AHP SERIES

SWIMMING POOL HEAT PUMPS
TECHNICAL CATALOGUE

ASTRALPOOL

INTRODUCTION

This specially designed swimming pool heat and chill pump is an air to water Heat Pump which extracts and magnifies low grade heat from air and delivers this upgraded combination to a swimming pool when it is operating in the heating mode. Similarly, when operating in the cooling mode, these Heat Pumps extract heat from the water in the swimming pool and deliver it to the air. Thus these Heat Pumps can be used for heating or cooling Swimming Pool water.

The designs of these Heat Pumps were done bearing in mind the climatic conditions in the Middle East and only the best components are used for its manufacture.

ASTRALPOOL HEAT PUMP FEATURES

- A highly efficient, Scroll compressor hermetically sealed.
- Titanium tube heat exchanger.
- Tube-in-fins heat exchanger extra large for greater efficiency with corrosion resistant coat.
- Economical and highly efficient.
- Easy installation and servicing.
- Safe and Environmental Friendly.
- Intelligent Defrosting.
- BMS Connectivity.

ASTRALPOOL HEAT PUMP FEATURES

Water Flow Switch Protection
When the volume of the inlet water is lower than minimum set point, the unit automatically shuts down to protect the system. When the volume increases to a normal level, the unit starts up again.

Antifreezing Protection
When the water inlet temp. is too low, the water pump starts up automatically to protect the system.

High/Low Pressure Protection
The High/Low pressure switch that monitors the pressure and shut down the unit when pressure rises above or drops below the desired set point.

High Discharging Temp. Protection
The unit will shut down automatically when the compressor discharging temp. rises above 110° C and start up again when the temperature drops below 85° C.

Compressor Overload Protection
When the compressor is working overload, the unit will stop working to protect the whole system.

Mod bus
ASTRALPOOL Heating/Cooling Unit is available for RS485 allowing the unit to work with centralized controller, which contributes to the high working efficiency.

Flexible Model Selection
ASTRALPOOL Heating/Cooling Units are of various models ranging:
Heating Units: 13 KW to 210 KW
Cooling Units: 8.8 KW to 150 KW
Users can choose the most suitable one for their residential or commercial application, so as to achieve the most cost-effective result according to their actual demand or existing water tank size.

Color Touch Display
ASTRALPOOL Heating/Cooling Unit's 5-inch wire-controlled LCD display is provided with powerful functions, such as water temperature curve display, easy timing, one key mute timer and so on. It has several control modes and the operation is much easier.

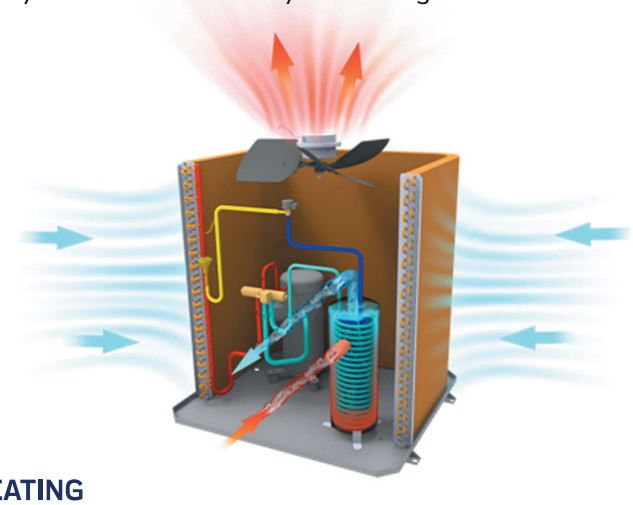
COOLING

• The temperature of the hot gaseous refrigerant discharged from the compressor is much higher than the outside ambient air temperature. When the outside air passes across the condenser coil, the gaseous refrigerant transfers its heat to the air and condenses into liquid.

• The liquid refrigerant passes through the expansion valve, reducing its pressure and temperature.

• The low temperature refrigerant passes to the heat exchanger evaporator, where the actual heat transfer takes place: the refrigerant absorbs heat from the water pumped into the heat exchanger and evaporates, whereby the water temperature is reduced.

• The gas refrigerant is then sucked to the compressor and compressed, increasing its pressure and temperature, ready to start the whole cycle once again.



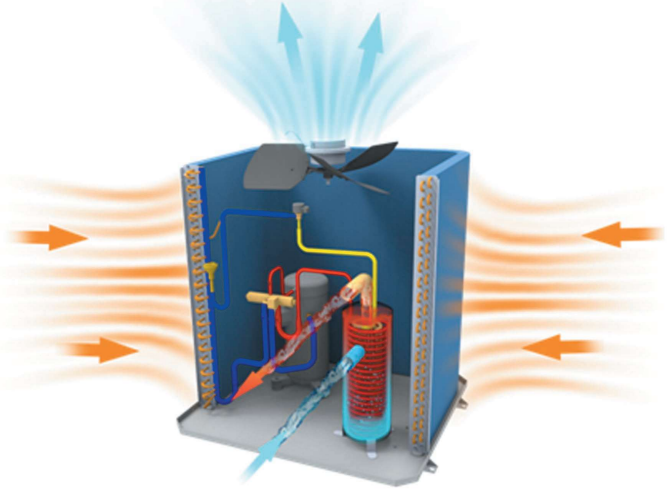
HEATING

• The heat transfer medium (the refrigerant) is colder than the outside air. As the outside air passes across the evaporator coil, the liquid refrigerant absorbs heat from the air and evaporates.

