minutes. If it tests T1≥29°C, the heat pump will start to work until T1≤28.5°C and last for 30 minutes to go into standby</li> </ul>

## Option 2; P3=1 Filtration pump is always on, P2=0 the timer function is no active

Under condition P3=1, whenT1≥Tset+1<sup>°</sup>C (T1≥29<sup>°</sup>C) last for 3 minutes, heat pump will be in standby, while filtration pump is always on.

# Under option 2, with activation of the timer; P2=1 to start and stop the filtration pump according the programming of the P4 (time), P5 (timer ON) and P6 (timer OFF)

### Condition for the heat pump start, timer ON actives;

When the timer reaches **the set time of TIMER ON**, the filtration pump will start and after 5 minutes the heat pump start. The heat pump stays in stop if the water in temperature is  $\geq$  Tset+1°C, before the TIMER OFF, the filtration is still activated.

### Condition to stop the heat pump, timer OFF actives;

When the timer reaches the set time of the TIMER OFF, the heat pump will stop and after 5 minutes the filtration pump stops.

## If heat pump is turned ON/OFF manually, the filtration pump will start and stop accordingly.

### NOTE :

Tset = Tseting water temperature For example : Tset =  $28^{\circ}$ C Tseting water temperature in your pool heat pump Tset-0.5 = less 0.5 °C than Tseting temperature, Tset- 0.5 =  $28-0.5=27.5^{\circ}$ C Tset+0.5= more 1 °C than Tseting temperature, Tset+ 0.5 =  $28+0.5=28.5^{\circ}$ C

## 6.5 Heating operation logic

V	Vorking status	Working mode	Water in temperature-T1	For example, water in temperature-T1	Heat pump working level						
1			T1< Tset-1	<b>T1&lt; 27</b> ℃	Powerful mode-frequency F9						
2		When you	Tset-1≦T1 < Tset	27°C ≦T1 <28°C	Frequency: F9 -F8-F7,,-F2						
3		select the	Tset≦ T1 <tset+ 1<="" td=""><td>28°C ≦ T1 &lt;29°C</td><td>Silent mode-frequency F2</td></tset+>	28°C ≦ T1 <29°C	Silent mode-frequency F2						
4		smart working mode "	T1≧Tset+1	<b>T1≧29°</b> C	HP will be in Standby, stop working until the water temperature drops to less 28°C.						
5	Start-up		T1< Tset	<b>T1&lt; 28</b> ℃	Smart mode -frequency F5.						
6	of heat	select	Tset≦T1 < Tset+1	28°C ≦T1 < 29°C	Silent mode-frequency F2/F1.						
7	pump	the "Silent working mode".	T1≧Tset+1	T1≧29℃	HP will be in Standby, stop working until the water temperature drops to less 28°C.						
8		When you select the "Powerful working mode."	T1 <tset+1< td=""><td><b>T1&lt;29℃</b></td><td>Powerful mode-frequency F10/F9</td></tset+1<>	<b>T1&lt;29℃</b>	Powerful mode-frequency F10/F9						
9			the "Powerful working mode."	the "Powerful working mode."	the "Powerful working mode."	the "Powerful working mode."	the "Powerful working mode."	the "Powerful working mode."	the "Powerful working mode."	T1≧ Tset+1	T1≧29℃
10			T1≧Tset	<b>T1≧28°</b> C	Standby						
11		When HP is	Tset>T1≧Tset-1	28°C>T1≧27°C	Silent-frequency F2						
12		Smart mode"	Tset-1>T1≧Tset-2	27°C>T1≧26°C	Frequency: F2 -F3-F4,,-F9						
13	Re-start		<tset-2< td=""><td><b>&lt;26</b>℃</td><td>Powerful-frequency F9</td></tset-2<>	<b>&lt;26</b> ℃	Powerful-frequency F9						
14	heat	When HP is	≧Tset	≧ <b>28</b> °C	Standby						
15	water in	working at "	Tset>T1≧Tset-1	28°C>T1≧27°C	Silent mode-frequency F2/F1						
16	standby Silent mode	Silent mode"	T1 <tset-1< td=""><td><b>T1&lt;27</b>℃</td><td>Smart -frequency F5</td></tset-1<>	<b>T1&lt;27</b> ℃	Smart -frequency F5						
17	status When HP is working at Powerful mode"	When HP is working at " Powerful mode"	T1 <tset-1< td=""><td>T1&lt;27℃</td><td>Powerful -frequency F10/F9</td></tset-1<>	T1<27℃	Powerful -frequency F10/F9						

