

# Swimming pool heat pump

STEP INVERTER

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Directions for installation and maintenance



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# ***Contents***

<b>1. Introduction .....</b>	<b><i>p2</i></b>
<b>2. Caution.....</b>	<b><i>p2</i></b>
<b>3. Delivery control .....</b>	<b><i>p3</i></b>
<b>4. Technical description .....</b>	<b><i>p3</i></b>
<b>Technical characteristics</b>	
<b>Outside</b>	
<b>Inside</b>	
<b>Explored view</b>	
<b>Wire control operation</b>	
<b>General diagram of the refrigerating circuit</b>	
<b>Safety and control systems</b>	
<b>Electric diagram</b>	
<b>5. Installation .....</b>	<b><i>p13</i></b>
<b>Rules of installation</b>	
<b>Hydraulic connections</b>	
<b>Electric connections</b>	
<b>Procedure of use</b>	
<b>6. Water flow and refrigerating circuit pressure.....</b>	<b><i>p17</i></b>
<b>7. Defrosting .....</b>	<b><i>p18</i></b>
<b>8. Environment problem .....</b>	<b><i>p19</i></b>
<b>9. Error messages and what to do .....</b>	<b><i>p19</i></b>

## ***1- Introduction***

**We thank you for having chosen our Heat pump.**

**This installation and maintenance notice contains the necessary information to its installation (delivery control, the installation, the connections) and to its repair. It is a complementary document to the user's manual which describes its instructions for use.**

**We invite you to read it first.**

## **2- Caution**

**This document is an integral part of the product and it must stay in the technical room.**

**This Heat pump is exclusively for heating swimming pools. Any other use not in conformity and random will be considered as dangerous and unsuitable.**

**The assembly, the electric connection and the start up must be carried out by specialized and professional person.**

**When connect to socket (power supply), please make sure that live wire, neutral wire, earth wire is right.**

**It is essential to maintain the temperature in the swimming pool lower than the recommended value by the swimming pool's manufacturer.**

**Please make sure that minimum water flow speed is  $7\text{m}^3/\text{h}$ .**

**In a concern to a constant improvement, our products can be modified without notice; the present pictures in this note or the characteristics which are described are not contractual.**

### 3- Delivery's control

**At the delivery time, check the condition of packing; in case of damages, have reservation about them to the carrier, before 48 hours and by registered letter with acknowledged receipt.**

**Before any manipulation, check the complete state of the machine.**

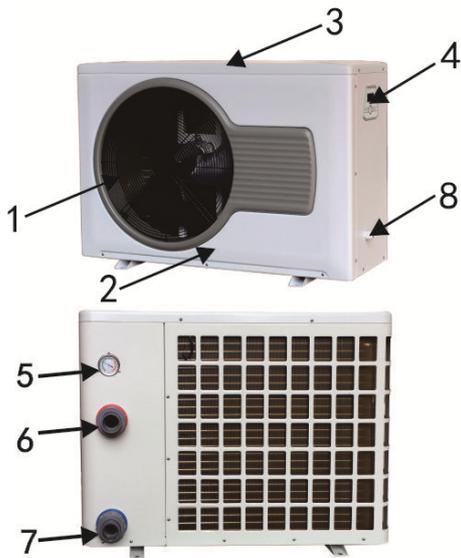
### 4- Technical description

#### Characteristics:

Unit Model	Unit	BP-90HS-SI EIP	BP-110HS- SI EIP	BP-130HS- SI EIP
Heating Capacity A26/W26	kW	9.0~2.3	11.0~2.85	13.0~4.0
COP A26/W26	W/W	6.0~13.8	6.0~13.8	5.9~13.6
Heating Capacity A15/W26	kW	6.4~1.7	7.7~2.05	9.3~2.8
COP A15/W26	W/W	4.6~7.1	4.6~7.1	4.50~7.0
Cooling Capacity A35/W28	kW	4.3~1.0	5.3~1.5	6.2~2.3
Power Input	kW	1.6~0.24	2.0~0.29	2.45~0.36
Current	A	7.5~1.1	9.3~1.5	10.7~2.2
Power Supply	V/P/Hz	220/1/50	220/1/50	220/1/50
Compressor Qty		1	1	1
Heating Exchanger		Titanium in PVC		
Water Connection	mm	50	50	50
Noise 1m	dB(A)	38~48	39~49	41~52
Noise 10m	dB(A)	19~29	20~30	21~31
Water Flow Volume	m3/h	4	5	6
Refrigerant (R32)	g	500	550	650
Co2 weight of the fluorinated greenhouse gases	T	0.34	0.37	0.44
Net Unit Size (L/W/H)	mm	880x310x600	880x310x600	1020x370x715
Carton Size (L/W/H)	mm	940x410x635	940x410x635	1080x470x750
Net/Gross Weight	kg	52/58	56/62	61/69