• The gaseous refrigerant then passes to the compressor and is compressed. When compressed, the pressure is increased and the temperature of the vapor rises, effectively concentrating the heat.

• The hot gaseous refrigerant passes to the heat exchanger condenser, where the actual heat transfer takes place: the intensely hot gaseous refrigerant transfers its heat to the water pumped into the heat exchanger and condenses back into a liquid.

• The liquid refrigerant then passes through an expansion valve, reducing its pressure and temperature, ready to start the whole cycle once again.



WORKING PRINCIPLE

TECHNICAL DATA SHEET FOR 50 HZ UNITS

SWIMMING POOL HEAT PUMP SPECIFICATIONS- (50HZ)											
ASTRALPOOL MODEL		**AHP 030-R4**	**AHP 050-R4**	**AHP 060-R4**	**AHP 080-R4**	**AHP 100-R4**	**AHP 130-R4**	**AHP 200-R4**	**AHP 250-R4**	**AHP 400-R4**	**AHP 500-R4**
Cooling Capacity	kW	8.8	14.5	17	25	30	38	58	72	120	150
Cooling Capacity	BTU/h	30000	49500	59500	85300	102000	130000	198000	245000	410000	510000
Cooling Power Input	kW	2.85	5.1	5.8	8.4	9.5	10.3	19.5	21.6	41.6	52.1
Heating Capacity	kW	13	21	25	35	45	55	82	108	160	210
Heating Capacity	BTU/h	44000	72000	86000	119400	150000	187000	280000	360000	550000	714000
Heating Power Input	kW	2.65	4.3	5	7.6	9	10.8	20	22.4	34.2	44.8
Running Current (C/H)	Amp	14.3/13.6	8.2/7.3	10.3/8.9	15.0/13.6	16.4/15.7	16.8/17.5	34.2/35	37.9/38.3	74.2/61.0	92.8/79.8
Power Supply	V/Hz	240V~/50Hz	415V/3N~/50Hz	415V/3N~/50Hz	415V/3N~/50Hz	415V/3N~/50Hz	415V/3N~/50Hz	415V/3N~/50Hz	415V/3N~/50Hz	415V/3N~/50Hz	415V/3N~/50Hz
Compress Quantity	Nos.	1	1	1	2	2	2	3	4	3	4
Compress Type		Rotary	Scroll	Scroll	scroll	scroll	scroll	scroll	scroll	scroll	scroll
Heat Exchanger		**Twisted Double Coil Titanium Heat Exchanger**									
Fan Quantity	Nos.	1	1	2	2	2	2	3	3	2	2
Fan Power Input	W	200	200	120×2	260×2	260×2	260×2	200×3	615×2	1780×2	2000×2
Fan Speed	RPM	830	830	850	920	830	830	830	830	870	920
Fan Direction		vertical	vertical	vertical	vertical	vertical	vertical	vertical	vertical	vertical	vertical
CFM per Unit		4800	4800	4656	4944	9600	9600	14400	14400	22366	27988
Noise	db(A)	58	58	56	61	61	61	65	66	65	67
Water Connection	mm	50	50	50	63	63	63	63	110	110	110
Water Flow Volume	m3/hr	3	5	6	8	10	13	20	25	35	50
Water Pressure Drop	kPA	10	12	12	15	10	13	20	25	24	24
Ambient Temperature	°C	**-15~53**									
COP		4.91	4.88	5.00	4.61	5.00	5.09	4.10	4.82	4.68	4.69
EER		3.09	2.84	2.93	2.98	3.16	3.69	2.97	3.33	2.88	2.88
Refrigerant		**R407C**									
Certification		**Manufactured to CE Conformity**									
Net Dimension	mm	743*700*830	743*700*830	1440*562*860	1490*735*1130	1448*750*1280	1448*750*1280	2150*760*1310	2177*1072*1890	2177*1065*2304	2175*1070*2070
Shipping Dimensions (l/w/h)	mm	765*735*860	765*735*860	1470*620*990	1510*790*1305	1540*770*1395	1540*770*1395	2240*830*1450	2240*1180*2000	2210*1210*2370	2240*1220*2120
Net weight/Shipping weight	kg	82/94	110/123	128/152	226/249	240/284	247/282	360/418	695/755	752/790	960/1005
Max Power Input	KW	3.42	6.12	6.96	10	11.4	13	24	26.9	50	62.5
Max Current Input	Amp	17.1	9.84	12.4	18	19.7	21	42	46	89.1	114.4

Note: Models are available on request with (R410A) and (R134A).
We reserve the rights to modify the above specifications without notice.

