

Instruction Manual

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8.5KW & 10.5KW Air Source Heat Pump Assembly / Installation

AQUA-WORLD

Wood Pools

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1.0 INTRODUCTION

Thanks for you have chosen our heat pump.

The heat pump is manufactured in compliance with strict technical standards in order to provide our customers with excellent quality and adequate reliability. These instructions for use contain all information required for installing the heat pump, putting it into operation and performing its maintenance. Read the instructions carefully before commencing any handling or maintenance. The manufacturer of this product shall not accept any liability and disclaims any responsibility for damage to property or injury caused by improper installation, putting into operation or inadequate maintenance.

This document shall constitute an integral part of the product and shall be stored in the machine room or close to the heat pump.

1.1 HEAT PUMP APPLICATIONS

This heat pump is intended solely for heating pool water and for maintaining its temperature economically at its required value. Any other application of the pump shall be deemed inappropriate.

The heat pump achieves its highest efficiency at air temperatures within the range from 15 to 25 °C. At ambient temperatures below +8 °C the system efficiency is low, while above 35 °C there is a risk of overheating. That is why the equipment should not be used outside of the temperature range of 8 ÷ 35 °C.

The optimum conditions for heat pump BP-85HS-A operation include swimming pools with the water volume not exceeding 45 m³ and the flow rate of water passing through the heat pump equal to 3.5 m³ per hour, at least.

The optimum conditions for operating the heat pump BP-100HS-A include swimming pools with the water volume up to 60 m³; the flow rate of water passing through the heat pump shall equal 4.0 m³ per hour, at least.

1.2 PRINCIPLE OF HEAT PUMP OPERATION

The heat pump, employing the cycle of compression and expansion of heat transfer fluid, makes it possible to take heat from ambient air. The air is driven (by a blower) through the evaporator, where its heat is transferred to the heat transfer fluid and the air temperature decreases. The heat transfer fluid is then compressed (and heated) by the compressor and transported into heat exchanger coils, where it transfers its heat to the pool water. Then, the cooled fluid flows from the heat exchanger into the expansion valve, in which it expands, its pressure is decreased considerably and its temperature abruptly drops down. The cooled fluid returns back to the evaporator to be heated again by air stream and the cycle repeats again. The entire process runs continuously and is controlled using pressure and temperature sensors.

The direction of water circulation can be reversed by selecting the appropriate mode of heat pump control. In this case the pool water would be cooled.

1.3 CHECK OF DELIVERY

The equipment is supplied completely assembled and ready for connection to the pipe manifold of pool filtration system and connection to the socket of single phase power supply (220 VAC/50 Hz).

At installation one should only put the end piece for condensate drain into the relevant hole in the housing bottom.

Before commencing any handling, check, please the equipment for completeness.

NOTE: Illustrations and descriptions given herein shall not be binding and may differ from the actually supplied product. The product manufacturer and supplier reserve the right to perform product changes without being obliged to update this document.



The symbol for waste classification in the EU countries

Protect the environment. Observe local regulations for waste disposal. Submit all unused or defective electrical appliances/devices for disposal to a specialised firm.

2.0

SAFETY INSTRUCTIONS



CAUTION: The equipment contains electrical components under voltage. The equipment may be opened only by an electrician of appropriate technical qualification. There is a danger of electrical accident!!

- (a) The equipment is not intended for use by persons having reduced physical, sensory or mental ability (including children) without being supervised and instructed by a responsible adult, for use by persons not well acquainted with the operation of the equipment within the scope hereof, persons whose ability of immediate response is reduced due to consumption of drugs and/or narcotics, etc.
- (b) The heat pump shall be located in compliance with the ČSN 33 2000-7-702 standard, i.e. at least 3.5 m from the outer edge of the pool.
- (c) The feeding circuit of the heat pump shall meet the requirements of the applicable standard ČSN 33 2000 and shall be provided with the circuit breaker of the minimum breaking current of 30 mA.
- (d) Any intervention into the heat pump electrical installation and the power supply circuit shall be carried out only by an electrician of appropriate technical qualification.
- (e) Do not install the heat pump in any place, where it can be flooded with water.
- (f) Make sure that no children will be present within the heat pump working area. The main switch of heat pump shall not be placed within children's reach.
- (g) Do not leave any incomplete heat pump in operation. All its protecting covers shall be always installed! The rotating blower may cause a serious body injury. If in operation, the inner piping is hot and may cause burns.
- (h) If it is found that the extension cable or supply cable of the pump is damaged, immediately switch the power supply circuit breaker OFF and have the defect made right.
- (i) Any repairs of the heat pump and intervention in its pressure circuit of coolant shall be performed only by a duly qualified specialist.
- (j) Maintenance and operation of this equipment shall be carried out in due compliance with these Instructions and their recommended frequency and periods shall be observed.
- (k) Only original spare parts shall be used. Any failure to observe these recommendations may cause the guarantee provided with this product shall become void and any claims will be refused accordingly.

3.0

EQUIPMENT DESCRIPTION AND TECHNICAL SPECIFICATION

3.1

TECHNICAL DATA

TYPE		BP-85HS-A	BP-100HS-A	BP-120HS-A	BP-140HS-A
Power supply	(V~ / Hz)	230 / 50	230 / 50	230 / 50	230 / 50
Protection degree		IP X4	IP X4	IP X4	IP X4
Protection class		I	I	I	I
Heating capacity*	(kW)	8,5	10,5	12	14
Cooling capacity*	(kW)	6,8	7,8	8,3	9,6
Rated power input*	(kW)	1,7	2,05	2,35	2,7
Operational power input*	(kW)	1,6	1,9	2,25	2,6
Rated current *	(A)	7,9	9,0	11,0	12,5
COP (heating, operational)*		5,0	5,1	5,3	5,4
Required water flow rate (min)	(m ³ /h)	4,0	4,5	6,0	7,0
Air flow rate	(m ³ /h)	2000	2400	2800	3200
Noise level	(dB(A))	<52	<53	<54	<55
Coolant (heat transfer fluid)		R 410A	R 410A	R 410A	R 410A
Cooling gas charge weight	(g)	950	1100	1300	1500
Equipment weight	(kg)	52	61	63	68
Dimensions (L x D x H)	(cm)	93 x 28 x 55	101 x 31 x 61	101 x 31 x 66	107 x 34 x 70