**\* possible variations of value according to climatic conditions**

**Outside:**

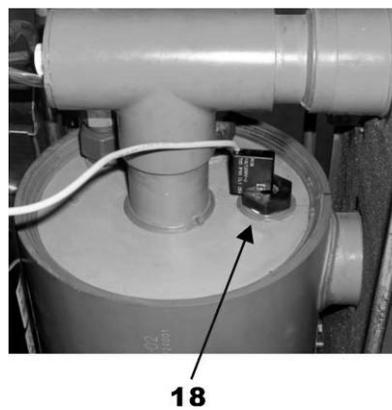
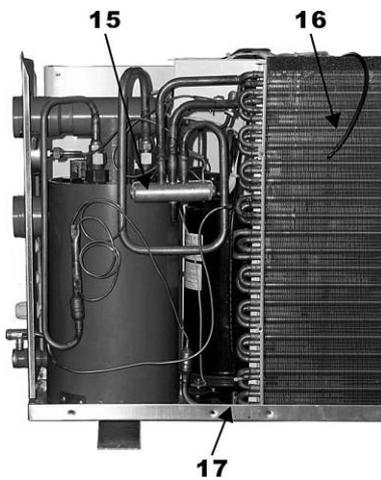
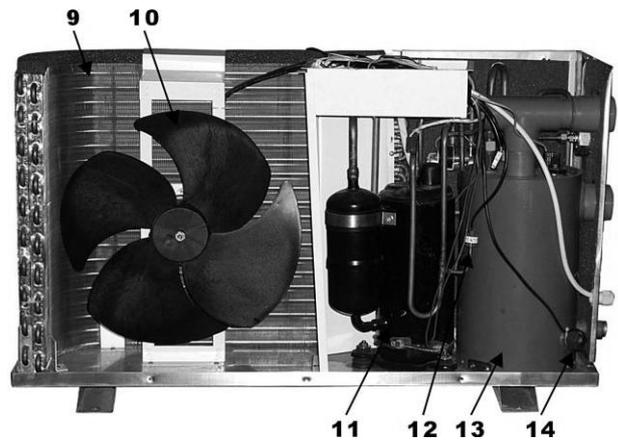


1	Fan protection grid
2	Front panel
3	Top cover
4	Control panel
5	Refrigerant pressure manometer
6	Fast connection for water outlet
7	Fast connection for water inlet
8	Wire connection for power supply

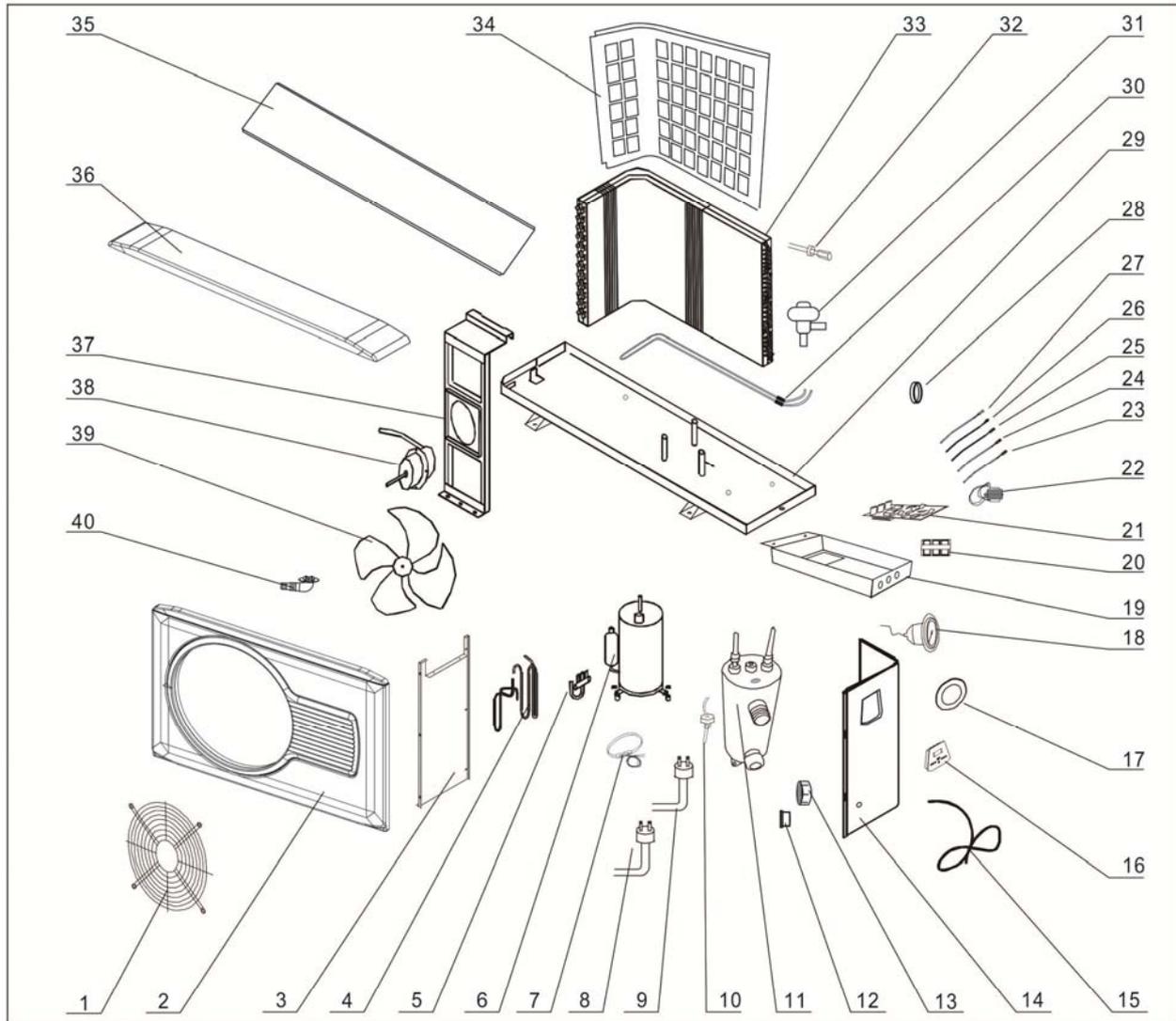
**Inside:**

(Front sheet cover and panel removed)

9	Evaporator
10	Fan
11	Compressor
12	High and low pressure interruptor
13	Titanium heat exchanger
14	Temperature sensor of swimming pool water
15	Four way valve
16	Ambient temperature sensor
17	Defrost sensor
18	Water flow switch



