4. Installation.

⚠ The heat pump must be installed and commissioned by specialised technicians and in keeping with current national system regulations.

⚠ Installation must be conducted evaluating all the specific site factors: vicinity and height of walls, public accessibility, etc.

4.1. Inspection.

⚠ Upon receiving the heat pump, check packaging integrity. The machine should come with complete **manuals**, for the user and for installation.

4.2. Handling.

⚠ The unit is equipped with suitable protections to protect the heat pump for any damages during handling. Avoid exerting pressure on the sides of the packaging.

Once the heat pump is unpacked, avoid exerting pressure on the body, plate heat exchanger and fan protection net. See Figure 1.

4.3. Positioning.

⚠ The heat pump must be positioned by specialised technicians and in keeping with current national system regulations.

The heat pump must be carefully positioned considering the following aspects:

- Dimensions and origin of hydraulic tubes.
- Location of the power supply.
- Support and its location.
- Necessary clearance.
- Noise wave and vibration echo.
- Condensation discharge.

4.3.1. Support and its location.

⚠ **The heat pump must be installed outdoors. It cannot be installed indoors and must be at least 3.5 [m] from the pool surface (zone 2[16]).**

⚠ **During normal operations, the heat pump plate heat exchanger produces condensation. The amount of condensation produced varies according to ambient conditions. The higher the air humidity, the higher the amount of condensation produced. The heat pump comes with a condensation drain. Make sure there are no obstacles to condensation draining.**

The heat pump must be positioned to avoid damages attributable to any water or condensation leaks. If necessary, install suitable discharge outlets or collection containers.

⚠ The heat pump must be installed on a solid and level support (cement slab or prefabricated platform). Avoid positioning the heat pump on instable ground. In this case, installing a suitably dimensioned support slab or platform is recommended. The support surface must be slightly tilted to promote correct rain water and condensation draining from the device base.

Support surface inclination must be a maximum of 2%.

⚠ Make sure the pump is not subject to rain water flows from nearby building roofs. Protruding roofs without gutters could pour significant amounts of water and/or debris on the heat pump which could damage it. If necessary, install gutters or discharge outlets to protect the heat pump.

⚠ **If the heat pump is installed under the pool level, any water leaks could cause significant water leaks or floods. Shott International SRL is not liable for any of said leaks, floods or consequent damages.**

⚠ Make sure the heat pump is not within the range of action of any irrigation systems. If necessary, install suitable protections.

[16] See CEI 64-8/7 for pool zone classifications.

4.3.2. Necessary clearance.

Minimum clearance required for heat pump installation is illustrated in the following figure.

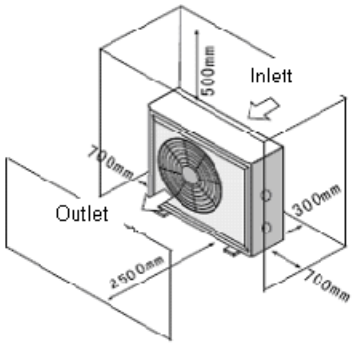


Figure 2: Clearance required for correct installation.

Clearance guarantees accessibility during SERIES BP heat pump maintenance and operations.

⚠ Avoid hot air from circulating between machine distribution and suction. See Figure 2. For this purpose, avoid all situations in which there could be an obstacle to the free flow of air produced by the fan. Specifically, pay careful attention to the direction of strong winds in the heat pump installation area. Strictly avoid installing the heat pump where the direction of strong wind is contrary to heat pump flow.

4.3.3. Noise wave echo.

SERIES BP heat pumps were designed with special attention to noise and vibrations. Retail or accessory shock absorbers can be used to diminish vibrations and noise.

Figure 3: Shock absorber supports.

To diminish noise wave echoes, avoid positioning the pump in the immediate vicinity of vertical walls.

4.4. Disposal.

4.4.1. General instructions.

⚠ Collecting recyclable material, both those used for packaging (cardboard, nylon, etc.) and those replaced during routine and extraordinary maintenance is recommended.

Suitable collection of waste material for recycling, processing and environmentally compatible disposal contributes in avoiding possible negative effects on the environment and health and promote the reuse and/or recycling of device materials.

Illicit product disposal by the user may be punishable by current national laws.

⚠ 2. Heat pump decommissioning.