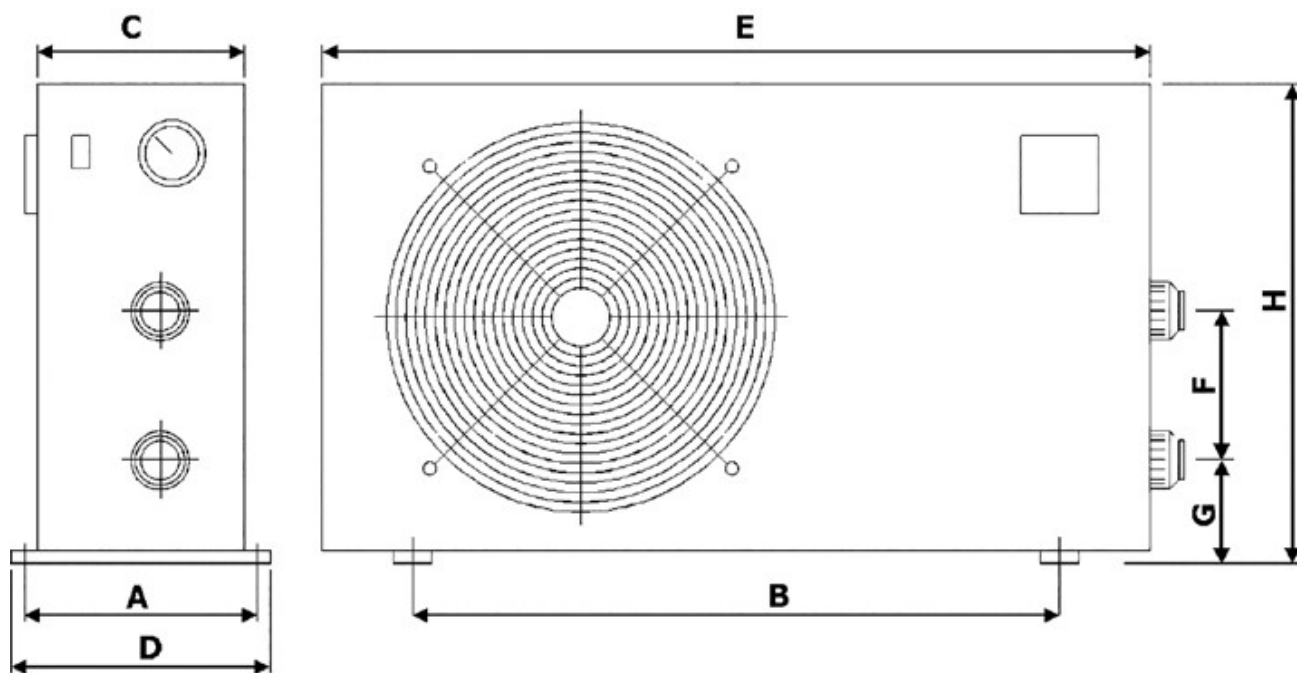
* These values may vary subject to climatic and operating conditions.

3.2

POOL WATER PARAMETERS

The heat pump is designed for heating pool water that meets the requirements for its harmlessness in terms of bathing. The limit values for heat pump operation: pH within the range of 6,8 – 7,9, chlorine total content shall not exceed 3 mg per litre. Water hardness shall be kept at the lower limit of its optimum range, i.e. slightly above 8 °dGh.

3.3 HEAT PUMP DIMENSIONS

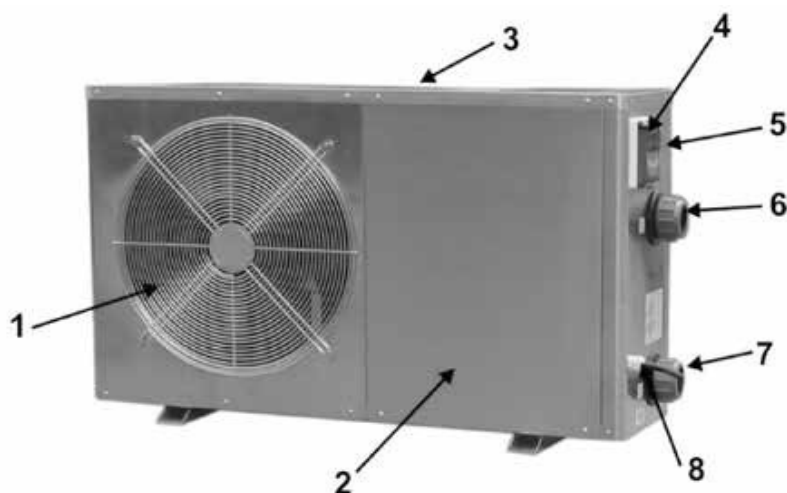


	BP-85HS-A	BP-100HS-A	BP-120HS-A	BP-140HS-A
A	295	340	342	366
B	580	665	663	723
C	285	305	305	330
D	320	370	370	395
E	935	1010	1010	1070
F	290	330	363	400
G	90	100	103	103
H	540	615	665	715

Note: The dimensions are given in mm.

WARNING: The manufacturer reserves the right to make such product modifications that will not influence its essential properties.

3.4 DESCRIPTION OF BASIC PARTS



- 1 – Blower protective grille (air outlet))
- 2 – Housing
- 3 – Upper lid
- 4 – Control panel
- 5 – Pressure gauge
- 6 – Neck for water outlet pipe connection
- 7 – Neck for water inlet pipe connection
- 8 – Power supply cable

3.5

SAFETY AND CONTROL SYSTEMS

The heating pump is fitted with the following systems:

Heat pump control based on temperature:

- The temperature sensor of evaporator triggers the defrosting process.
- The ambient (outdoor) temperature sensor provides for switching the heat pump OFF, if the temperature drops below 7 °C (factory setting). The normal operation will resume as soon as the ambient temperature has risen to -5 °C (factory setting). For the procedure for changing the factory settings see, please, chapter **5.3 Operating Parameter Setting and Checking**.
- The temperature sensor installed on the heat exchanger provides for switching the heat pump OFF, as soon as the water temperature has achieved its required temperature. The normal operation will resume as soon as the temperature of water in the exchanger has decreased by 2 °C below the set temperature (factory setting).