## 6.6 Cooling operation logic

Working status		Working mode	Water in	For example, water	Heat pump working level
1			$T1 \leq T_{cot}$	T1 $\leq$ 27°C	Standhy
1	-		11=15et-1		
2		when you select	Tset-1 <t1 td="" ≦tset<=""><td>27°C<t1 28°c<="" td="" ≦=""><td>Silent mode-frequency F2</td></t1></td></t1>	27°C <t1 28°c<="" td="" ≦=""><td>Silent mode-frequency F2</td></t1>	Silent mode-frequency F2
3		working mode "	Tset <t1≦tset+1< td=""><td>28&lt; T1 ≦29°C</td><td>frequency: F9 -F8-F7,,- F2</td></t1≦tset+1<>	28< T1 ≦29°C	frequency: F9 -F8-F7,,- F2
4			T1≧Tset+1	<b>T1≧29°</b> C	Powerful mode-F9
5	Start-up of	When you select	T1≦Tset-1	≦ <b>27°</b> C	Standby
6	heat pump	the "Silent working	Tset-1 <t1 td="" ≦tset<=""><td>27°C&lt; T1≦28°C</td><td>Silent mode - frequency F2/F1</td></t1>	27°C< T1≦28°C	Silent mode - frequency F2/F1
7		mode".	T1>Tset	<b>T1&gt;28</b> ℃	Smart mode -frequency F5
8		When you select the "Powerful	T1>Tset-1	<b>T1&gt;27℃</b>	Powerful mode-frequency F10/F9
9		working mode."	T1≦Tset-1	<b>T1≦27°</b> C	Standby
10			T1≦Tset-1	<b>T1≦27°</b> C	Standby
11		Smart	Tset ≦T1 <tset+1< td=""><td>28 ≦T1 &lt;29°C</td><td>Silent- frequency F2</td></tset+1<>	28 ≦T1 <29°C	Silent- frequency F2
12		Smart	Tset+1 ≦T1 <tset+2< td=""><td><b>29</b> ≦<b>T1 &lt;30</b>°C</td><td>Frequency: F2 -F3-F4,,- F9</td></tset+2<>	<b>29</b> ≦ <b>T1 &lt;30</b> °C	Frequency: F2 -F3-F4,,- F9
13	Re-start to		T1≧Tset+2	T1≧30°C	Powerful mode -frequency F9
14	in standby	Silont	Tset <t1≦tset+1< td=""><td>28&lt; T1≦29°C</td><td>Silent mode-frequency F2/F1</td></t1≦tset+1<>	28< T1≦29°C	Silent mode-frequency F2/F1
15	status		T1>Tset+1	T1>29°C	Smart mode-frequency F5
16		Powerful	T1>Tset+1	<b>T1&gt;29℃</b>	Powerful mode-frequency F10/F9
17			T1≦Tset-1	T1≦27℃	Standby