TECHNICAL DATA SHEET FOR 60 HZ UNITS

SWIMMING POOL HEAT PUMP SPECIFICATIONS- (60HZ)									
Astral Model		**6Z-AHP030-ZO**	**6Z-AHP050-ZO**	**AHP 060-R4 60**	**6Z-AHP100-ZO**	**AHP 130-R4 60**	**AHP 200-R4 60**	**AHP 250-R4 60**	**AHP 500-R4 60**
Cooling Capacity	kW	8.8	14.5	17	30	38	58	75	150
Cooling Capacity	BTU/h	30000	49500	59500	102000	130000	198000	256000	510000
Cooling Power Input	kW	2.85	5.1	5.8	10.2	13.2	19.5	25	52.1
Heating Capacity	kW	13	21	25	45	55	82	105	210
Heating Capacity	BTU/h	44000	72000	86000	150000	187000	280000	358000	714000
Heating Power Input	kW	2.65	4.3	5	9.5	12.5	18	24.5	44.8
Running Current (C/H)	Amp	14.3/13.6	7.3/7.1	10.3/8.9	16.4/15.7	19.2/18.8	30.8/29.8	38.3/37.9	92.8/79.8
Power Supply		240V~/60Hz	380~415V/3N~/60Hz	380~415V/3N~/60Hz	380~415V/3N~/60Hz	380~415V/3N~/60Hz	380~415V/3N~/60Hz	380~415V/3N~/60Hz	380~415V/3N~/60Hz
Compress Quantity	Nos.	1	1	1	2	2	3	4	4
Compress Type		Rotary	Scroll	Scroll	scroll	scroll	scroll	scroll	scroll
Heat Exchanger		**Twisted Double Coil Titanium Heat Exchanger**							
Fan Quantity	Nos.	1	1	2	2	2	3	3	2
Fan Power Input	W	330	330	330×2	330×2	330×2	330×3	330×3	2200×2
Fan Speed	RPM	900	900	900	900	900	900	900	715
Fan Direction		vertical	vertical	vertical	vertical	vertical	vertical	vertical	vertical
Noise	db(A)	58	58	56	61	64	65	66	67
Water Connection	mm	50	50	50	63	61	63	110	110
Water Flow Volume	m3/hr	6	7.5	9	10	19.5	30	30	50
Water Pressure Drop	kPA	10	12	12	10	13	20	24	30
Ambient Temperature	°C	**-15~53**							
COP		4.91	4.88	5.00	4.74	4.40	4.56	4.29	4.69
EER		3.09	2.84	2.93	2.94	2.88	2.97	3.00	2.88
Refrigerant		**R407C**							
Certification		**Manufactured to CE Conformity**							
Net Dimension	mm	755*700*830	670*670*850	1440*562*860	1452*740*1280	1452*740*1280	2150*766*1322	2170*1065*1930	2180*1080*2060
Shipping Dimensions (l/w/h)	mm	830*750*1060	770*720*1140	1550*650*1100	1600*800*1520	1600*800*1520	2200*850*1550	2220*1190*2150	2280*1120*2500
Net weight/Shipping Weight	kg	85/110	125/150	195/225	310/340	320/350	510/550	850/900	1060/1120

Note: Models are available on request with (R410A) and (R134A).
We reserve the rights to modify the above specifications without notice.

AHP 030/050 – R4

	A	B	C	D	E	F	G	H	I
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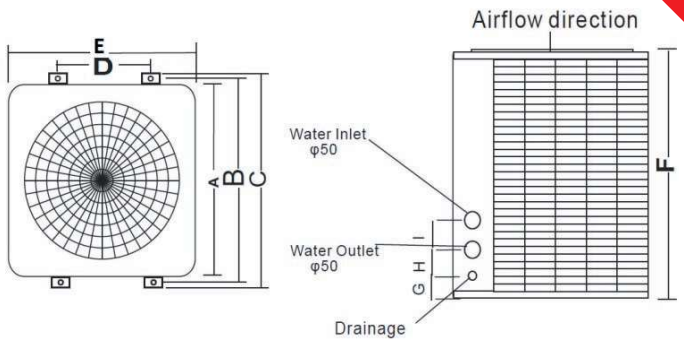
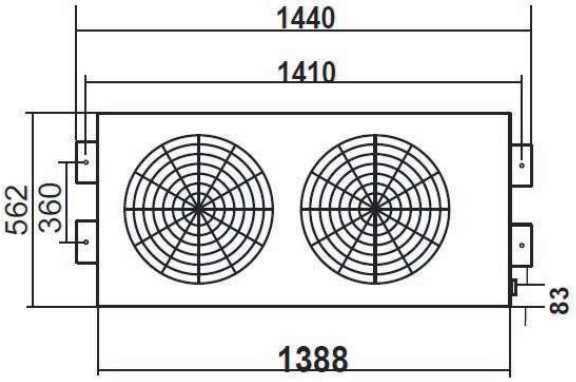
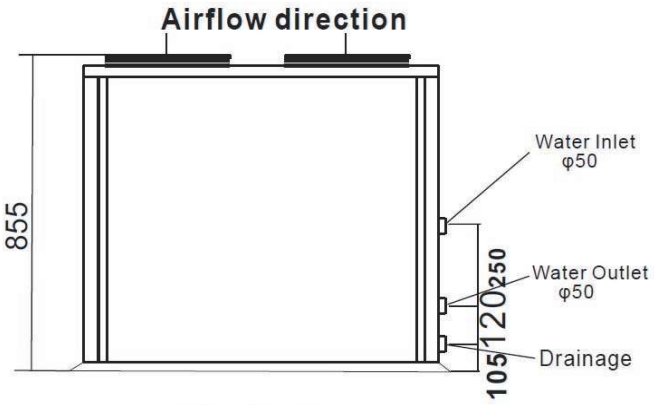
AHP050-R4	704	720	743	400	700	840	95	117	105