Safety systems include:

- The water flow rate sensor installed at the heat exchanger inlet.
The flow rate sensor switches the heat pump ON, when water is flowing through the exchanger and switches the pump OFF in the moment the water stops flowing or the flow rate drops below its minimum required value.
- The sensor of minimum/maximum gas pressure in the cooling circuit.
- The temperature sensor in the compressor delivery line.
- Time delay
The equipment is provided with a time-delay device with the set time lag of $Z 1 \div 3$ min. for protecting the control devices in the circuit and removal of repeated restarts and contactor vibrations. This time delay will restart the equipment automatically within approx. 3 minutes after each interruption of heat pump operation. The time delay will be enabled even in the case of a short interruption of power supply and prevent the equipment from starting earlier than the pressures are equalised in the cooling circuit. Any interruption of power supply in the course of the delay will not influence the set time interval.

In the case of failure of any of these systems (if a system defect or disconnection takes place or an abnormal temperature is measured), the relevant error message is displayed on the screen, see chapter **7.3 Error Messages and Their Removal** herein below.

Warning: The removal of any of the safety and control systems or putting it out of operation shall cause cancellation of the guarantee.

4.0

HEAT PUMP INSTALLATION AND CONNECTION

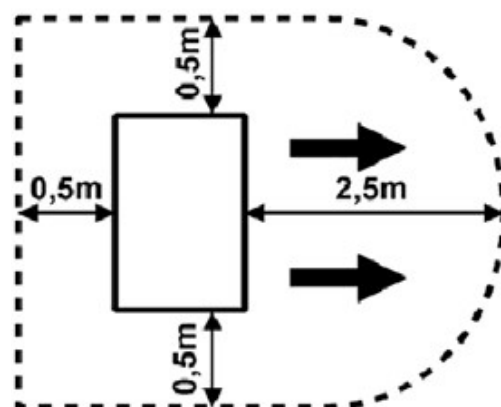
4.1

SITE SELECTION

The heat pump is intended for outdoor installation and will operate well in almost any outdoor environment, provided that the three following prerequisites are met:



- Do not install the heat pump in a contained area with limited access of air, where the air cannot circulate freely enough. Both the inflow and outflow of air should not be restricted in any respect. In the working area around the heat pump, as indicated in the figure, no items can be placed. Do not place the pump among bushes and shrubs that could restrict the access of air. Any obstacle to free circulation will reduce the efficiency of heat exchange and can even result in stopping the pump
- The equipment shall be installed at a place protected from direct sunlight and other heat sources, where it can intake air from a naturally sun heated space. It is further recommended to erect a light roofing above the pump to protect it from direct sunlight and rain.
- Do not place the equipment close to any road where it would come into contact with products of traffic, as any increased dust content in air will cause progressive deterioration of heat exchange efficiency.



- (d) The air outlet should not be directed to areas, where the increased circulation of cold air may be bothering (windows, terrace, etc.). The air outlet should not face against the direction of prevailing winds.
- (e) The equipment distance from the pool edge shall not be shorter than 3.5 m. It is recommended to install the heat pump at the distance of 7 m from the pool provided that the overall length of interconnecting pipe system will not exceed 30 m. One should take into account that the longer the pipe, the greater the heat loss. To get an idea, a 30m long pipe system will show the loss of about 0,6 kW per hour (2000 BTU) for each 5 °C difference between the temperatures of pool water and the ground (provided that the pipe system is buried in dry ground). Such loss represents the increase of 3-5 % in the time of heat pump operation.
- (f) The equipment shall be placed on a firm and even surface, such as a concrete slab or steel base and the heat pump housing shall be padded with vibration isolation mounts (rubber silent-blocks) and attached by bolts or screws to the base in order to reduce noise and extend the heat pump service life
- (g) The rear side of the evaporator consists of lamellae made of soft metal and is liable to mechanical damage. Therefore, adequate measures should be taken and suitable site chosen to have the lamellae protected from damage.

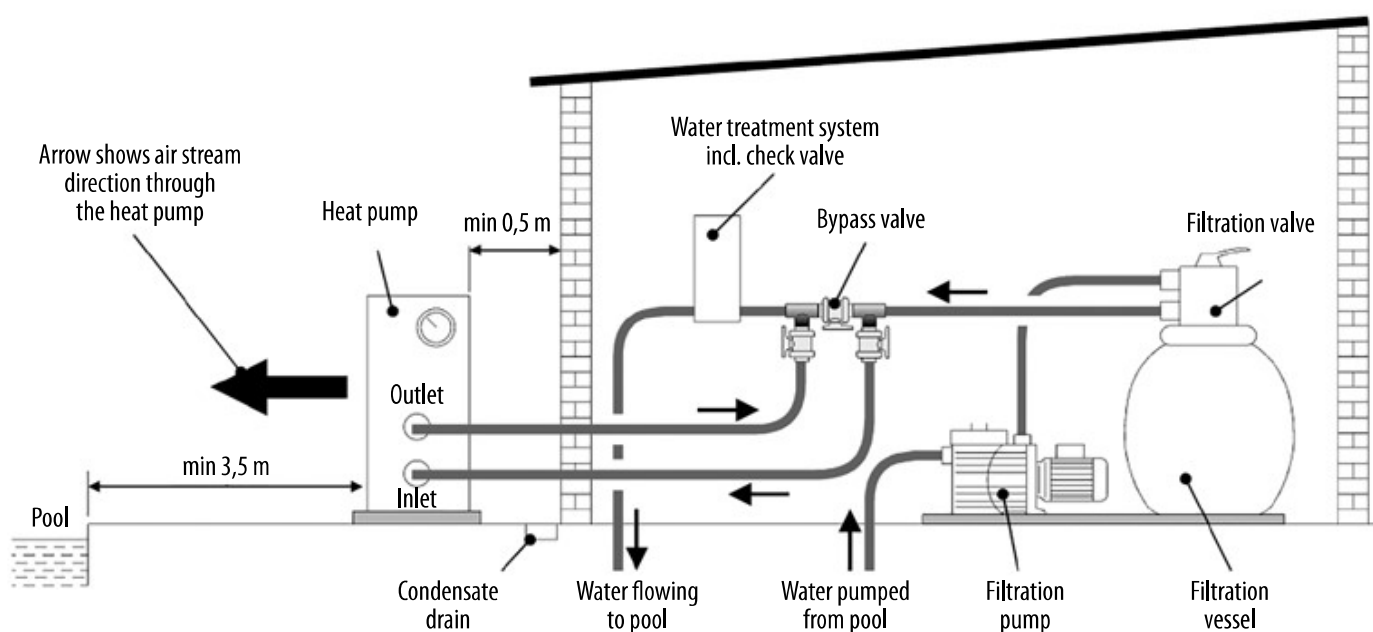
Note: If it is intended to use the heat pump for an indoor pool the supplier should be consulted concerning pump placement and its connection to the pool.