When the unit reaches the end of its working life and must be removed and/or replaced, follow the instructions below:

- Refrigerant gas must be collected by specialised technicians and sent to collection centres.
- Compressor lubricant oil must be collected by specialised technicians and sent to collection centres.

- The body and various parts, if unusable, should be dismantled and divided according to their material type (for example, copper, aluminium, plastic, etc.) and must be sent to collection centres.

4.4.3. Electric/electronic waste disposal.

In keeping “Implementation of Directives 2002/95/CE, 2002/96/CE and 2003/108/CE” on the reduction of the use of hazardous substances in electric and electronic material as well as waste disposal. The barred bin symbol on the equipment or packaging indicates that the product must be separated from other waste at the end of its working life. Therefore, the user must take equipment to electronic and electro-technical waste collection centres at the end of its working life or return it to the dealer when purchasing similar new equipment, on a one to one basis. Suitable collection of decommissioned equipment for recycling, processing and environmentally compatible disposal contributes in avoiding possible negative effects on the environment and health and promote the reuse and/or recycling of device materials. Illicit product disposal by the user may be punishable by current national laws.

4.5. Hydraulic connections.

4.5.1. Warnings.

The heat pump hydraulic connections must be performed by specialised technicians and in keeping with current national system regulations.

During hydraulic connections, avoid using free flames near or within the heat pump.

The following retail components are recommended for hydraulic connections:

- Cut-off valves upstream and downstream from the heat pump to facilitate maintenance and/or heat pump bypass from the pool hydraulic system.
- Hydraulic circuit charge and drain valve for the heat pump.
- Hydraulic circuit bypass valve, see Figure 6.
- Mechanical filter upstream from the heat pump, usually a sand filter.
- Non-return valve, installed between the pool and the heat pump output fitting, to prevent water reflux.

Tubes that have the same diameter of the heat pump inlet and outlet are recommended for upstream and downstream heat pump connections.

During periods of heat pump disuse, for example, during the winter, drain water from the heat pump circuit and heat pump.

Chemical dosing devices, when applicable, must be installed downstream from the heat pump and non-return valve. This prevent chemically saturated water reflux which could damage the heat pump.

4.5.2. Installation hydraulic layout.

The hydraulic circuit where the heat pump is installed must be created observing the following general layout.

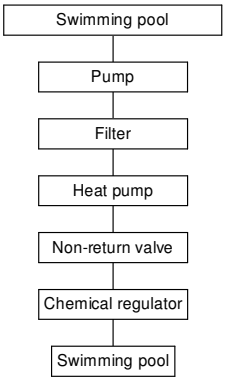


Figure 4: General hydraulic circuit layout.

The pump must be hydraulically connected with PVC tubes with 50 [mm] external diameters.Tubes must be inserted in the fittings for about 1÷2 [cm] and secured with the supplied fast connections.

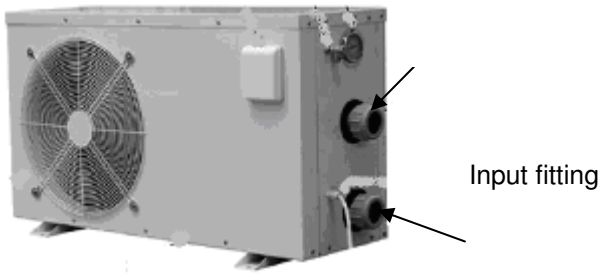


Figure 5: Hydraulic connections

The hydraulic circuit is usually created as illustrated in the following figure.