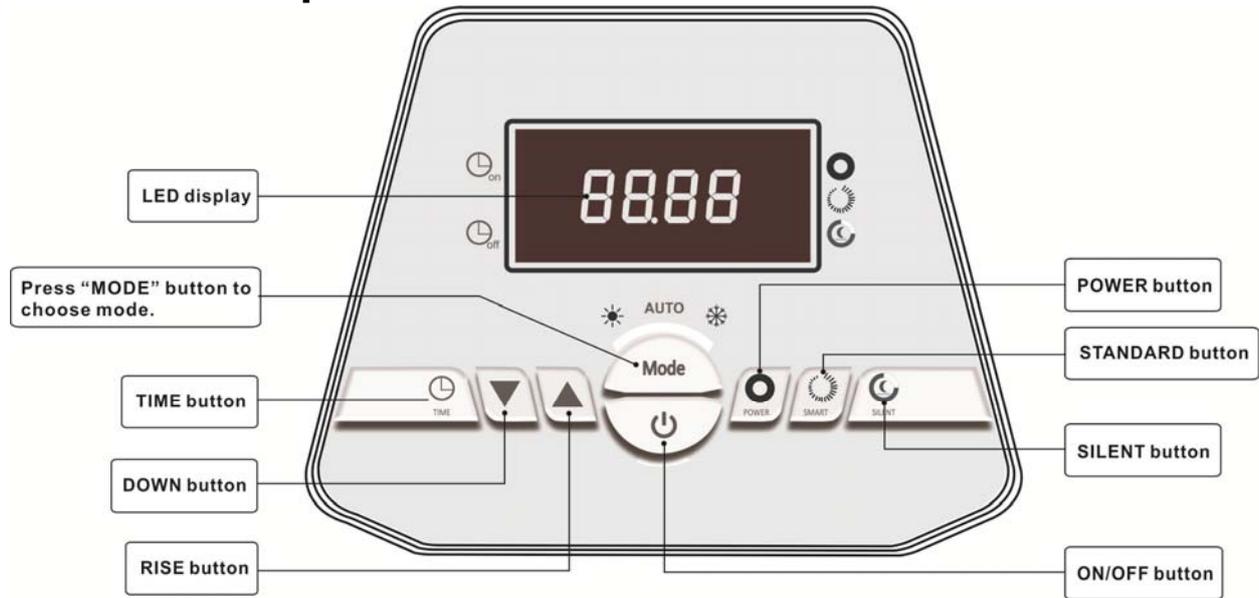
# Explored view



1	Fan protection net	17	Rubber water fender	33	Evaporator
2	Front panel	18	Pressure manometer	34	Left rear net
3	Verge board	19	Electrical box	35	Up frame
4	Copper pipe	20	Terminal	36	Top cover
5	Four way valve	21	Circuit board	37	Motor bracket
6	Compressor	22	Reactor	38	Fan motor
7	Crankshaft heater	23	Water outlet sensor	39	Fan
8	High pressure interruptor	24	Water inlet sensor	40	Drain tube
9	Low pressure interruptor	25	Compressor sensor		
10	Water flow switch	26	Heating coil sensor		
11	Titanium heat exchanger	27	Ambient sensor		
12	Water connection kit	28	Magnet ring		
13	Joint water connection kit	29	Frame		
14	Right rear board	30	Evaporator heater		
15	Power cord	31	Electronic expansion valve		
16	Wire controller	32	Refrigerant charge valve		

# Wire control operation

## Wire controller operation



## Functions of Buttons

### “” button

If the machine is on, press this button to turn it off.

If the machine is off, press this button to turn it on. And the TSET will be shown for 5S. Then it will show the inlet water temperature and working mode. (System will keep the working mode. If no, the default working mode is Smart mode under Heating.)

During parameter checking or setting, press this button will return to default interface. (The parameter checking setting will be saved.) Press this button again will turn the machine off.

### “MODE” button

Press “M” button 3 seconds to convert modes.

Press this button to check and set parameters, With the function of “▲” “▼” buttons, you can check current run parameters 1~F.

NO	Meaning	Range	Remarks
1	Inlet water temperature	-50 ~ 99°C	Measured value
2	Outlet water temperature	-50 ~ 99°C	Measured value
3	Outdoor ambient temperature	-50 ~ 99°C	Measured value
4	Exhaust gas sensor temperature	0 ~ 150°C	Measured value
5	Return gas sensor temperature	-50 ~ 150°C	Measured value
6	Heating coil sensor temperature	-50 ~ 150°C	Measured value
7	Cooling coil sensor temperature	-50 ~ 150°C	Measured value
8	Main EEV steps	80 ~ 480	Measured value
9	Auxiliary EEV steps	150 ~ 480	Measured value
A	Current of compressor	0 ~ 30A	Measured value
b	Module temperature	50 ~ 150°C	Measured value
C	DC bus voltage value		Measured value
d	Running frequency of compressor	20 ~ 90Hz	Measured value
E	Rotation speed of fan 1	0 ~ 1599(rpm)	Measured value
F	Rotation speed of fan 2	0 ~ 1599(rpm)	Measured value

### “▲” “▼” button

TSET setting and Lock/Unlock the screen

TSET setting: Press “▲” / “▼” button, raise or reduce the TSET 1°C by 1°C.

**Lock/Unlock the screen:** Press “▲” and “▼” button 3 seconds, to set keylock; Press “▲” and “▼” button 3 seconds again to release keylock.

### “TIME” button

**Press “TIME” button for 3s to enter clock setting.** With the function of “▲” “▼” buttons, you can set hour first. Then press “TIME” button again, minute setting will be available.

**Press “TIME” button to enter the timer setting.** Press “⌚” button to set the Timer Switch ON, Change the hour using the “▲” and “▼” key. Press “⌚” button again to change the minutes using the “▲” and “▼” key; Press “⌚” button again to set the Timer Switch OFF, Change the hour using the “▲” and “▼” key. Press “⌚” button again to change the minutes using the “▲” and “▼” key, Press “⌚” button again the display returns to normal. “⌚<sub>on</sub>” and “⌚<sub>off</sub>” light up.

The timer setting is from 0 to 24 hours to recycle.

When the setting timer for on and off is the same, the setting timer is not available.

When the setting timer (displayed blinks), Press “MODE” to deactivate TIMER.