4.2 HEAT PUMP INSTALLATION

- (a) The heat pump should be used in combination with the filtration unit comprising a part of user's installation of the pool. The flow through the heat pump should correspond to its recommended value (see **Table 3.1 Technical Data**) and shall not be more than two times higher. In order to provide for the proper operation of heat pump the **bypass line** shall be installed. The system consists of three valves that allow setting the flow rate through the pump (see chapter **6.2 Operational State Setting Using Bypass**).
- (b) The heat pump is fitted with inlet and outlet fittings with cap nuts and sealing rubber rings for connecting the pump to D50 pipes. For connection to the filtration circuit use a D50 PVC tube, or 50/38 reducing fittings that allow using the \varnothing 38 mm hose. The lower and upper fitting should be used for heat exchanger inlet and outlet, respectively. Before screwing the caps nut on, apply lubricant on the threads. Insert the D50 tube into the sleeve piece of heat exchanger no less than 1 cm and no more than 2 cm. Consider also the use of quick couplers for the heat pump inlet and outlet to make easier its connection to and disconnection from the filtration circuit for draining all water before wintering or commencing maintenance/service works.
- (c) The heat pump shall be connected to the pool filtration circuit downstream of the filter and upstream of the water treatment equipment (automatic chlorine dispenser, ozoniser and so on). A typical connection of filtration circuit is shown on the following figure.

Note: In case the automatic chlorine dispenser is used in the filtration circuit, a check valve with titanium spring shall be installed upstream of the dispenser. Failing this, in the course of pump standby time chlorine concentration will increase in the exchanger of heat pump above its permissible level and cause damage to the exchanger.

Typical connection of the filtering circuit and the heat pump



NOTE: The manufacturer supplies the heat pump only. Other components shown on the figure comprise the parts of appropriate water supply circuit and shall be provided by the heat pump user or installer's firm.

4.3

ELECTRICAL CONNECTION

4.3.1

CONNECTION TO THE MAINS



IMPORTANT: The heat pump is supplied with a power supply cable provided with the plug for connecting it to the mains socket. Socket installation shall meet the requirements of the ČSN 33 2000 standard, including adequate protection and installation of a residual-current circuit breaker (RCCB) of the actuating current not exceeding 30 mA.

The use of a double socket with common switching (by a switch or a timer) is recommended.
The heat pump ON/OFF switching is described in chapters 5 and 6.

4.3.2

PERMANENT ELECTRICAL CONNECTION



IMPORTANT: In case you decide to connect your heat pump permanently it will mean an intervention into its wiring that shall be carried out only by a specialist of appropriate technical qualification and the installation shall meet the following requirements:

- (a) The heat pump together with the power supply for the pump of filtration unit shall be connected via a separate circuit breaker and switch, or, possibly, a timer for its regular starting. The supply cable shall be of adequate size (the cable of 3x2.5 mm² cross section is recommended) and provided with a residual-current circuit breaker (RCCB) of the actuating current not exceeding 30 mA. The parameters of power network (voltage & frequency) shall comply with the equipment ones.
- (b) The electrical connection shall be carried out by a duly qualified technician in compliance with applicable IEC regulations and standards.
- (c) The pump wiring shall be properly grounded. The impedance of grounding circuit shall meet applicable IEC regulations and standards.
- (d) The power and control cables shall be wired and laid in the simplest and easy to understand way, without any useless crossing.
- (e) Before putting it into operation, the wiring system should be carefully checked and measured with the view to eliminating any erroneous connections.
- (f) The following table gives the data of recommended protection:

Heat pump model		BP-85HS-A BP-100HS-A	BP-120HS-A BP-140HS-A
RCCB parameters:	Rated current	16 A /C	16 A /C
	Actuating current	30 mA	30 mA
Circuit breaker value:		16 A /C	16 A /C

5.0



CONTROL UNIT

5.1

FUNCTION OF CONTROL UNIT WITH A LED PANEL



5.2 HEAT PUMP SWITCHING ON AND OFF

- Connect the equipment to the mains (switch the circuit breaker on).
- After switching the system on, press the  key. In operation the display shows the temperature of water at the heat exchanger inlet and the heating mode symbol.
- Press the  key to switch the heat pump off. The equipment will then stay in the standby state.

In the standby state the LED panel shows the actual time (if set).

In the operating state the LED panel displays the current water temperature.

5.3 OPERATIONAL PARAMETER SETTING AND CHECKING

- In the standby state (OFF) press the key ◀ or ▶ to enable the setting interface. By repeated pressing of keys ◀ or ▶ display the parameters 0 – F, see the table below.
- Select the parameter you wish to change and press the **SET** key. Make the required change in its value by operating the keys ◀ and ▶. Press the **SET** key again to store the adjusted value and finish the process.
- By operating the keys ◀ and ▶ in the operating state the set and measured values can be checked. However, no parameters may be changed, excepting setting the target temperatures of water, i.e., parameters 0, 1 and 2.
- If no key is pressed in the course of setting/checking process within the period of approx. 8 s, the screen will change over automatically into its standard display mode.