AHP 060 – R4

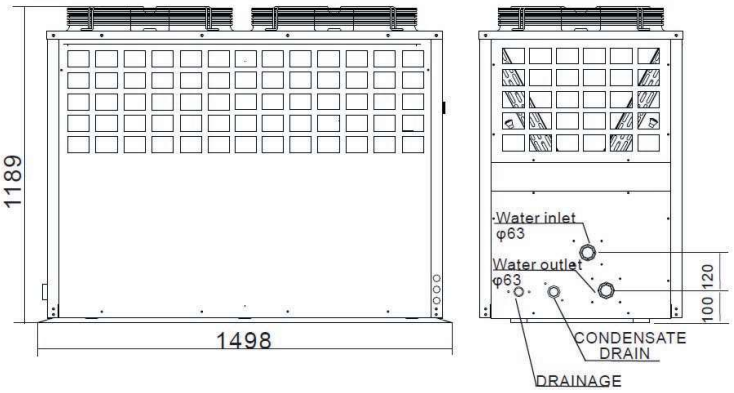


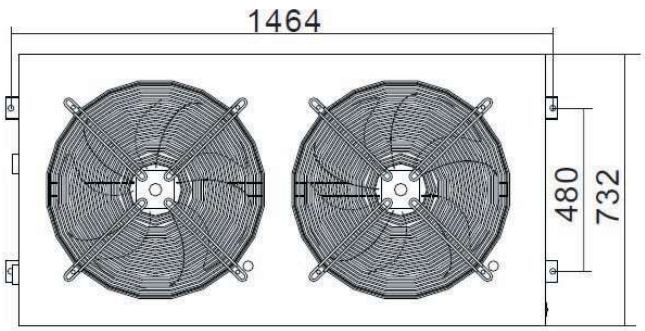
Vertical vision



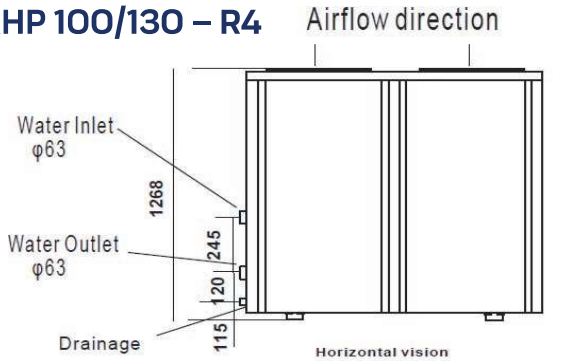
Horizontal vision

AHP 080 – R4

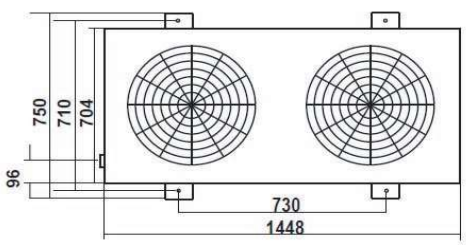




AHP 100/130 – R4

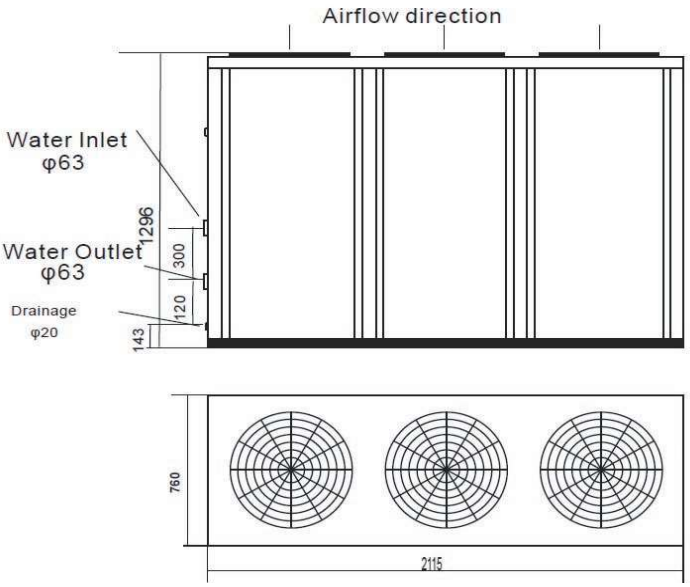


Horizontal vision

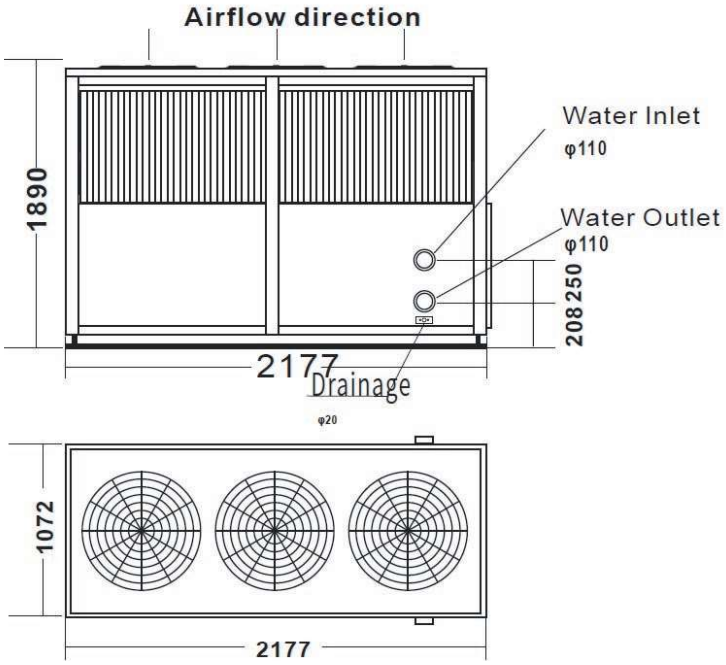


Vertical vision

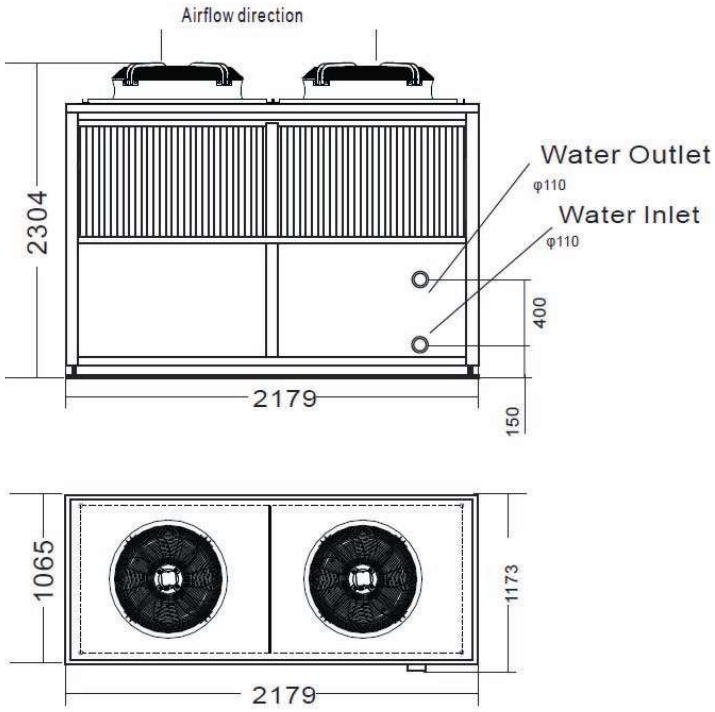
AHP 200 – R4



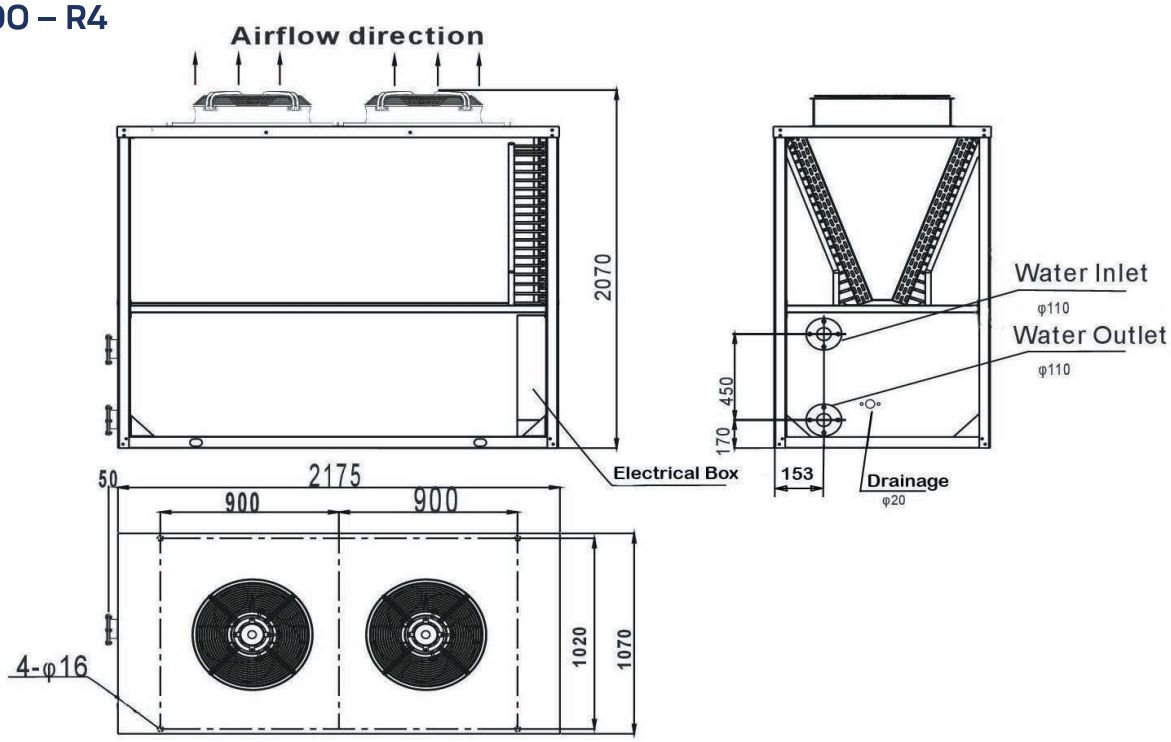
AHP 250 – R4



AHP 400 – R4



AHP 500 – R4



INSTALLATION CONDITIONS

Do not install the unit near a flammable gas source, since a gas leak may occur and cause an explosion.

- According to the place where the unit must be installed (humid place, etc.), install electrical protection by a 30 mA differential circuit breaker. Otherwise, an electrical discharge may take place.
- Condensers must have been completely drained. Otherwise, the water could leak out of the unit and dampen and damage its components.

WARNING

- Do not leave a damaged installation. The unit could cause an accident.
- Do not mount or place anything upon the unit. The fall of the object or the unit could cause an accident.
- Verify the network compatibility with the data specified in the unit before starting to install the heat pump.

SPECIFIC INSTRUCTIONS:

It is obligatory for users contact a specialized company that has experience installing and repairing heat pumps. Users should not install or repair the heat pump themselves nor should another person do it.
The operating environment of the unit usually varies between 8°C and 50°C.

INSTALLATION RULES

It is necessary to determine the unit location according to certain criteria:

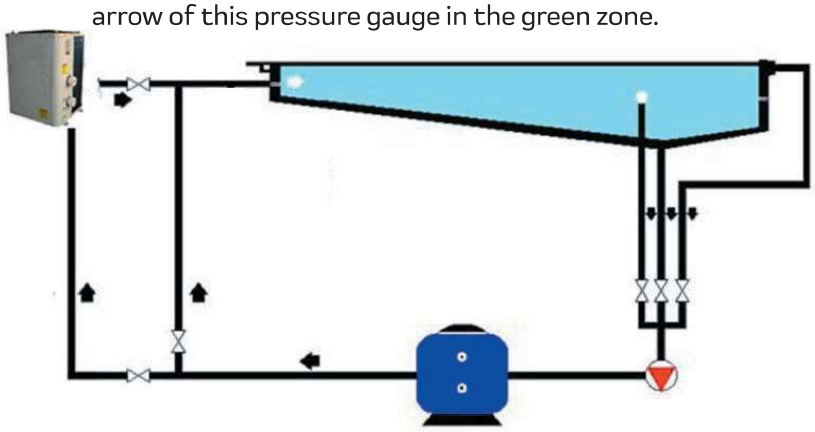
- The unit must be secured on a hard base (concrete or hard steel frame type) and must be protected from flood risks.
- The unit must be installed outside, taking advantageof the sun's direct rays.
- A clear space of 0.75 m to 1.0 m all around the unit is recommended.
- If the heat pump is to be installed in a garage or under a vertical overhang, the unit must have a minimum of 2.5 meters clearance from the top of the heat pump.
- The air caused by the helix must be directed away from the limits of the work environment (windows, doors...)
- The minimum distance between the heat pump and the rim of the swimming pool must be at least 3.5 m. (Electrotechnic Regulations for Low Voltage, Supplementary Technical Instructions, Low Voltage, 31, ITC-BT-31).
- The electrical and hydraulic connections must be made according to the applicable regulations (NF C 15 100, EC 1 364). The ducting for the connections must be fixed.
- During operation of the unit, it is normal that the condensation produced by the evaporation unit will produce a certain quantity of water which will have to be evacuated. It is important to remember that no part of the tubing or hose may be above the level of the drain hole in the base of the heat pump.
- This condensation water does not have to be treated in any special manner.

Keep lawn sprinkler heads from spraying on the heat pump to prevent corrosion and damage. Use a deflector if needed.

- Make sure the heat pump is not located where large amounts of water may run off from a roof into the unit. Sharp sloping roofs without gutters will allow massive amounts of rain water, mixed with debris from the roof, to be forced through the unit.

HYDRAULIC CONNECTIONS

Connect the PVC piping water inlets and outlets of the swimming pool to the heat pump inlet and outlet. The connection will be performed through a by-pass over the filtering circuit of the swimming pool after the filter and before the water treatment. Adjust the flow so that the arrow of this pressure gauge in the green zone.



If it is not possible to install the feeder 25cm below the water discharge of the heat pump a siphon should be installed. For additional security, a check valve should also be installed to prevent the chemical product from returning to the pump when water circulation is interrupted.

There must be water flowing through the hydraulic connections when the unit is running.

Never place concentrated chemicals in the swimming pool skimmers.