### “SMART” Mode

Press "Smart" button to enter smart mode, the machine runs in smart mode.

### “POWER” Mode

In heating mode, press "Power" button to enter power mode, the machine runs in power mode.

### “SILENT” Mode

Press "Silent" button to enter silent mode, the machine runs in silent mode.

### Coercive Defrosting

Press “MODE” and “▼” button 5S when unit is heat mode, the unit go to defrost state,

When fulfilled defrost stop conditions, defrost is stopped.

### Symbol explanation



Run light : light on during running



Heating light: light on during heating mode. Heating light flash means defrosting.



Cooling light: light on during cooling mode



AUTO light: light on during auto mode



Timing boot light: light on if timing boot function is enabled.

Timing boot light flash means timing boot checking or setting.



Timing shutdown light: light on if timing shutdown function is enabled.

Timing shutdown light flash means timing shutdown checking or setting.

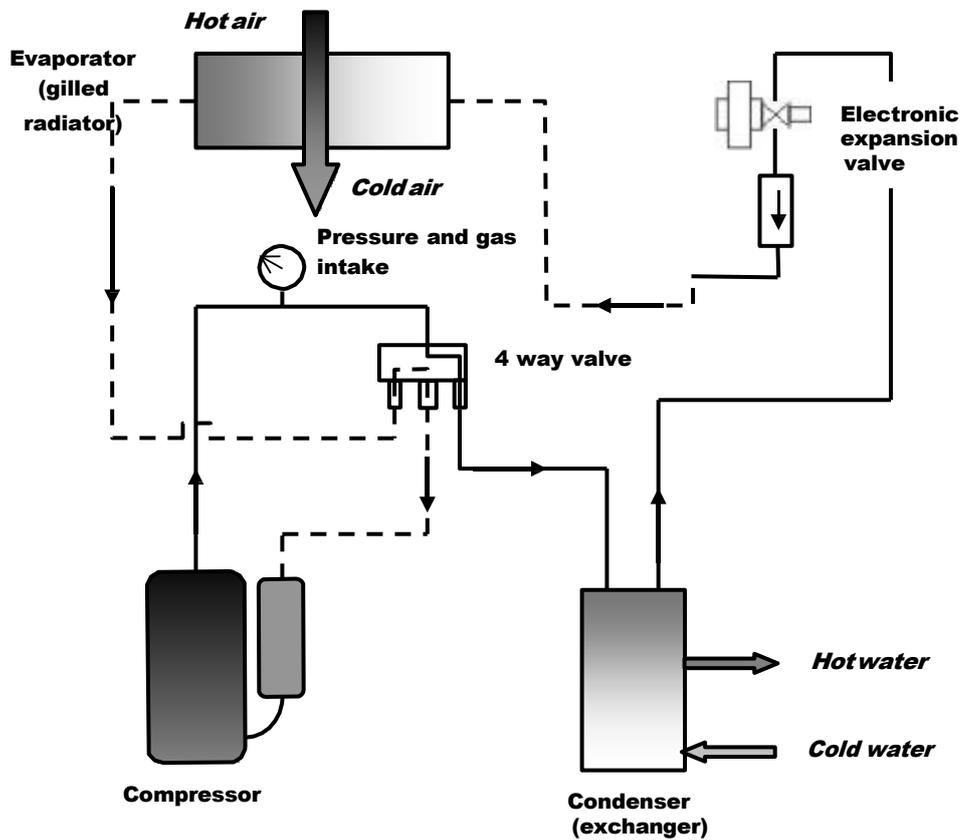
-  ■ Light on under smart mode, machine working with the standard frequency.
-  ■ Light on under power mode, machine working with the high powers.
-  ■ Light on under silent mode, machine working with the low frequency.

# General diagram of the refrigerating circuit

The heat pump is reversible allowing the swimming-pool's heating or cooling:

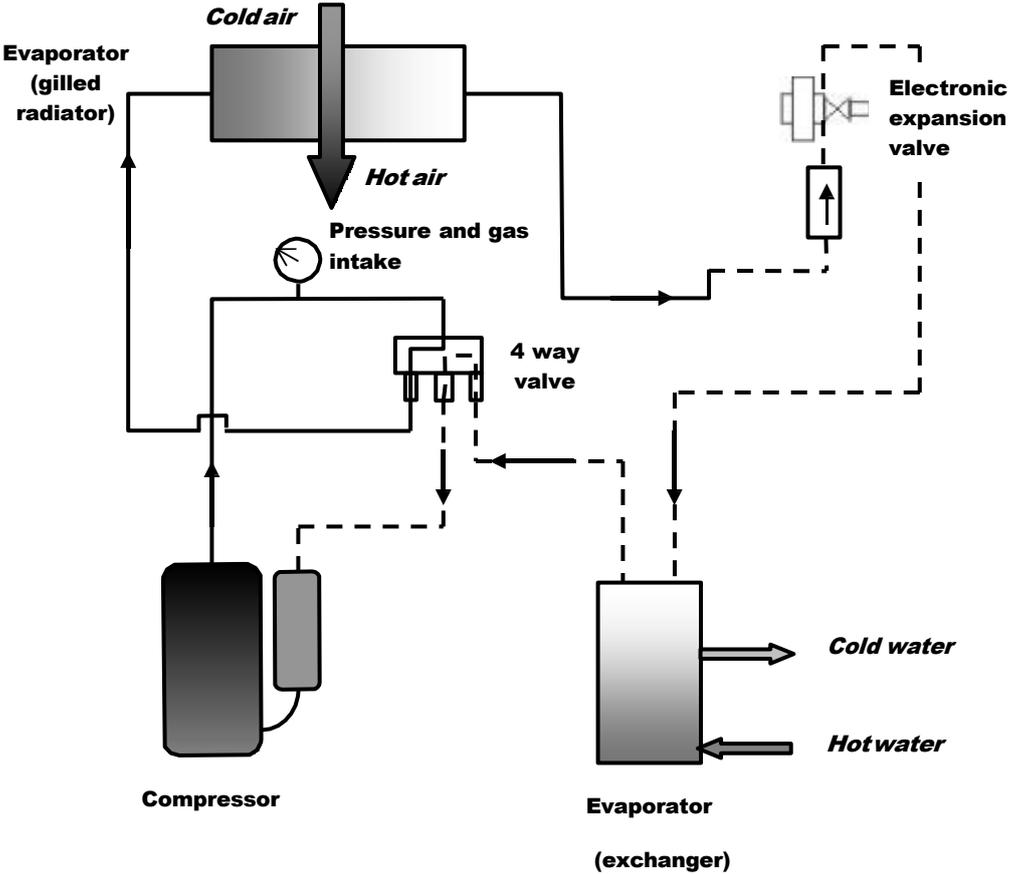
## Swimming-pool water's heating mode:

The cold and liquid refrigerant fluid absorbs the heat contained in the air through the evaporator (gilled radiator), in which it is vaporizing; it is then put up in pressure and in temperature by the compressor which sends it in the condenser (exchanger) where it loses its heat (in giving it to the water of swimming pool) and comes back in liquid state; it loses its pressure and still cools in the expansion valve before turning back to the evaporator for a new cycle.



**Swimming-pool water's cooling mode:**

The 4 way valve reverses the circulation of the refrigerant fluid; the fluid vaporizes in the exchanger (evaporator) in getting the heat of the water, goes through in the compressor which reheats it and through in the gilled radiator (which becomes condenser) where it comes back to liquid state.



# **Safety and control systems**

**Heat pumps are equipped with the following standard protection systems:**

## **1. Water flow switch**

Thanks to this flow switch, the heat pump will not work when the filter pump is not working (and the water is not circulating). This system prevents the heat pump from heating only the water flow in the heat pump itself. The protection also stops the heat pump if water circulation is cut off or stopped.

## **2. Refrigerant gas high and low pressure protection**

The high pressure protection makes sure the heat pump is not damaged in case of overpressurisation of the gas. The low pressure protection emits a signal when refrigerant is escaping from the conduits and the unit cannot be kept running.

## **3. Overheating protection on the compressor**

This protection protects the compressor from overheating.

## **4. Automatic defrost control**

When the air is very humid and cold, ice can form on the evaporator. In that event, a thin layer of ice appears that will grow increasingly bigger as long as the heat pump is running. When the temperature of the evaporator has become too low, automatic defrost control will be activated, which will reverse the heat pump cycle so that hot refrigerant gas is sent through the evaporator during a brief period of time to defrost it.

## 5. Anti-frost protection during winter

Anti-frost protection can only be activated when the heat pump is in **STAND-BY mode** or **shutdown protection**:

1) During standby mode, when the ambient temperature  $\leq 5^{\circ}\text{C}$ , First anti-frost protection activated.

Water pump will run automatically each 10 minutes. When the ambient temperature  $\geq 8^{\circ}\text{C}$ , First anti-frost protection off.

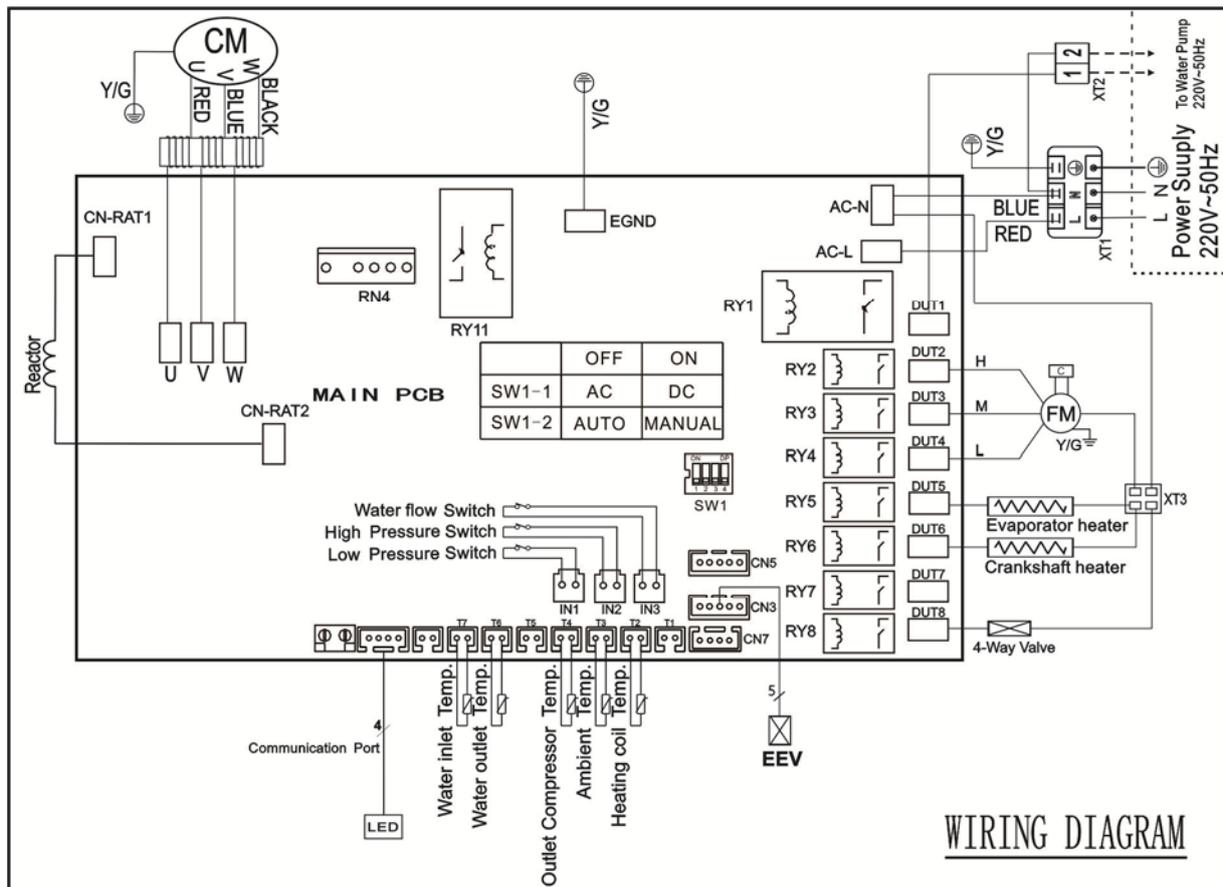
2) When the heat pump shut down, and ambient temperature  $\leq 5^{\circ}\text{C}$ , outlet water temperature  $\leq 2^{\circ}\text{C}$ , Second anti-frost protection activated. Heat pump will turn on automatically and run in heating mode. When ambient temperature  $\geq 8^{\circ}\text{C}$  or outlet water temperature  $\geq 15^{\circ}\text{C}$ , Second anti-frost protection off.