No.	Meaning	Range	Setting (yes/no)	Factory setting
0	Target temperature in the cooling mode	15 ~ 45 °C	yes	27 °C
1	Target temperature in the heating mode	15 ~ 45 °C	yes	27 °C
2	Target temperature in the automatic mode	15 ~ 45 °C	yes	27 °C
3	Interval of checks of frosting	30 ~ 90 min.	yes	40 min
4	Defrosting start temperature	-30 ~ 0 °C	yes	-5 °C
5	Defrosting stop temperature	2 ~ 30 °C	yes	15 °C
6	Defrosting time	1 ~ 15 min.	yes	6 min.
7	Protection from low ambient temperature	-20 ~ 10 °C	yes	-7 °C
8	Temperature protection at compressor outlet	95 ~ 110 °C	yes	95 °C
9	Automatic restart after power outage	0/1 0(no) 1(yes)	yes	1
A	Mode selection (heating/heating & cooling)	0/1	NO	1
B	Filtration pump mode	0/1	NO	1
C	Adjustment of thermostat sensitivity (difference between switch-out and switch-on temperatures)	1 ~ 10 °C	yes	2 °C
D	Water inlet temperature	-9 °C ~ 99 °C	Read-out value	
E	Coolant temperature at compressor outlet	-9 °C ~ 125 °C	Read-out value	
F	Evaporator temperature	-9 °C ~ 99 °C	Read-out value	
H	Ambient temperature	-9 °C ~ 99 °C	Read-out value	

Note: The factory setting may differ from the data shown in the table.

Note: It is recommended not to change any setting marked with the word **NO**.

Notes on the table of operating parameters:

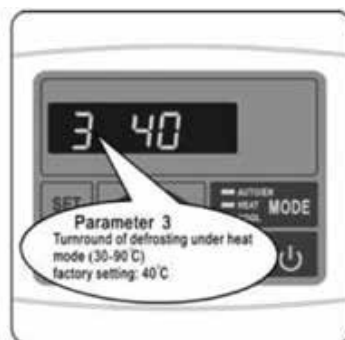
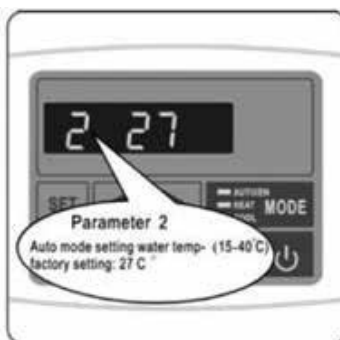
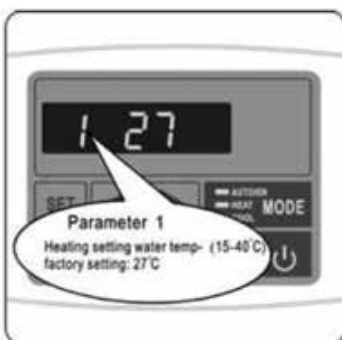
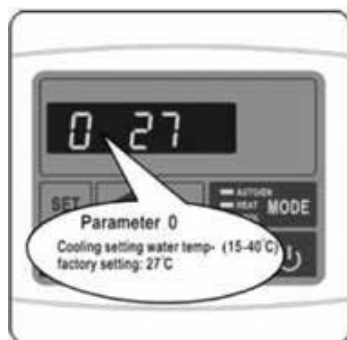
- **Parameters from 3 to 6 – Automatic defrosting setting:**
If the temperature sensor on the evaporator reads a lower temperature than set by Parameter 4 checked in regular intervals given by Parameter 3, the system will switch over into the defrosting mode and terminate this mode after either of the values (temperatures) set in Parameter 5 and Parameter 6 has been achieved.
- **Parameter 8 – temperature at compressor outlet:**
The temperature sensor switches the equipment **OFF** after achieving the set temperature. It is recommended not to change the factory setting.

■ **Parameter 9 – automatic restart after power outage:**

If the position “1” is set, the equipment will start automatically after the power supply has been resumed. If “0” is set, the equipment will await operator’s intervention. It is recommended not to change the factory setting.

■ **Parameter b – filtration pump mode:**

If the filtration pump control system is connected to relevant terminals, the heat pump will control the operation of filtration pump as required.



Parameter 0

Water target temperature setting in cooling mode 15 ~ 45°C (factory setting 27°C)

Parameter 1

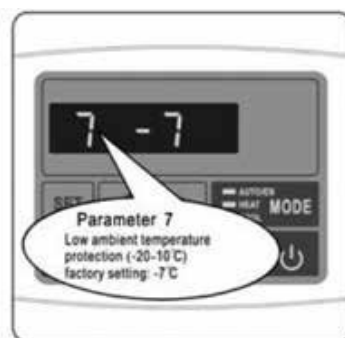
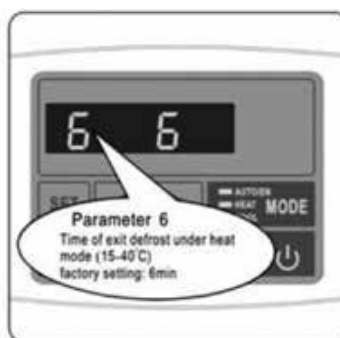
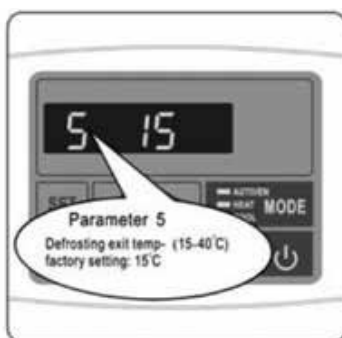
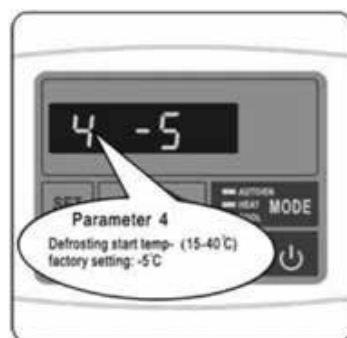
Water target temperature setting in heating mode 15 ~ 45°C (factory setting 27°C)