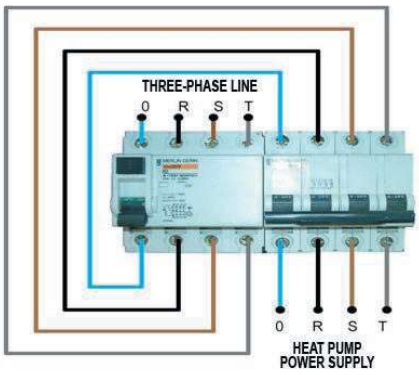
A full-flow shut-off valve should be installed on each of the hydraulic elements in the equipment, so that each of these may be isolated if needed (for filter cleaning, repairs, substitutions, etc.) without the need to drain the circuit.

Anti-vibration dampers should be installed in the inlet and outlet of the machine, in order to avoid vibrations which may cause cracks or breakage in the hydraulic connections.

In order to avoid possible breakage, do not force the PVC tubes connected to the water supply.

ELECTRICAL CONNECTION

- The power supply for the heat pump must come, preferably, from a sole circuit provided with standard-issue protection components (see above: protection by a 30 mA differential) and a magnetic circuit breaker.



- The electrical installation must be carried out by a qualified professional (an electrician, for example) according to the applicable laws and regulations of the target country.
- The heat pump circuit must be linked to a safety earth circuit levelled to the terminal block.
- The cables must be correctly installed so that they do not cause interferences (items in the lead boards).
- The heat pump may be connected to an earthed 230/2/50Hz or 400/3/50Hz general-purpose power supply.
- Table 1 shows some indicative sections, which must be verified and adapted according to the installation needs and conditions.
- All wiring should comply with local and national electric codes and should not be prone to overheating and subsequent voltage failures. As a guide, you can use the general power supply table for lengths of less than 25 metres.
- The acceptable tolerance to voltage fluctuation is +/- 10% during operation.

ELECTRICAL DATA	MODEL								
	AHP030-R4	AHP050-R4	AHP060-R4	AHP100-R4	AHP130-R4	AHP200-R4	AHP250-R4	AHP400-R4	AHP500-R4
Voltage. (V)	230 II	400 III	400 III	400 III	400 III	400 III	400 III	400 III	400 III
Section (mm^2) POWER	4	4	4	6	6	10	16	35	50
Nº. of wires	3	5	5	5	5	5	5	5	5

The electrical installation should be done by qualified professionals, keeping in mind the following points:

1. Connect the equipment following the wiring diagram included in this manual.
2. Place a U-curve thermal-magnetic circuit breaker in the general power connection to protect the line in the case of a short in the circuit.
3. Place a differential circuit breaker in the general power connection to protect the equipment from possible grounding problems. The differential breaker should be minimum 30 mA.
4. Before installing the connections, be sure to disconnect the electricity so that the power supply is turned off.
5. Connect the power supply wires to the unit's input terminal.
6. Connect the grounding wire to its corresponding terminal.
7. Connect the debugger control connections for the debugger in parallel with the debugger time connection.

IMPORTANT:
The heat pump should always operate together with the purification pump. We must have the precaution never to interconnect timers or programmers which may stop the purification pump and leave the unit working alone.

All local and national electricity codes concerning the protection of defects in electric power lines should be respected at all times during the electrical installation.
Verify the torque of all electrical connections.

The electrical resistance between the ground and any electric terminal will be verified to be over 1 megaohm. Otherwise, the equipment will not start up until electrical loss is located and repaired.

In the case of fluctuations in the power supply, a power supply stabilising system is recommended in order to protect the equipment.

HIBERNATION PROCEDURE

1. **Switch off the filtering pump.**
2. **Turn off the by-pass valves.**
3. **Open completely the drain cock of the condensers.**
4. **Drain the exchanger to protect it from ice.**
5. **Once drained part of the condenser, close the drain cock.**
6. **Check the connectors and the (closed) by-pass valves of the heat pump to restrict the entrance of foreign bodies or water to the exchanger.**

DETECTING LEAKS:

- Symptoms of gas leaks.
- Leaks will cause a decrease in the refrigerant charge in the equipment. Low refrigerant charge may be the caused by the following symptoms:

1. The evaporating temperature is very low. This may be also caused by an obstructed fluid line or the incorrect operation of the expansion valve.

2. The compressor is functioning on cycles which are too short.

3. Compressor is overheated: Gas leaks cause gas flow to be insufficient to cool the compressor. This may cause the tripping of the internal thermostat of the compressor.

4. The compressor operates continuously, there is not enough refrigerant to obtain the desired power, and since the specified temperatures are never reached, the unit never shuts down.

- In any case, it is better not to wait until a leak appears and service regularly the circuit.

METHODS FOR SEARCHING FOR A GAS LEAK:

- There are various tools on the market used in order to detect leaks, although not all of them are sufficiently sensitive to certain types of refrigerants. It is very important to choose an adequate detector for the refrigerant used for this equipment and that the maintenance guidelines by followed.
- You can also use soap bubbles (liquid detergent in a spray bottle) to detect leaks.
- Other methods such as halogen lighters and additives may also be used to detect leaks.

ELECTRICAL CONNECTION

MAINTENANCE INSTRUCTIONS

This operation must be obligatorily carried out by a professionally qualified person. It should be carried out at least once a year and includes several elements:

- Cleaning of the evaporator(s) with the aid of a thin brush and a non-dirty and non-chlorinated water spray.
- Revision of instructions and operating issues of the unit.
- Revision of the safety mechanisms.
- Dusting the circuit board.
- Checking the earth connections.
- Checking the gas pressure.