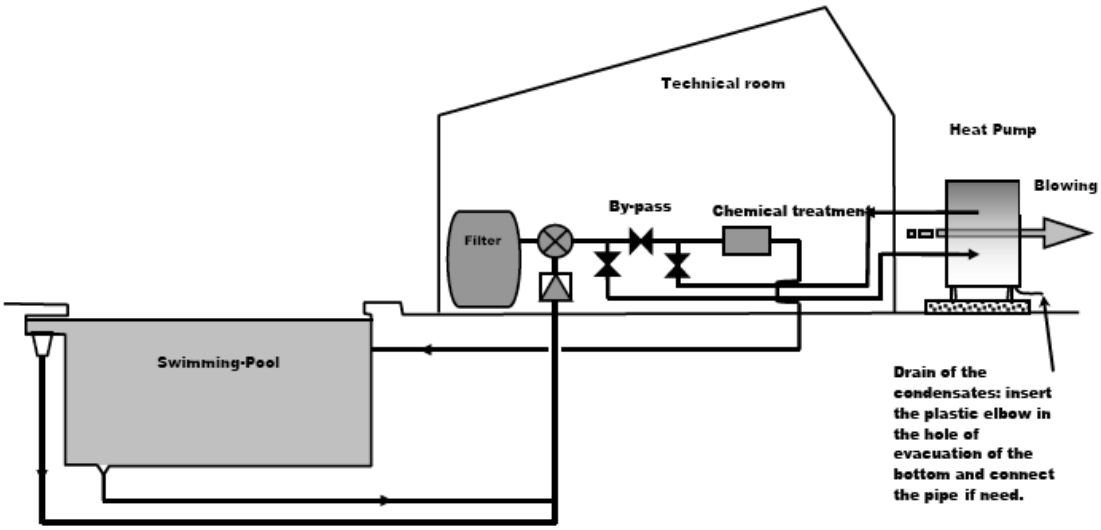


Figure 6: Typical hydraulic circuit part layout.

***Minimum heat pump water input flow* must not be under the value required for the model in question. See Paragraph 2.** For system layouts such as that in Figure 6, water flow can be regulated using the bypass valve.

4.6. Electrical connections.

⚠ **The heat pump electrical connections must be performed by specialised technicians and in keeping with current national system regulations.**

⚠ **Working on live electrical equipment is prohibited. Before starting work, make sure the heat pump is disconnected from the electrical mains.**

Electrical connections must be performed as illustrated in the wiring diagram in Figure 10.

⚠ Power voltage must not vary more than 10 % from the nominal value. It must be within the 207÷253 [V] interval. If power voltage is subject to frequent variations, contact specialised technicians for suitable protection devices.

Install a protection device, circuit breaker with delayed type 16 [A] fuse, upstream from the heat pump. This protection device must only service the heat pump. Furthermore, install a contact switch protection device, circuit breaker, that has nominal operating differential current not over 30 [mA].

Figure 7: Protection device and/or contact switch.

⚠ The electrical mains connected to the heat pump must be grounded.
If a socket is installed for electrical mains connections, the latter must have a protection grade no lower than IPX4 and must have a grounding terminal. The same applies for the mains which must be grounded.

4.7. Socket installation for mains connections.

⚠ Use a socket with nominal current no lower than 16 [A] equipped with a grounding terminal with protection grade no lower than IPX4.

Proceed as follows to install the mains connection socket:

⚠
- **Make sure the heat pump is disconnected from the mains.**
- Open the socket and connect the heat pump power wires to the terminals. Make sure electrical connections observe that illustrated in the following figure, Figure 8. Terminal names:
  - L. phase conductor;
  - N, neutral conductor;
  - ⏚, grounding conductor.
- Close the socket.

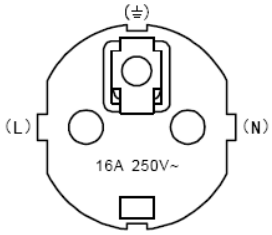


Figure 8: Socket connection illustration.

4.8. Mains connection cord replacement.

⚠ Use a three-polar cord no lighter than an ordinary rubber sheathed flexible cord[17], each conductor section must not be lower than 1.5 [mm^2].