Parameter 2

Water target temperature setting in automatic mode 15 ~ 45°C (factory setting 27°C)

Parameter 3

Time interval for check for frosting (factory setting 40 min)



Parameter 4

Switch-on temperature for defrosting (factory setting -5°C)

Parameter 5

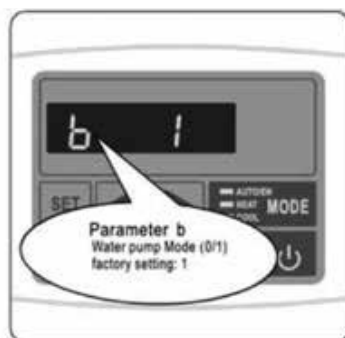
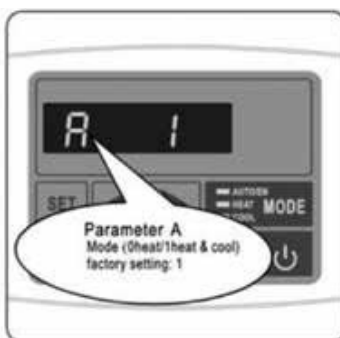
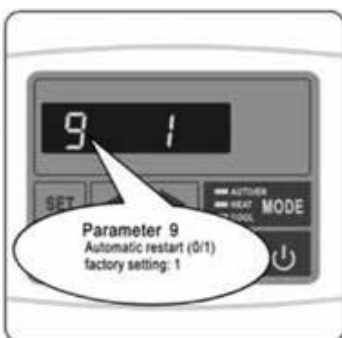
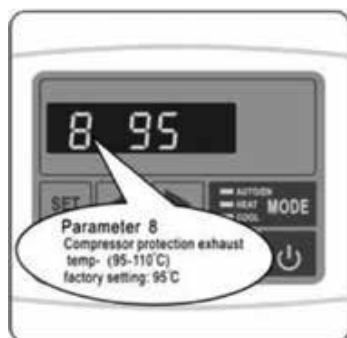
Switch-off temperature for defrosting (factory setting 15°C)

Parameter 6

Defrosting time (factory setting 6 min)

Parameter 7

Temperature of protection from low ambient temperature (factory setting -7°C)



Parameter 8

Protection of compressor outlet temperature 95 ~ 110°C (factory setting 95°C)

Parameter 9

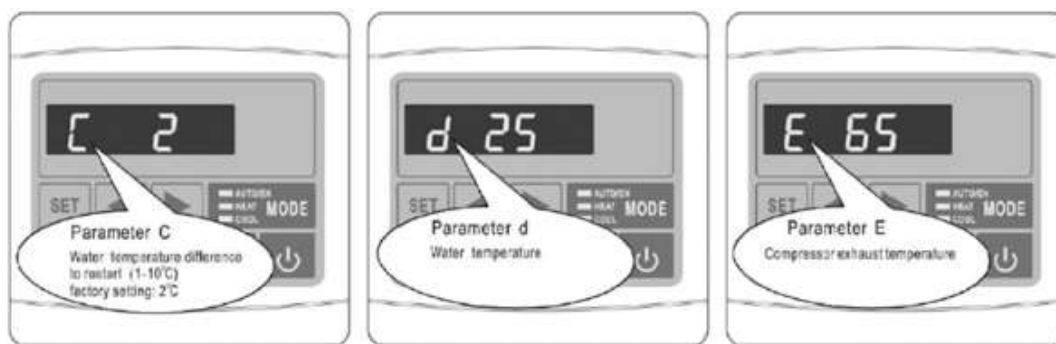
Automatic restart after power outage 0/1 (factory setting 1)

Parameter A

Mode selection (heating / heating & cooling) (factory setting: heating & cooling)

Parameter b

Filtration pump mode 0/1 (factory setting 1)



Parameter C
Temperature difference
for restart 1 ~ 10°C
(factory setting 2°C)

Parameter d
Incoming water temperature

Parameter E
Coolant temperature
at compressor discharge

Parameter F
Evaporator temperature

Parameter H
Ambient temperature

5.4 CHANGE OF OPERATING MODE

The operating mode of heat pump can be changed only if the equipment is in operation.



- Press to switch the equipment on. During operation the display shows the temperature of water at the heat exchanger inlet and indicates the active operating mode.
- Press the key **MODE** to change the mode (AUTO – HEATING – COOLING). You are able to change the operating mode only if the equipment is in operation.
- Press the key ◀ or ▶ to switch the control interface on. Select the parameter for setting the target temperature in question and if you wish to change its value, press the key **SET**. Then using the keys ◀ and/or ▶, set the new target temperature as required.
- The equipment will go off for about three or four minutes and then resume operation in the mode so changed.

5.5 TIME AND TIMER SETTING (CLOCK, TIMER ON, TIMER OFF)

Note: Both the time and the timer can be set only if the equipment is in standby mode.

Note: If no key is pressed in the course of setting process within the period of approx. 8 s, the screen will change over automatically into its standard display mode.

5.5.1 TIME SETTING

- Press the key **CLOCK** and the time shown on the display will start flashing. Press the **CLOCK** key again and using the arrows ◀ and ▶ set the hour. Press the **CLOCK** once more and set the minute in the same way. Finally, confirm your selection by pressing the **CLOCK** key.

5.5.2 TIMER SETTING

- Before attempting to set the timer the time shall be set first.
- Set the start of this working cycle by means of the key **TIMER ON** (green marked). Press the **TIMER ON** key and the time shown on the display will start flashing. Press the **TIMER ON** key again and using the arrows ◀ and ▶ set the hour. Press the **TIMER ON** once more and set the minute in the same way. Finally, confirm your selection by pressing the **TIMER ON** key.
- Set the time of working cycle switch-off in similarly, but using the **TIMER OFF** key (red marked) for the purpose.
- As soon as the timer is set, the heat pump will work in the day mode in compliance with the set times of the start and the end of its working cycle.
- In case the same times are set for the start (ON) and the end (OFF) the cycle, the timer will not commence operation.
- To cancel the timer operation press the **TIMER ON** and **CLOCK** keys in sequence (the green indicator light will go off) and then the **TIMER OFF** and **CLOCK** in the same way (the red indicator light will go off, too).