PREVENTIVE MAINTENANCE

A record should be kept of each element repaired or substituted as well as of all maintenance and repairs.
The surface of the exterior panels may be cleaned with a soft cloth and non-abrasive cleaner.

DISCONNECT THE EQUIPMENT FROM THE POWER SUPPLY before performing any maintenance procedures.

TO KEEP IN MIND

EVAPORATOR COIL

The evaporator coil should be kept clean and free of obstacles which may hinder the circulation of air through them. In order to clean it, use water (little pressure) and non-abrasive detergents or cleaning liquids made specifically for it.

COMPRESSOR

- Compressor oil must be checked in those unit models provided with an oil viewer.
- Verify that the compressor refrigerates adequately with the circulating gas (verify the refrigerant charge).
- Verify that the power consumption has not increased.
- Verify that the compressor discharge pressure is not too high and that the intake pressure is not too low.
- Verify that the compressor fasteners are not deteriorated.
- Verify that no frost develops on the compressor

CONDENSER

Install chemical feeders “downstream” from the heat pump, as far away and at a lower height. The feeder should never be installed near the intake of the purification pump as this will damage the condenser.
NEVER introduce concentrated chemical products in the pool skimmers as this will damage the Titanium condenser.

In climates where temperatures occasionally fall below freezing, circulate the water using the purification pump to maintain the water temperature above freezing (0º C).
In the case these temperatures are persistent or common, the heating and purification system should be completely drained. The condensers have a system the purge the system.

FAN

Verify the flows of the fan each year.
Clean the louvers of the fan as well as the protection grill regularly.

ELECTRICAL PANEL

Verify all electrical connections.
Verify that there is no over-heating of the electrical terminals.
Verify that the protection systems operate correctly.
Verify that the regulator operates correctly and verify the temperature with a mercury thermometer (calibration probe).

TROUBLE SHOOTING GUIDE

The reasons why your heat pump may not function properly are mentioned below:

THE UNIT DOES NOT START

- Operating switch tripped: Check there is no short circuit in the control panel, repair the possible short circuit.

Coil contactor does not activate: Verify that it is not burned, and replace it if it is. Verify the terminals which activate the coil.

- Thermal switch tripped: Verify the voltage of the line. Verify that the operating conditions are correct. Excessive compressor consumption. Short circuit in the compressor.

Low pressure switch tripped: Verify that the pressure switch operates correctly and substitute if necessary. Verify that the fan is operating correctly. Verify the refrigerant charge of the equipment (refrigerant leak, loss of refrigerant fluids) in order to solve this problem; please refer to the refrigerant charge section.

- Verify that there is sufficient ventilation around coils. Check for any obstruction of the cooling circuit and eliminate the obstruction if necessary. Verify that the thermostatic valve is operating properly, checking the bulb has no gas leaks and that the pressure inlet is free of obstruction. Replace if needed.
- High pressure switch tripped: Verify that the pressure switch operates correctly and substitute if necessary. Check the refrigerant charge (excess refrigerant) in order to solve this please refer to the refrigerant charge section. Check for any obstruction of the cooling circuit and eliminate the obstruction if necessary. Verify there is a good water flow through the condenser, checking there are no obstructions in the hydraulic circuit, the shut-off valves are open and the purification pump operates properly (replace if needed).
- Flow alarm: Verify the purification pump is operating properly (pump flow may be less than needed). The filter of the purification pump is dirty. Clean it if needed. By-pass are closed or not sufficiently open. Revise it if needed. The pump is not working. Revise clock condition and purification mode. The flow switch is faulty (call for service).
- Defrost cycle: The ambient conditions are not correct (temperatures are too low). The unit does not work under these conditions. It is recommended to disconnect the unit.

LOW OIL LEVEL

- Low initial oil charge: Refill up to needed level.
- Oil stains on the equipment: Check for leaks in the cooling circuit and repair them if necessary, check the torque on the high and low pressure valves, and replace them if necessary.

THE EQUIPMENT OPERATES ON CYCLES WHICH ARE TOO SHORT

- The low pressure switch opens then closes again: Verify the points mentioned in the “low pressure switch tripped” section above.
- Intermittent contact on machine control unit: Repair or replace the faulty electrical part. Check the temperature indicator.

Make sure the equipment is not too large for the facilities.

THE EQUIPMENT DOES NOT SHUT DOWN

- Verify that the thermostat functions properly, repairing or replacing it if necessary.

Compressor contactor contacts are stuck together: Check that the coil is functioning properly and that the contacts are not burned.

- The pressure of the intake duct is too low: Check the refrigerant charge of the equipment for leaks, to solve this problem please refer to the refrigerant charge section. Check that there are no obstructions in the cooling circuit, filter-drier, expansion valve, etc. and replace if necessary. Verify that the equipment is powerful enough for the existing thermal conditions.
- Excessive noise: The fastening screws of the compressor or fan are loose: Tighten all the fastening elements.
- Check the compressor oil level.
- The compressor produces internal bumping noises: Check that the noise does not come from any fluid leak from overheating.