## 7. Troubleshooting

## 7.1 Error code displays on controller

Malfunction	Error code	Reason	Solution
Inlet water temperature sensor failure	PP01	<ol> <li>The sensor in open or short circuit</li> <li>The wiring of sensor is loose</li> </ol>	<ol> <li>Check or change the sensor.</li> <li>Re-fix the wiring of the sensors.</li> </ol>
Outlet water temperature sensor failure	PP02	<ol> <li>The sensor in open or short circuit</li> <li>The wiring of sensor is loose</li> </ol>	<ol> <li>Check or change the sensor.</li> <li>Re-fix the wiring of the sensor.</li> </ol>
Heating piping sensor failure	1PP03/ 2PP03	<ol> <li>The sensor in open or short circuit</li> <li>The wiring of sensor is loose</li> </ol>	<ol> <li>Check or change the sensor.</li> <li>Re-fix the wiring of the sensor.</li> </ol>
Backup (return air) sensor failure	PP04	<ol> <li>The sensor in open or short circuit</li> <li>The wiring of sensor is loose</li> </ol>	<ol> <li>Check or change the sensor.</li> <li>Re-fix the wiring of the sensor.</li> </ol>
Ambient temperature sensor failure	PP05	<ol> <li>The sensor in open or short circuit</li> <li>The wiring of sensor is loose</li> </ol>	<ol> <li>Check or change the sensor.</li> <li>Re-fix the wiring of the sensors.</li> </ol>
Exhaust piping sensor failure	1PP06/ 2PP06	<ol> <li>The sensor in open or short circuit</li> <li>The wiring of sensor is loose</li> </ol>	<ol> <li>Check or change the sensor.</li> <li>Re-fix the wiring of the sensors.</li> </ol>
Antifreeze protection in Winter	PP07	Ambient temperature or water inlet temperature is too low	<ol> <li>Check inlet water temperature &amp; outlet water temperature .</li> <li>Normal protection.</li> </ol>
Low ambient temperature protection	PP08	<ol> <li>Out of the normal operating ambient temperature for this machine by checking outlet water temperature</li> <li>Outlet water temperature sensor abnormality</li> </ol>	<ol> <li>Stop using, beyond the scope of using.</li> <li>Change the sensor.</li> </ol>
Piping temperature too high protective under cooling mode	1PP10/ 2PP10	<ol> <li>Ambient temperature or the water temperature is too high in cooling mode</li> <li>Refrigeration system is abnormal</li> <li>Pipe temperature sensor failure</li> </ol>	<ol> <li>Check the ambient temperature.</li> <li>Check refrigeration system.</li> <li>Change the pipe temperature sensor.</li> </ol>
Over low protection for outlet water temperature in cooling mode T2	PP11	<ol> <li>Low water flow</li> <li>Outlet water temperature sensor abnormal</li> <li>The differences of outlet water</li> <li>temperature and set temperature is 7°C or</li> <li>above in cooling mode</li> </ol>	<ol> <li>Check filtration pump and waterway system.</li> <li>Change outlet water temperature sensor.</li> <li>Change the setting temperature.</li> </ol>

Malfunction	Error code	Reason	Solution	
			1. Choose the silent mode.	
		1. Ambient temperature is too high	2. Check the water flow or filtration pump.	
		2. Water temperature is too high	3. Check the fan motor under cooling	
		3. Water flow is too low	mode, replace a new one if it is abnormal.	
High proceure failure	1EE01/	4. Fan motor speed is abnormal or fan motor	4. Check and repair the refrigerating	
nigii pressure failure	2EE01	is damaged under cooling mode	system.	
		5. Gas system jammed	5. Reconnect the high pressure wire or	
		6. High pressure wire is loose or damaged	replace a new high pressure switch.	
		7. Too much refrigerant	6. Check and repair the refrigerating	
			system.	
			1.Check the EEV and piping system, check	
			the motor.	
		1. EEV has blocked or pipe system is jammed	2. Check the fan motor under heating	
	1FF02/	2. Fan motor speed is abnormal or fan motor	mode, replace a new one if it is abnormal	
Low pressure failure	2FF02	is damaged under heating mode	3. Check refrigeration system or check the	
	21102	3. Gas leakage	pressure value through the high-pressure	
		4. Low pressure wire is loose or damaged	gauge.	
			4. Reconnect the low pressure wire or	
			replace a new low pressure switch.	
			1. Check the wiring of water flow switch or	
		1. The wiring of water flow switch is loose or	change a new one.	
Water flow failure	EE03	water flow switch damaged	2. Check the filtration pump or the	
		2. No / Insufficient water flow	waterway system if there has air or	
			jammed inside.	
		1. Low water flow	1. Check the water flow switch if it works	
		2. Water flow switch is stuck and the water	well.	
Over heating		supply stops	2. Check the filtration pump or the	
protection for water	EE04	3. Outlet water temperature sensor is	waterway system if there has air or	
temperature in	-	abnormal	jammed inside.	
heating mode T2		4. The difference of outlet water temperature	3. Check outlet water temperature sensor	
		and set temperature is 7 $^\circ C$ or above in	or replace a new one.	
		heating mode	4. Change the setting temperature.	
			1. Check the pressure gauge, please fill with	
			some gas if it is lack of gas.	
		1. Lack of gas	2. Check the filtration pump or the waterway	
		2. Low water flow	system if there has air or jammed inside.	
Exhaust too high	1EE05/ 2EE05	3. Piping system has been blocked	3. Check the piping system if there was any	
protection T6		4. Exhaust temperature sensor failure	DIOCKEd.	
		5. Ambient temperature is too high	4. Change a new exhaust temperature sensor.	
			5. Check whether the current ambient	
			temperature & water temperature are beyond	
			the running temperature of the machine.	