5.6 CONTROL PANEL LOCKING

Press and hold pressed the keys **SET** and ◀ simultaneously for about 5 seconds. This operation will lock the control panel. Unlock the panel in the same way.

6.0 EQUIPMENT APPLICATION AND OPERATION

6.1 OPERATING INSTRUCTIONS

IMPORTANT:

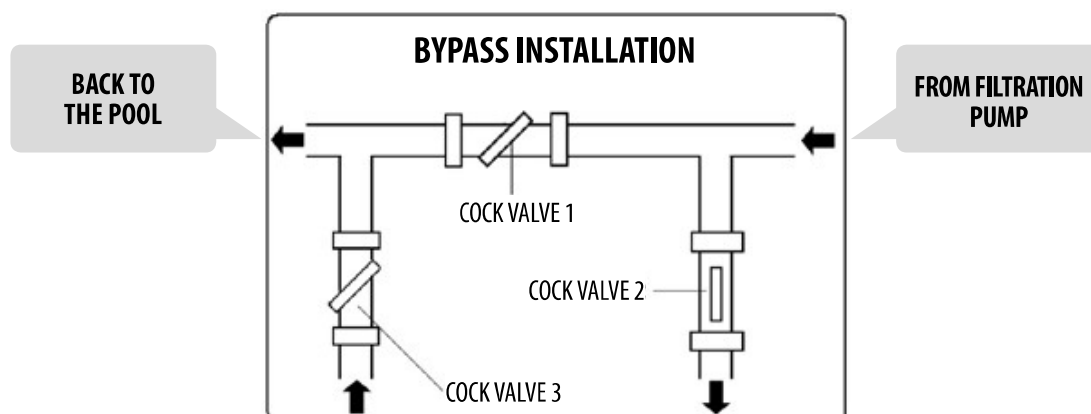
- In order the heat pump to heat the pool the filtration pump has to operate and water must flow through the heat exchanger.
- Never switch the heat pump on if dry and the filtration system is not operating
- Never cover the heat pump, as fresh ambient air must flow through it.
- Protect the heat pump from frost. Before winter season drain all water from the filtration system and the heat pump and store them for winter according to relevant instructions.

6.2 ADJUSTMENT OF OPERATING STATE USING BYPASS

In case a bypass line comprises a part of filtration circuit (it is not delivered as a part of heat pump supply), it may be used for setting the optimum operation of heat pump after putting the latter in operation.

Bypass Use

The bypass line consists of three cock valves installed according to the figure below. On the right water comes from the filtration pump, while on the left it flows through the return line back to the pool.



Close the cock valve 1 completely and open the cock VALVES 2 AND 3 on the inlet and outlet lines of the heat pump, respectively. At these conditions there is the maximum flow through the heat pump. Put the heat pump into operation in the heating mode. Wait until the value of pressure read on the pressure gauge stabilizes. The correct pressure setting should be within the range of 21 – 35 kg/cm² (bar). If the pressure stabilizes below the value of 21 kg/cm², the cock valve 1 should be open a bit and the cock valve 3 closed a bit to reduce the flow rate through the heat pump. If the pressure stabilizes above the value of 35 kg/cm² the flow through the filtration circuit is insufficient and measures should be taken to increase it.

Routine adjustments of the three bypass valves:

COCK VALVE 1: Closed a bit so that the heat pump pressure gauge shows a pressure within the range from 21 to 35 kg/cm² (bar).

COCK VALVE 2: Open.

COCK VALVE 3: Half closed.

6.3 WATER CONDENSATION

Lower temperatures of the evaporator during the heat pump operation are the cause of air moisture condensation on evaporator lamellae and condensate formation. If the relative air humidity is very high, as much as a few litres per hour can be produced. This water will flow down over the lamellae into the space of cabinet bottom and drains away through a plastic fitting designed for connection to a 3/4" PVC draining hose directing the condensate to a suitable sewer system.

It is very simple to mix up the condensed water with water leaked from heat pump inside. There are two simple methods how one can find whether the liquid is the condensate or not:

1. Switch the equipment off and leave the pool pump in operation only. If the water stops flowing out, the condensate is concerned.
2. Make the test for the presence of chlorine in the water in question (provided that chlorine is used for pool water treatment) – condensate should not contain chlorine.

Note: Moisture that can be present near the equipment results from water vapour condensation and is quite OK.

6.4 AUTOMATIC DEFROSTING OF EVAPORATOR

The evaporator has to be defrosted in the heating mode only, as the evaporator lamellae can get iced up by condensate if ambient temperatures are too low. The process runs automatically according to parameters set for the defrosting mode, see chapter 5.3 **Operating Parameter Setting and Checking**. The following process refers to setting the parameters 3, 4, 5 a 6.

Course of Defrosting:

- 1 – **Process start:**
The defrosting system will switch-on, if the following conditions are met at the same time:
 - The temperature measured by the temperature sensor of defrosting drops below -5 °C (the measurement is made in each 40 minutes of operation).
 - The compressor runs for 40 minutes continuously, without interruption.
- 2 – **Both the compressor and blower are stopped.**
- 3 – **After the delay of approx. 20 second the four-way valve is reconfigured.**
- 4 – **One minute after stopping (only) the compressor starts and the frost deposit accumulated on the lamellar evaporator begins to thaw out which is usually associated with vapour formation.**
- 5 – **Process end:**
Defrosting is finished as soon as either of the following conditions is met:
 - The temperature of the temperature sensor rises to 15 °C.
 - The compressor runs for the total time of 6 minutes only.
- 6 – **The compressor stops.**
- 7 – **One minute (approx.) after it has stopped the four-way valve is reconfigured.**
- 8 – **Within two minutes of stopping the compressor starts again together with the blower in the heating mode.**

6.5 FORCED DEFROSTING

In case that frost begins to deposit on the evaporator one can make use of the forced defrosting function.