If outlet water sensor fault, inlet water sensor will be use instead.

If outlet water sensor and inlet water sensor both fault, First anti-frost protection activated.

3) During anti-frost protection, the display shows code E04.

## Electric diagram



# 5- Installation

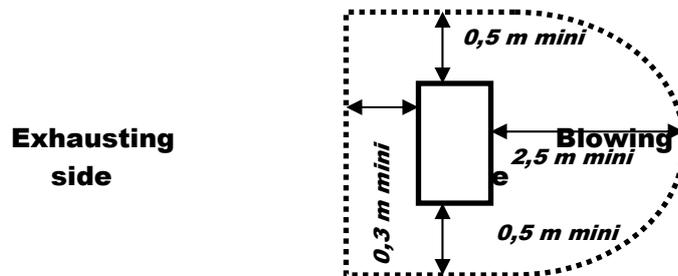
## Rules of installation:

Electric and hydraulic connections must be carried out according to standards in effect (NF C 15 100, CE I 364).

The machine must be installed outside.

The machine must be posed on its ant vibratory studs, set and lying flat and on a massive base (concrete slab); this base must have a sufficient height to prevent any entry of water by the bottom of the machine. Height must be adjusted to fit the connector collecting the condensates.

The obstacles such as wall and vegetation must be separated from the machine as indicated on the diagram below.



Do not to install the Heat pump in a confined place (the fan would recycle its air and the Heat pump would be down performance).

The fan should not blow towards the windows or crossing point.

Safety distance between the swimming pool and the foot bath: the fitter must imperatively refer to the standard C15-100 section 702; the machine should not be installed in volume 1 surrounding the swimming pool but at least in volume 2 so at a distance of 3 m minimum of the swimming pool and foot bath.

## Other precautions of installation:

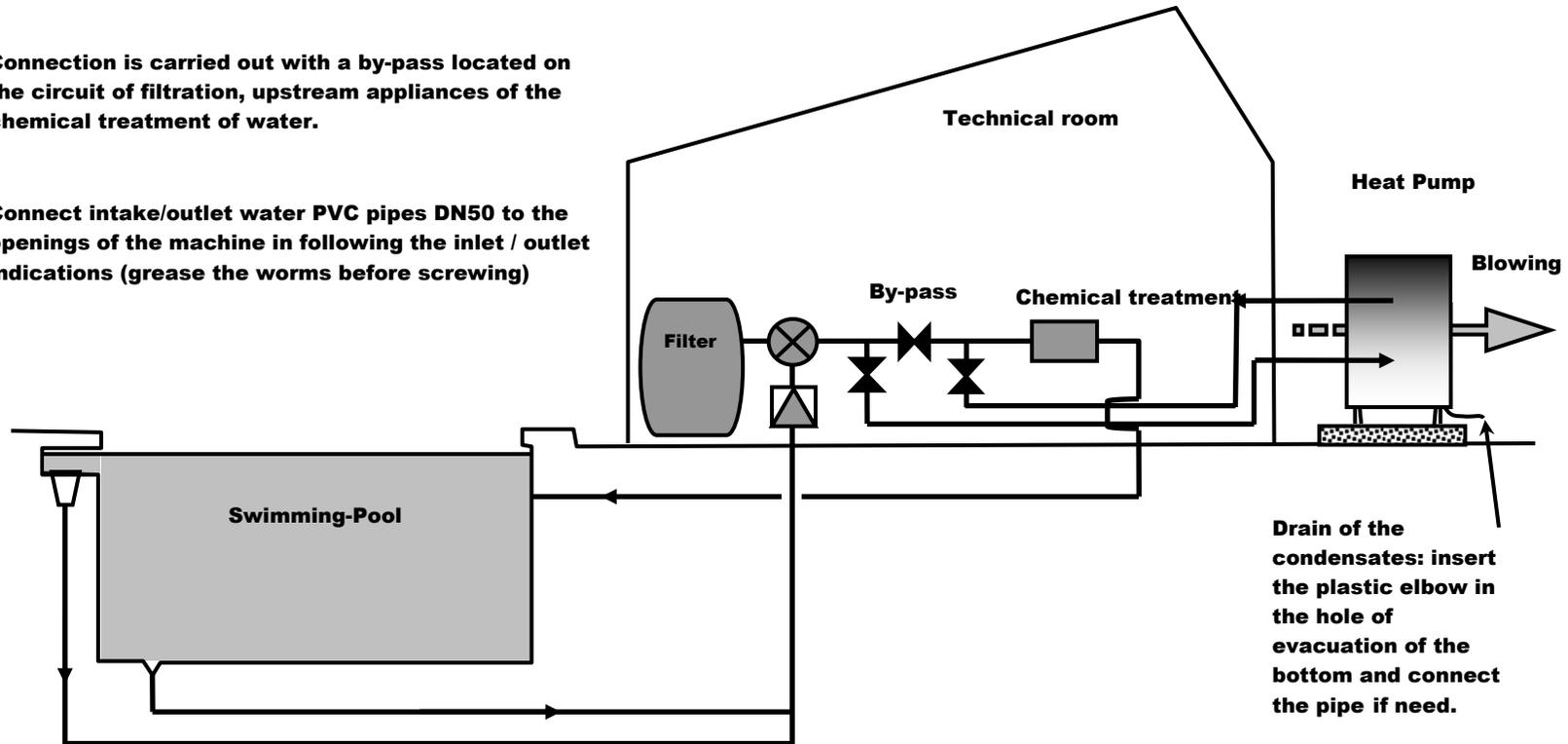
- Do not to install the machine near a way with circulation of car in order to avoid mud projections.
- Avoid directing blowing against dominant winds.
- If the machine is intended to be used in winter, put it in a place protected from the falls of snow.
- The machine must be able to be supervised in order that children do not play around