Malfunction	Error code	Reason	Solution	
Controller failure	EE06	<ol> <li>Signal is not in a good connected or damaged</li> <li>Controller failure</li> </ol>	<ol> <li>Stop the power supply and restart.</li> <li>Re-connect the signal wire or replace a new one.</li> <li>Replace a new controller.</li> </ol>	
Compressor current protection	1EE07/ 2EE07	<ol> <li>The compressor current is too large instantaneously</li> <li>Wrong connection for compressor phase sequence</li> <li>Compressor accumulations of liquid and oil lead to the current becomes larger</li> <li>Compressor or driver board damaged</li> <li>The water flow is abnormal</li> <li>Power fluctuations within a short time</li> </ol>	<ol> <li>Check if the power in the normal range</li> <li>Check the compressor</li> <li>Check the compressor phase</li> <li>Check the phase sequence connection</li> <li>Check the waterway system and filtration pump</li> <li>Check mains power input</li> </ol>	
Communication failure between controller and main board	EE08	<ol> <li>Signal wire is not in a good connected or damaged</li> <li>Controller failure</li> <li>Driving failure</li> </ol>	<ol> <li>Stop the power supply and restart.</li> <li>Re-connect the signal wire or replace a new one.</li> <li>Check the controller or replace a new one.</li> <li>Check the driving system or update it.</li> <li>Check the driving system or update it.</li> </ol>	
Communication failure between Main control board and Driving board	1EE09/ 2EE09	<ol> <li>Poor connection of communication wire</li> <li>PCB failure</li> <li>The wire is damaged</li> </ol>	<ol> <li>Stop the power supply and restart.</li> <li>Reconnect the communication wire or replace a new one.</li> <li>Check the wires according to the electric diagram.</li> <li>Replace a new PCB.</li> </ol>	
VDC voltage too high protection	1EE10/ 2EE10	<ol> <li>Line voltage is too high</li> <li>Driver board is damaged.</li> </ol>	<ol> <li>Check whether the power supply is normal.</li> <li>Change driver board or main board.</li> </ol>	
IPM module protection	1EE11/ 2EE11	<ol> <li>Data mistake</li> <li>Wrong compressor phase connection</li> <li>Compressor liquid and oil accumulation lead to the current becomes larger</li> <li>Poor heat dissipation of drive module or high ambient temperature</li> <li>Compressor or driver board damaged</li> </ol>	<ol> <li>Program error, turn off electricity supply and restart after 3 minutes.</li> <li>Check compressor sequence connection.</li> <li>Check the pressure of system by pressure gauge.</li> <li>Check if the ambient and water temperature is over high.</li> <li>If it is the refrigeration system failure, send it to the service center.</li> <li>Change the driver board.</li> </ol>	
VDC voltage too low protection	1EE12/ 2EE12	<ol> <li>Mother line voltage is too low</li> <li>Driver board is damaged.</li> </ol>	<ol> <li>Check if the power supply is in the normal range.</li> <li>Change the driver board.</li> </ol>	