Press and hold pressed the key **MODE** for about 10 seconds. The equipment will start defrosting the evaporator. The mode of forced defrosting will terminate as soon as the set defrosting parameters are achieved. Then the equipment will stop for a minute (approx.) and resumes operation in its normal heating mode.

Note: The defrosting parameters can be set – for details see chapter 5.2 **Operating Parameter Setting**.

Note: Neither automatic nor forced defrosting can be used in case the heat pump operates in the cooling mode.



DANGER: Use the mode of forced defrosting only if there is a real frost deposit on the evaporator. The application of forced defrosting in other events may result in equipment overheating, coolant leakage or even damage to the equipment.

6.6 POSSIBLE PROBLEMS DUE TO EXTERNAL CONDITIONS

Under certain external conditions the exchange of heat may be insufficient between coolant and water on one side and coolant and air on the other side. It results in a pressure increase in the cooling circuit and increased power consumption of the compressor. The temperature sensor fixed at compressor discharge line and the circuit breaker in the supply line will protect the equipment from such extreme conditions. The display will show the error message EE 6.

This state is due to the following causes:








HEATING MODE	COOLING MODE
<p>Insufficient water flow rate. Close the bypass valve to increase heat transfer from water to water</p>	<p>Too high water flow rate. Open the bypass valve to reduce water flow rate and increase thereby the heat transfer from water to coolant.</p> <p>Insufficient flow of air. Make sure that evaporator lamellae are not fouled.</p>





Note: This error message will be most possibly displayed when the temperatures both of pool water and of ambient air are high.

6.7 REMARKS ON HEAT PUMP OPERATION

- Heat pump efficiency will increase with the increasing temperature of ambient air.
- The achievement of required pool water temperature may take a few days. This time is quite normal and depends particularly on climatic conditions, the volume of pool water, size of water surface area, time of heating pump operation and pool heat loss (caused by evaporation, heat transfer through pool walls, radiation, etc.). Failing to take measures to limit the heat loss, it will not be economical, or even possible, to maintain any higher temperature of pool water.
- To limit the heat loss at the time in which the pool is out of use, a cover or solar blanket can be used.
- The temperature of pool water should not exceed 30 °C. Warm water has not any refreshing effect and, moreover, creates favourable conditions for microbial growth (of algae, etc.). In addition, certain pool components may have temperature limits, for instance the foils of foil pools can get soft and lose their firm shape. Do not set any higher temperature than 30 °C on your thermostat.

6.8 SIMPLIFIED DESCRIPTION OF CONTROL

Activity	Remote device or control key of heat pump		Display	Heat pump response
Heat pump		Connect the supply cable plug in the mains socket or switch ON the circuit breaker of HP supply circuit (in case of fixed connection;		Shows the current water temperature.
HP) power ON		Switch the filtration pump ON	dtto	
Switching ON the pool water circulation in the pipe system	◀ and ▶	Selectable within the range of 15 °C to 45 °C		The HP heats or cools water until achieving its required temperature
Setting pool water temperature		Press the key		The HP will be put into operation within the time interval of 1 – 3 min in its previously set operating mode (heating or cooling).
Heat pump starting	MODE	Press the key MODE		The HP will stop for 3 – 4 min, its mode changes and the HP starts in the newly set mode.

Activity	Remote device or control key of heat pump		Display	Heat pump response
Stop		Press the key		The HP stops immediately and stays in the standby state.
Switching OFF		Pull out the supply cable plug from the mains socket or switch OFF the circuit breaker of HP supply circuit (in case of fixed con-nection).		The heat pump gets completely switched OFF.

7.0 MAINTENANCE AND INSPECTION

7.1 MAINTENANCE



CAUTION: The equipment includes live electrical components. Only an electrician of adequate technical qualification may open the housing. There is a risk of electrical accident!



IMPORTANT: Before any attempt to make intervention into the equipment make sure it is fully disconnected from its power supply.

- (a) Clean regularly both the pool and the filtration unit to protect the equipment from damage due to fouled or clogged filter.
- (b) Inspect regularly the power supply system, the condition of the supply cable in particular. In case the equipment begins to show operational irregularities, switch it off immediately and contact an authorised service centre.
- (c) Check regularly the working area of heat pump (see the figure in chapter 4.1 Site Selection) and keep it clean and free of debris, dead leaves or snow.
- (d) If the heat pump is not used, disconnect it from the mains, drain it and cover it with an impermeable tarpaulin or PE foil.
- (e) Wash the heat pump exterior with clean water and an ordinary kitchenware cleaning agent.
- (f) Using a soft brush clean regularly the outer surfaces of evaporator and keep it free of any stuck dirt. The lamellae can be carefully cleaned using a flat, not sharp tool. The guarantee shall not apply to any mechanical damage to the lamellae.
- (g) Check regularly the tightness of screws (bolts) anchoring the equipment to the support and the screws fixing the covers. Check the supply cable for damage and wear. Clean any rusted parts with a wire brush and treat them with corrosion resistant coating.
- (h) Regularly remove the top cover and clean the heat pump from dirt.
- (i) Any repair shall be carried out by a duly qualified technician.
- (j) Any maintenance work of the cooling system shall be carried out by a duly qualified technician.

7.2 WINTERING

- (a) Disconnect the heat pump from the mains.
- (b) Close the bypass cock valves nos. 2 and 3 (see the figure in chapter 6.2 Adjustment of Operating State Using Bypass).
- (c) Drain all water from the heat pump by disconnecting the pipe system from both connections of the filtration circuit (**THERE IS A RISK OF FREEZING**).
- (d) **Suck all residual water from the evaporator to leave it dry (THERE IS A RISK OF FREEZING).**
- (e) Reconnect the filtration circuit (do not tighten its connections) to protect the heat pump against ingress of dirt or water.



IMPORTANT: Correct wintering is very important. No water can be left in the heat exchanger. The guarantee shall not apply to any exchanger damage caused by frost.