**Hydraulic connections:  
respect imperatively**

**To**

**Connection is carried out with a by-pass located on  
the circuit of filtration, upstream appliances of the  
chemical treatment of water.**

**Connect intake/outlet water PVC pipes DN50 to the  
openings of the machine in following the inlet / outlet  
indications (grease the worms before screwing)**



## **Electric connections:**

**CAUTION:** before connecting the machine, make sure that the feeder is disconnected to the electrical network.

The electric installation must be carried out by an experienced electrician and the supply must come from a severing equipment and differential protection; the whole must be carried out according to standards' in force in the country where the material is installed.

### **Characteristics of the electric supply:**

- 230 V +/- 10%, single-phase current, 50 Hz

- Mode of neutral TT and TN.S; the circuit of heat pump must be connected to an earth circuit.

### **Characteristic minimum of the protection:**

- Protection must be of 16 A, by circuit breaker or fuse; it must protect the Heat pump exclusively; the circuit breaker must be specified with curve D, the fuse must be specified Am.

- Differential protection : 30 mA (the length of cable between the connector block of the heat pump and the protection of should not exceed 12 m).

### **Control :**

The heat pump is fitted out with a water flow detector which function is to apply the signal to the electronic card when the water flow is sufficient.

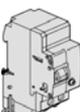
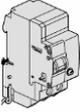
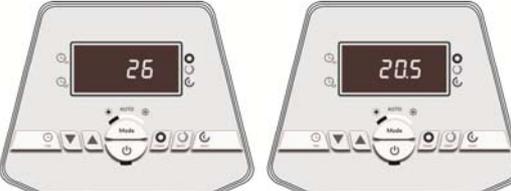
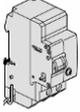
We recommend when it is possible to control the heat pump to the filtration pump (by contacting relay non supplied to insert in the feeding circuit of the heat pump).

The remmended water flow speed is 5~12m<sup>3</sup>/h(Depending on the model).

### **Removed control panel:**

An extension cord allows the removal of the panel in inserting it in a standard electric box into the technical local; the option is supplied with a cover allowing to seal the aperture let by the removal of the control panel.

## Procedure of use

Action	External Appliance or Button of heat pump	Display	Heat pump response
Put the heat pump under tension	Engage the circuit breaker of the heat pump 		Display TIME
Put in circulation the swimming pool water into the pipes	Engage the circuit breaker of pump of filtration 		
Start	Press the button  Displays the set temperature 5S(adjustable) and the current temperature		Start between 1-4 minutes in the previous operation mode (heating/auto/cooling)
Chose the operation mode	Press the button 3S 		Stop for 3-4 minutes, reverse of cycle and restart in a new mode
Set the water temperature into the swimming pool	 adjustable from 10°C to 45°C		The heat pump heats or cools until the required temperature
Chose the control mode	 POWER SMART SILENT		The heat pump operates in smart or silent mode
Stop	Press the button 		Immediate stop and wait
Switch off	Use the circuit breaker of pump of filtration, and heat pump 		Complete stop

## **6- Water Flow and refrigerating circuit pressure**

**After putting into service, do the settings of pressure of the refrigerant circuit for having an optimal operating of the heat pump, following:**

### **Stage 1:**

**Before starting the Heat Pump, ambient temperature around 20°C, refrigerant meter shows pressure from 14 to 16kg/cm<sup>2</sup>.**



### **Stage 2:**

**Close completely the by pass valve and open large inlet and outlet valves of the Heat Pump; in these conditions the totality of the water flow goes by the Heat Pump.**

**Put into service the Heat Pump in heating mode, wait for the indicated pressure being stabilized; the correct setting of the pressure is from 21 to 35 kg/cm<sup>2</sup>; In most of cases (pump of filtration given a flow until 20m<sup>3</sup>/h) you do not have to open the by pass valve.**

**If the stabilized pressure is under 21kg/cm<sup>2</sup>, the progressive opening of the by pass valve will allow rising this pressure.**

**The adjustment of the by pass valve done, you have in principle no reason to modify it during the season. See the paragraph “Environment problem” too.**

## **7- Defrosting**

### **1. Defrosting conditions under heating mode:**

**When heating, the cumulative running time of the compressor  $\geq 45$ min (parameter 11), and the continuous running time of the compressor  $\geq 5$ min;**

**Cooling coil temperature  $< -3^{\circ}\text{C}$  (parameter 12);**

**① (ambient temperature - cooling coil temperature)  $\geq 5^{\circ}\text{C}$  (parameter 15), and  $-7^{\circ}\text{C} \leq$  ambient temperature  $\leq 17^{\circ}\text{C}$  (parameter 16) for 30 seconds;**

**② (ambient temperature - cooling coil temperature)  $\geq 9^{\circ}\text{C}$  (parameter 15 +  $4^{\circ}\text{C}$ ), and an ambient temperature  $< -7^{\circ}\text{C}$  for 30 seconds;**

**When the above conditions are all met, it will enter defrosting; (Note: ① and ② only need to meet one of them)**

**When the temperature of the cooling coil is faulty, and the ambient temperature is  $\leq 20^{\circ}\text{C}$ , the defrosting will be timed, and the defrosting time is every 10 mins;**