Malfunction	Error code	Reason	Solution
		1. The compressor current is too large momentary	1. Check the compressor if it works normally.
Input current over	1EE13/	2. The water flow is abnormal	2. Check the waterway system.
high protection	2EE13	3. Power fluctuations within a short time	3. Check if the power is in the normal range.
		4. Wrong reactor	4. Check if the reactor is used correctly.
IPM module thermal circuit is abnormal	ermal 1EE14/ circuit mal 2EE14 2. Fan motor is abnormal or damaged 3. Fan blade is broken		<ol> <li>Check if the motor speed is too low or fan motor is damaged, replace it by a new one.</li> <li>Replace a new driver board.</li> <li>Change the fan blade if it is broken.</li> </ol>
IPM module temperature too high protection	1EE15/ 2EE15	<ol> <li>Output exception of IPM module thermal circuit</li> <li>Fan motor is abnormal or damaged</li> <li>Fan blade is broken</li> <li>The screw on driver board is loose</li> </ol>	<ol> <li>Check the main board or replace the driver board.</li> <li>Check if the motor speed is too low or fan motor is damaged, replace it by a new one if any failure.</li> <li>Change the fan blade if it is broken.</li> <li>Check the screws on driver board.</li> </ol>
PFC module protection	1EE16/ 2EE16	<ol> <li>Output exception of PFC module</li> <li>Fan motor is abnormal or damaged</li> <li>Fan blade is broken</li> <li>Input voltage leap, input power is abnormal</li> </ol>	<ol> <li>Check the main board or replace the driver board.</li> <li>Check if the motor speed is too low or fan motor is damaged, replace it by a new one.</li> <li>Change the fan blade if it is broken.</li> <li>Check the input voltage.</li> </ol>
DC fan motor failure	EE17	<ol> <li>DC motor is damaged</li> <li>For the tri-phase check if the neutral is connected</li> <li>Main board is damaged</li> <li>The fan blade is stuck</li> </ol>	<ol> <li>Detect the DC motor for mono phase machine, replace a new one if any failure.</li> <li>Check the wire connection for tri-phase machine.</li> <li>Check the boards, replace a new driver board or main board if any failure.</li> <li>Check if there is any barrier in front of the fan blade and remove it.</li> </ol>
PFC module thermal circuit is abnormal	1EE18/ 2EE18	The driver board is damaged	<ol> <li>Check if the motor speed is too low or the fan motor is damaged, replace it by a new one.</li> <li>Change a new driver board.</li> </ol>
PFC module high temperature protection	1EE19/ 2EE19	<ol> <li>PFC module thermal circuit output abnormal</li> <li>Fan motor is abnormal or damaged</li> <li>Fan blade is broken</li> <li>The screws on the driver board are not tight</li> </ol>	<ol> <li>Check the main board or replace the driver board.</li> <li>Check if the motor speed is too low or the fan motor is damaged, replace it by a new one if any failure.</li> <li>Change the fan blade if it is broken.</li> <li>Check the screws on the driver board.</li> </ol>