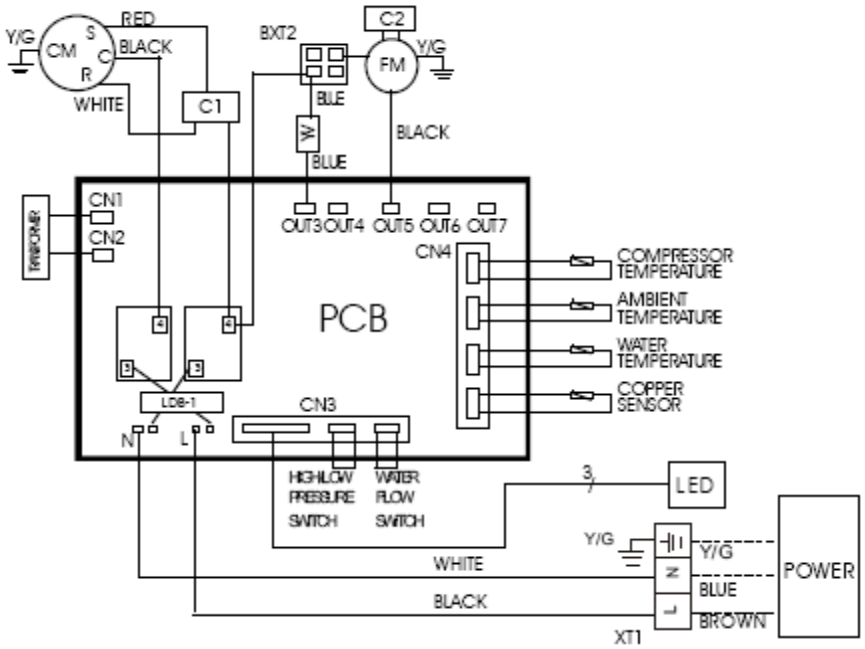
Proceed as follows to replace the mains connection cord:

⚠
- **Make sure the heat pump is disconnected from the mains.**
- Remove the upper heat pump panel by unscrewing the fastening screws.
- Remove the control board protection panel by unscrewing the fastening screws.
- Disconnect the mains connection wire from the terminals, see Figure 9 and Figure 9.
- Install the new mains connection cord using the supplied or similar raceway.
- Connect the connection cord to the electrical mains observing terminal names:
  - L. phase conductor;
  - N, neutral conductor;
  - ⏚, grounding conductor.
- Reassemble the control board protection panel and upper panel.

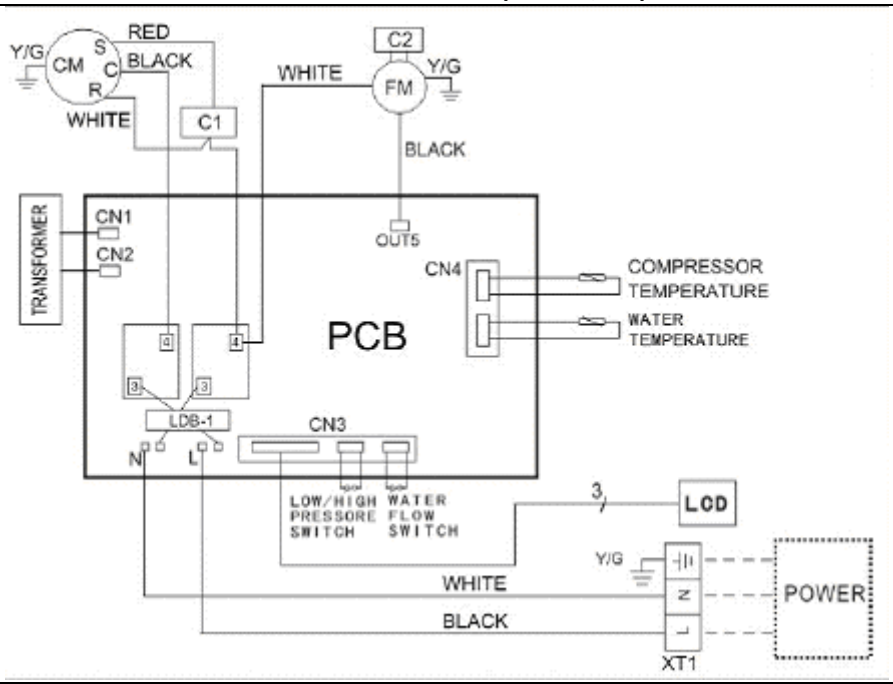
Figure 9: Mains connection terminals.

[17] 60245 IEC 57 designation.

Model BP-xxHS-A (xx=50, 85, 100).



Model BP-xxWS-B (xx=35, 50).



Model BP-160HS-A.