### **2. Defrosting conditions at startup:**

**When the stop/standby/compressor cut off time  $\geq 30$ min;**

**$-7^{\circ}\text{C} \leq$  ambient temperature  $\leq 3^{\circ}\text{C}$ , and coil temperature  $< -3^{\circ}\text{C}$  (parameter 12);**

**When the compressor starting condition is met (the water temperature is lower than the backlash/starting temperature, but still not started), and the above conditions are met, it will enter defrosting; .**

**3. Defrost operation frequency: When entering defrost, the frequency is fixed at 60Hz.**

### **4. Condition for exit the defrosting:**

**After 2 minutes of defrosting, when the cooling coil temperature is  $\geq 20^{\circ}\text{C}$  (parameter 14) or the defrosting time reaches 10 mins (parameter 13), it will exit the defrosting.**

### **5 Defrosting steps:**

**When the defrosting conditions are met, following steps will start:**

**1) Compressor stops, and fan stops after 15 seconds;**

**2) The four-way valve is energized at 55 seconds;**

**3) The compressor restarts at 60S;**

**4) The water pump keeps running;**

**The following steps will be performed when the defrosting exit condition is satisfied:**

**1) Compressor and fan stop;**

**2) The four-way valve loses power at 55S;**

**3) The fan is turned on at 60S, and the compressor starts after 5 seconds to resume normal heating running;**

### **6 The abnormal exit of the defrosting:**

**1) When the error protection occurs during defrosting, the system immediately exits the defrosting and stops running;**

**2) Low pressure protection is not detected during defrosting;**

**7 Coercive defrosting: When the cooling coil temperature is lower than the defrosting exit temperature, press and hold the "M" +**

**"▼" buttons for 3 seconds to enter the coercive defrosting.**

## **8 – Environment problem**

**Under certain external conditions the heat exchanges between the refrigerant and the water on one hand and between the fluid and the air on the other hand are insufficient; the consequence is that the refrigerating circuit runs up in pressure and the compressor consumes more electricity.**

**The temperature sensors compressor outlet and the magnetic circuit breaker on the compressor power supply protect the compressor from these extreme conditions; the error messages E 12 occur.**

**The condition causing this situation is as follows:**

**In heating mode:**

**- insufficient water flow:**

**close the by-pass valve for increasing the refrigerant exchange → water**

**In cooling mode:**

**- too important water flow: open the by pass valve for decreasing the water flow and so the exchange water → refrigerant**

**- insufficient air flow: be sure that the real net of condenser are not blocked.**

**Note: these error codes are likely to occur if temperature of swimming pool water is high and the ambient air is hot.**

## **9 – Error codes:**

**This table explains the error codes caused by a defective regulating component or by a security operation.**

<b>Error codes</b>	<b>Problem</b>	<b>Cause</b>	<b>Solution</b>
E 03	Water over heating fault	Water flow not enough	Water flow switch fault
			Check the water pump
			Pipe block
E 04	Anti-freezing protection	Normal protection of machine	No need to do anything
E 05	High pressure error	Insufficient water flow	Check the water flow
		Pressure switch out of order	Replace the pressure switch
		Too much refrigerant gas present	Have the heat pump checked by a refrigeration technician
E 06	Low pressure error	Not enough refrigerant gas	Have the heat pump checked by a refrigeration technician
		Leak in the cooling conduits	Have the heat pump checked by a refrigeration technician
E 09	Communication fault between wire controller and PCB	Communication wire fault	Check or replace the wire
		wire controller fault	replace the wire controller
E 10	Communication failure of variable frequency drive module	PCB failure	Please replace the PCB
E 12	Compressor exhaust temperature is too high	Water temperature and environmental temperature is too high	Set to the safety of water temperature.
		Refrigerant leakage	Check and repair.
		Insufficient water flow	Check the water flow

E 15	Inlet temperature sensor fault	Connection fault	Check the connection
		Inlet temperature sensor fault	Replace the inlet temperature sensor
E 16	Evaporator sensor fault	Evaporator fault	Check the connection
		Evaporator temperature sensor fault	Replace the Evaporator temperature sensor
E 18	Compressor exhaust sensor fault	Connection fault	Check the connection
		Compressor exhaust sensor fault	Replace the compressor exhaust sensor
E 21	Ambient sensor fault	Connection fault	Check the connection
		Ambient temperature sensor fault	Replace the ambient temperature sensor
E 23	Cooling out water temperature over low protection	Connection fault	Check the connection
		Outlet temperature sensor fault	Replace the outlet temperature sensor
		The water flow is too low	Check pump and water flow
E 27	Outlet temperature sensor fault	Connection fault	Check the connection
		Outlet temperature sensor fault	Replace the outlet temperature sensor
E 28	Fan motor fault	The PCB dial code is wrong	Change to the correct dial code
E 29	Return gas temperature sensor fault	Connection fault	Check the connection
		Return gas temperature sensor fault	Replace the return gas temperature sensor
E 32	Heating out water temperature over high protection	Connection fault	Check the connection
		Outlet temperature sensor fault	Replace the outlet temperature sensor
		The water flow is too low	Check pump and water flow
E 33	Cooling model condenser temperature is too high protection	Condenser fault	Check the connection
		Condenser temperature sensor fault	Replace the condenser temperature sensor
		Motor speed is too low	Replace motor
		The fan blades damage	Replace the fan blades
		Condenser aging	Clean or replace the condenser
		EEV blockage or malfunction	Check for cleaning or replacement
E 34	IPM too high temperature	Fan motor damaged	Change the fan motor
		The fan blades damage	Replace the fan blades
		PCB fault	replace the PCB
E 35	Overcurrent protection	The current is too high	Check the power supplier
			Water temperature is too high
E 20 **	Frequency module fault	IPM module has problem	replace the PCB