Malfunction	Error code	Reason	Solution	
Input power failure	1EE20/ 2EE20	The supply voltage fluctuates too much	Check whether the voltage is stable.	
Software control abnormal	1EE21/ 2EE21	<ol> <li>Compressor runs out of step</li> <li>Wrong program</li> <li>Impurity inside compressor causes the unstable rotate speed</li> </ol>	<ol> <li>Check the main board or change a new one.</li> <li>Update the correct program.</li> <li>Check the refrigeration system.</li> </ol>	
Current detection circuit failure	1EE22/ 2EE22	<ol> <li>Voltage signal abnormal</li> <li>Driver board is damaged</li> <li>Main board failure</li> </ol>	<ol> <li>Change a new main board.</li> <li>Change a new driver board.</li> </ol>	
Compressor start failure	1EE23/ 2EE23	<ol> <li>Main board is damaged</li> <li>Compressor wiring error or poor contact or unconnected</li> <li>Liquid accumulation inside</li> <li>Wrong phase connection for compressor</li> </ol>	<ol> <li>Check the main board or change a new one.</li> <li>Check the compressor wiring according to the circuit diagram.</li> <li>Check the compressor or change a new one.</li> </ol>	
Ambient Temperature device failure on Driver board	1EE24/ 2EE24	Ambient Temperature device failure	Change the driver board or main board.	
Compressor phase failure	1EE25/ 2EE25	Compressors U, V, W are just connected to one phase or two phases	Check the actual wiring according to the circuit diagram.	
Four-way valve reversal failure	1EE26/ 2EE26	<ol> <li>Four-way valve reversal failure</li> <li>Lack of refrigerant ( no detect when TH2 or TH1 malfunction )</li> </ol>	<ol> <li>Switch to Cooling mode to check the</li> <li>4-way valve if it has been reversed</li> <li>correctly.</li> <li>Change a new 4-way valve.</li> <li>Fill with gas.</li> </ol>	
EEPROM data read malfunction	EE27	<ol> <li>Wrong EEPROM data in the program or failed input of EEPROM data</li> <li>Main board failure</li> </ol>	<ol> <li>Re-enter correct EEPROM data.</li> <li>Change a new main board.</li> </ol>	
The inter-chip communication failure on the main control board	EE28	Main board failure	<ol> <li>Stop electricity supply and restart it.</li> <li>Change a new main board.</li> </ol>	

#### **Remarks:**

1. In heating mode, if the water out temperature is over  $7^{\circ}$  higher than the setting temperature, the controller displays EE04 for water over-heating protection.

2. In cooling mode, if the water out temperature is over 7  $^{\circ}$ C lower than the set temperature, the controller displays PP11 for water over-cooling protection.



**EE04 Water Overheating Protection** 



**PP11 Water Overcooling Protection** 

Mode	Water out temperature	Setting temperature	Condition	Malfunction
	*0	*		EE04
Heating mode	<b>36</b> C	<b>29</b> <sup>°C</sup>	Tout - Tset ≧ <sup>7</sup> ℃	Overheating protection for water
				temperature
	÷	÷.		PP11
Cooling mode	23 <sup>°C</sup>	<b>30</b> <sup>°</sup> C	Tset - Tout ≧ <sup>7</sup> ℃	Too low protection for water
				temperature

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

Malfunctions	Observing	Reasons	Solution
	LED wire controller no display	No power supply.	Check cable and circuit breaker if it is connected.
	LED wire controller displays the actual time	Heat pump under standby status.	Startup heat pump to run.
Heat pump is not running	LED wire controller displays the actual water temperature	<ol> <li>Water temperature is reaching to the setting value, HP under constant temperature status.</li> <li>Heat pump just starting to run.</li> <li>Under defrosting.</li> </ol>	<ol> <li>Verify the water temperature setting.</li> <li>Startup heat pump after a few minutes.</li> <li>LED wire controller should display " Defrosting ".</li> </ol>
Water temperature is cooling when HP runs under heating mode	LED wire controller displays actual water temperature and no error code displays	<ol> <li>Choose the wrong mode.</li> <li>Figures show defects.</li> <li>Controller defect.</li> </ol>	<ol> <li>Adjust the mode to proper running.</li> <li>Replace the defected LED wire controller, and then check the status after changing the running mode, verifying the water inlet &amp; outlet temperature.</li> <li>Replace or repair the heat pump unit.</li> </ol>
Short running	LED displays actual water temperature, no error code displays.	<ol> <li>Fan NO running.</li> <li>Air ventilation is not enough.</li> <li>Refrigerant is not enough.</li> </ol>	<ol> <li>Check the cable connections between the motor and fan, if necessary, it needs to be replaced.</li> <li>Check the location of heat pump unit, and eliminate all obstacles to make good air ventilation.</li> <li>Replace or repair the heat pump unit.</li> </ol>
water stains	Water stains on heat pump unit.	<ol> <li>Concreting.</li> <li>Water leakage.</li> </ol>	<ol> <li>No action.</li> <li>Check the titanium heat exchanger carefully if it is any defected.</li> </ol>
Too much ice on evaporator	Too much ice on evaporator.		<ol> <li>Check the location of heat pump unit, and eliminate all obstacles to make good air ventilation.</li> <li>Replace or repair the heat pump unit.</li> </ol>