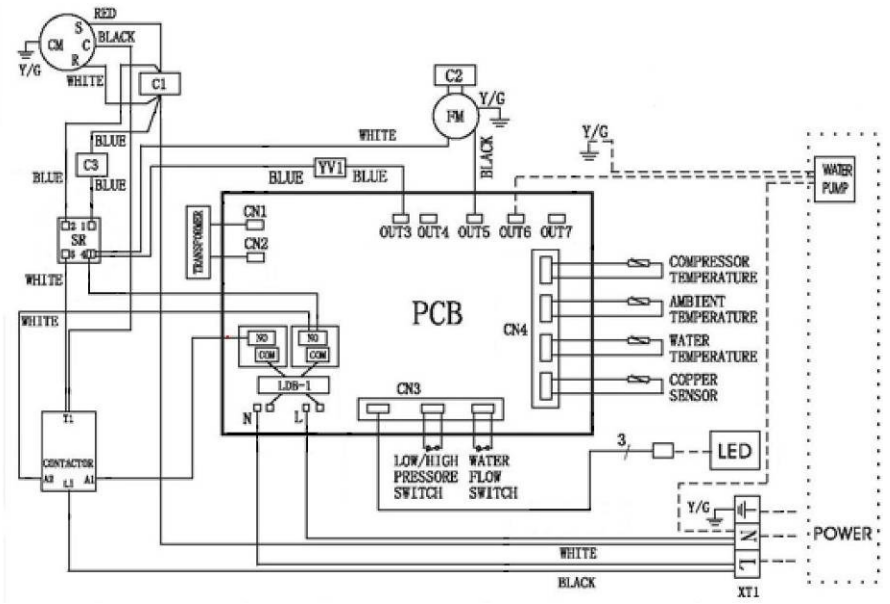


Figure 10: Wiring diagram.

YV	Four way valve
FM	Fan motor
CM	Compressor
PCB	Control board
LDB-1	Dispersion sensor
XT1	Electrical mains connection terminals
XT2	Hub
C1	Compressor capacitor
C2	Fan capacitor

Table 1: Control board part legend.

4.9. Commissioning, preliminary checks.

4.9.1. Commissioning, precautions.

⚠ Before starting the pump, make sure there is water in the pool, that the skimmer and suction fittings, when installed, are submerged, that the cut-off valves do not prevent water flow from the pool to the heat pump and vice versa and that the circulation pump is on.

4.9.2. First start-up, preliminary checks.

⚠ At first heat pump start-up, make sure that:

- the electrical mains were connected in keeping with current national system regulations, see Paragraph 4.6.
- there are no refrigerant fluid leaks checking the pressure on the manometer, see Paragraph 5.3, using leak detection devices.
- Make sure hydraulic connections were correctly performed, see Paragraph 4.5.
- Make sure all body panels are in place and locked with screws.
- Make sure there are no impediments to free water flow from the pool to the heat pump and vice versa.

5. Operations and use.

5.1. Introduction.

Please read the paragraph on energy savings, see Paragraph 1.5.
SERIES BP heat pumps are equipped with control boards which, thanks to a simple but functional interface, allow heat pump programming to guarantee efficient service.

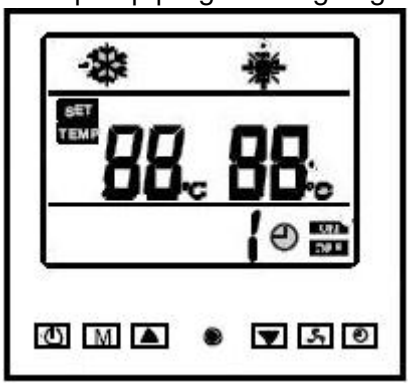


Figure 11: Heat pump panel.

	Heat pump on/off button.
M	Operating mode selection button (heating/cooling[18]) or operating parameter programming access.
	Up button.
	Down button.
	Multi-function button.
	Timer or temperature control on/off button.
	Heat pump operating mode indication: cooling.[19]
	Heat pump operating mode indication: heating.

Table 2: control panel display symbol key.

5.2. Control panel use.

The control panel displays all information required for the user, data and/or error messages. Please see Paragraph 7.5.

5.2.1. Turning on the heat pump.

Use the protection device and/or contact switch to turn on the heat pump. Please see Paragraph 4.6.

5.2.2. Standby.

Water temperature is displayed when the heat pump is turned on. Please see Figure 12. The heat pump is in standby conditions. It does not heat or cool pool water.

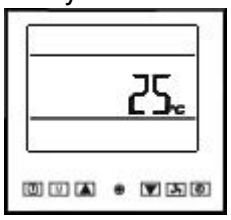


Figure 12: Heat pump display in standby conditions.