## 8. Electrical Wiring

# 8.1 Swimming pool heat pump wiring diagram INVERPAC C660



#### **INVERPAC C900**



Note: Above electrical wiring diagram only for your reference, please subject machine posted the wiring diagram.

## 8.3 Electrical connection

The power supply for the heat pump must come, preferably, from an exclusive circuit with regulatory protection components (30mA differential protection) and a magneto-thermal switch.

- The electrical installation must be carried out by a specialized professional (electrician) in accordance with the standards and regulations in force in the country of installation.

- The heat pump circuit must be connected to a safety earth circuit at the terminal block.

- The cables must be properly installed to prevent interference.

- The pump is intended for connection to a general power supply with earth connection.

- Section of the cable; This section is indicative and should be checked and adapted according to the needs and conditions of use.

- The tolerance of acceptable voltage variation is +/- 10% during operation.

## 9. Exploded Diagram

## Model: INVERPAC C660









#### **INVERPAC C660**

No	ERP	Name	No	ERP	Name
1	108010138	Fan grill	40	117110094	Water outlet temp. sensor T2-TH5
2	108810111	Top cover	41	116000092	Water flow switch
3	133030011	Controller cover box	42	117110053	Water inlet temp. sensor T1-TH6
4	117020281	Controller	43	108810007	Exchanger base tray
5	133020064	Controller cover	44	113170048	TT exhanger to Filter
6	103000374	Evaporator	45	113030143	4-way valve to exchanger
7	108810115	Left panel	46	119000022	EEV
8	108810114	Baffle	47	121000028	4 way valve
9	108810112	Left panel	48	121000038	4 way valve coil
10	108810109	Front panel	49	113010456	Discharge pipe
11	136020005	Rubber block	50	116000068	High pressure switch
12	108810105	controller fixing plate	51	116000073	Low pressure switch
13	113190001	Sensor holder	52	113030144	4-way valve to exchanger
14	113190001	Sensor clip	53	113170049	TT exhanger to Filter
15	117110051	Discharge temp. sensor	54	120000066	Filter
16	108810071	Front panel	55	113080101	EEV to distribution piping
17	136020119	Wire loop	56	113120068	Liquid tank to EEV
18	136020131	Wire loop	57	113130048	Filter to liquid tank
19	132000035	Fan blade	58	113060153	4-way valve to evaporator piping
20	112000092	Fan motor	59	117110050	Evaporator temperature sensor
21	108810073	Fan motor bracket	60	113010457	Discharge pipe
22	101000149	Compressor	61	113020695	Discharge pipe
23	105000015	Liquid tank	62	113020696	Discharge pipe
24	108810008	Evaporator support	63	113060154	4-way valve to evaporator piping
25	108810068	Base tray	64	108810047	Controller cover
26	108010107	Needle valve bracket	65	117230002	Reactor
27	108810010	Evaporator support	66	108810075	Electric box
28	108810034	Evaporator support	67	108810076	Panel
29	108810035	Evaporator support	68	117250018	РСВ
30	103000375	Evaporator	69	117140024	Driver board
31	108810113	Right panel	70	117140025	Driver board 3 phase
32	133020010	Ambient temp. sensor clip	71	108810083	Electric box cover
33	117110049	Ambient temp. sensor T5-TH1	72	108810084	Electric box cover
34	108810108	Column	73	115000005	Power terminal
35	108810116	Back panel	74	142000038	Relay
36	108810110	Back panel	75	108010085	Clip
37	106000012	Pressure gauge	76	108010086	Clip
38	102040818	Exchanger	77	115000023	Power terminal
39	108010025	Exchanger temperature sensor			