5.2.3. Turning off the heat pump.

Use the protection device and/or contact switch to turn off the heat pump. Please see Paragraph 4.6.
Make sure the heat pump is in standby before turning it off.

[18] **The BP-xxWS-B (xx=35, 50) model has only one operating mode: heating.**
[19] **Operating mode not included in model BP-xxWS-B (xx=35, 50).**

5.2.4. Starting the heat pump.

To start the heat pump, press . The heat pump starts within 3 minutes. The last selected operating mode (heating or cooling[20]), see Figure 13. Figure 14 and Paragraph 5.2.13.8, the last temperature set and the current pool water temperature (heating or cooling) is immediately displayed.

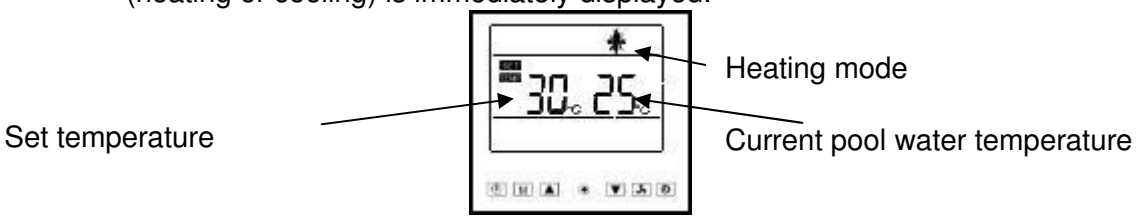


Figure 13: Heat pump display when turned on, heating mode.

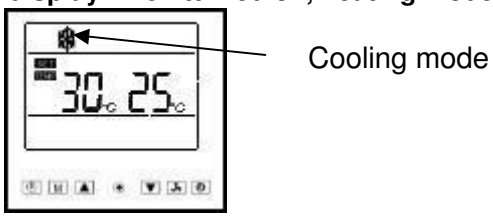


Figure 14: Heat pump display when turned on, cooling mode.

5.2.5. Operating mode selection[21].

Start the heat pump, see Paragraph 5.2.4, press M to select the operating mode:

- Heating, is displayed, see Figure 13.
- Cooling, is displayed, see Figure 14.

⚠ Whenever the operating mode changes, the set temperature is switched to the following default values:

- Heating mode, 40 [°C].
- Cooling mode, 30 [°C].

Thus, the set temperature must be regulated, see Paragraph 5.2.6, whenever the operating mode changes.

5.2.6. Set temperature regulation.

⚠ Before regulating the set temperature, carefully read the instructions in Paragraph 1.4.

Set temperature can be regulated by pressing ▲, to increase it and ▼, to decrease it. Set temperature can be selected in the interval 5÷45 [°C].

Parameter programming, upon heat pump assembly, guarantees that the difference between pool water temperature and set temperature is never over 3 [°C] as illustrated by the following examples:

- Heating mode, set temperature 30 [°C], pool water temperature is never under 27 [°C].
- Cooling mode, set temperature 15 [°C], pool water temperature is never over 18 [°C].

5.2.7. Minimum working temperature and restart temperature[22].

Once the pump is started, see Paragraph 5.2.4. if the ambient temperature is lower than the minimum working temperature, the heat pump stops, displaying error message “EE C”, and only restarts if the ambient temperature exceeds the restart temperature. When the pump is constructed, the minimum working temperature and

[20] **Operating mode not included in model BP-xxWS-B (xx=35, 50).**
[21] **Not included in model BP-xxWS-B (xx=35, 50).**
[22] **Not included in model BP-xxWS-B (xx=35, 50).**

restart temperature are a –15 [°C] and –13 [°C] respectively, minimum admissible values.

⚠ The minimum working temperature must be at least 2 [°C] lower than the restart temperature.

Proceed as follows to set minimum working temperature:

- When the pump is in standby, see Paragraph 5.2.2, press ⏻ and hold down for 3 seconds.