**INVERPAC C900** 







No.	ERP	Part Name	No.	ERP	Part Name
1	108930031	Pillar	46		PVC fixing plate
2	108010138	Fan grill	47	102050057	DN90 flange
3	112000092	Fan motor	48	108930026	Titanium heat exchanger support ribs
4	108930076	Top cover	49	117110190	Water inlet temp. sensor T1-TH6
5	132000035	Fan blade	50	108930025	Titanium heat exchanger bracket
6	108930075	Top cover connecting plate	51	119000077	EEV

7	108930080	Back air return panel	52	113080141	EEV to distribution piping
8	108930012	Pillar	53	113010468	Discharge pipe
9	106000012	Pressure gauge	54	121000013	4 way valve coil
10	108930077	Top cover	55	121000041	4 way valve
11	108930032	Pillar	56	113030181	4-way valve to exchanger
12	133030011	Controller installation box	57	113420251	Titanium heat exchanger outlet tube
13	117020341	Controller	58	113420249	Titanium heat exchanger inlet tube
14	133020061	Waterproof box	59	113420250	Titanium heat exchanger inlet tube
15	108930021	Left and right windshield	60	113060186	4-way valve to evaporator piping
16	108930079	Side panel	61	113010469	Discharge pipe
17	103000392	Evaporator	62	113190001	Sensor holder
18	108930013	Fan motor bracket	63	117110050	Evaporator temperature sensor T3-TH2
19	108930039	Evaporator plate	64	113470011	Tube
20	103000393	Evaporator	65	116000068	High pressure switch
21	117110188	Evaporator temperature sensor T3-TH2	66	113120072	Liquid storage tank to EEV
22	108930002	Evaporator support panel	67	120000003	Dehydrator filter
23	108930003	Evaporator support panel	68	108930029	Anti-vibration pipe clamp
24	105000015	Liquid storage tank	69	136020032	Rubber shock absorber
25	101000165	Compressor	70	113170059	Exchanger to filter
26	105000012	Gas-liquid separator	71	108930028	Tube bracket
27	108930004	Evaporator support panel	72	116000073	Low pressure switch
28	108010107	needle valve holder	73	113020714	Gas return piping
29	12000034	needle valve	74	113170060	Exchanger to filter
30	108930007	Evaporator support panel	75	113020715	Gas return piping
31	108930005	Evaporator support panel	76	113060187	4-way valve to evaporator piping
32	108930006	Evaporator support panel	77	113130051	Filter to storage tank
33	108930030	Base tray	78	108930068	Electric box
34	133020010	Clip	79	108930027	Reactance shield
35	117110187	Ambient temp. sensor T5-TH1	80	117230002	Reactor
36	108930078	Front plate	81	108930015	Liner
37	108930010	Pillar	82	117250018	РСВ
38	110000050	Cable connector	83	117140025	Driver board 3 phase
39	110000048	Cable connector	84	117140024	Fan motor drive board
40	108930020	Maintenance panel	85	108930016	Electric box cover
41	108930019	Maintenance panel	86	115000027	Power terminal
42	108930011	Pillar	87	115000005	Power terminal
43	102041170	Titanium heat exchanger	88	142000038	Relay
44	117110094	Water outlet temp. sensor T2-TH5	89	108010085	Crimping clip
45	116000092	Water flow switch	90	108010086	Crimping clip
	1				

## 10. Maintenance

#### Warning!

-Before any maintenance work on the appliance, you must cut the electricity supply as there is a risk of electric shock which may cause material damage, serious injury or even death.

- It is recommended that the appliance undergo general servicing at least on a yearly basis to ensure its proper operation, maintain performance levels and prevent any possible failures. These operations are carried out at the user's expense, by a qualified technician.

for maintenance to be carried out by a qualified technician.

-For maintenance to be carried out by a qualified technician, please read the safety instructions in the first pages provided in the chapters of maintenance before performing any of the maintenance operations described below.

(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 HP unit.

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

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

(4) In another way, you should check the unit is water fully before the unit start to run again.

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

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

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