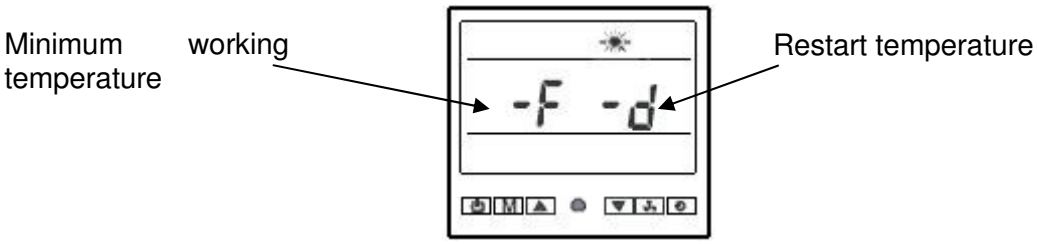


Figure 15: Minimum working temperature and restart temperature.

- Regulate minimum working temperature with keys ▲ (increase), ▼ (decrease). Minimum working temperature cannot be under –15 [°C] (-F), the regulation interval for minimum working temperature is -15÷97 [°C].
- Press ⏻, to regulate the restart temperature.
- Regulate restart temperature with keys ▲ (increase), ▼ (decrease). Minimum restart temperature cannot be under -13 [°C] (-d), the regulation interval for restart temperature is -13÷99 [°C].

5.2.8. Automatic start settings.

When the pump is in standby, see Paragraph 5.2.2, press ⏲ to turn on the automatic start mode. Press ▲ (increase), ▼ (decrease) to select when the heat pump should automatically start (1÷24 hours).

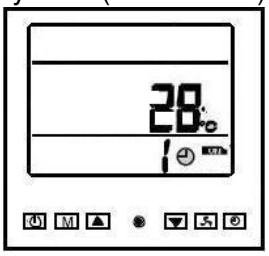


Figure 16: Automatic start settings.

⚠ Automatic start can only be set when the pump is in standby, see Paragraph 5.2.4.

5.2.9. Automatic standby settings.

When the pump is running, see Paragraph 5.2.4, press ⏲ to turn on the automatic standby mode. Press ▲ (increase), ▼ (decrease) to select when the heat pump should automatically return to standby mode (1÷24 hours), see Paragraph 5.2.2.

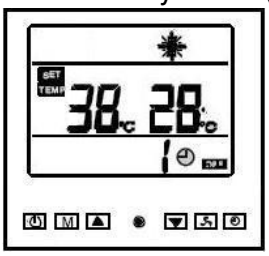


Figure 17: Automatic standby settings.

Automatic standby can only be set when the pump is running, see Paragraph 5.2.4.

5.2.10. Manual defrost[23].

Frost may form on the plate heat exchanger during normal operations in heating mode, see Figure 1. Frost on the plate heat exchanger reduces heat pump performance. Frost is formed during heating mode because the heat pump cools surrounding ambient air to heat water. SERIES BP pumps are equipped with a temperature sensor that detects frost on the plate heat exchanger and starts automatic defrost. However, if this is insufficient, manual defrost can be started.

⚠ Manual defrost can only be started when the heat pump is running in heating mode.

When the pump is running, see Paragraph 5.2.4, press and hold down for 5 seconds to turn on manual defrost. Manual defrost lasts several minutes. At the end of the manual defrost cycle, the heat pump automatically starts.

When defrosting, refrigerant fluid pressure is increased to make refrigerant fluid hotter so that it heats the plate heat exchanger during circulation to defrost.

⚠ When defrosting, refrigerant fluid pressure significantly increases. For further information, see Paragraph 5.3.

⚠ The heating mode icon blinks during defrost. See Figure 18.

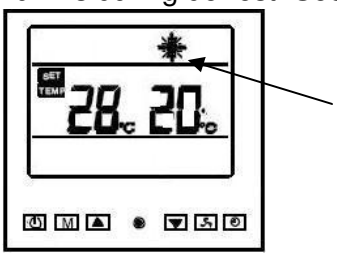


Figure 18: Manual defrost.

5.2.11. Key lock.

Keys can be locked to prevent accidental regulations.

To lock keys, press and simultaneously hold down keys and for 5 seconds.

Symbol will appear on the display. See Figure 19 and Figure 20.

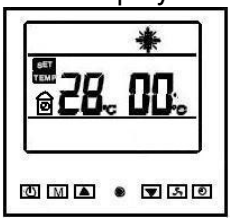


Figure 19: Key lock, heating mode.

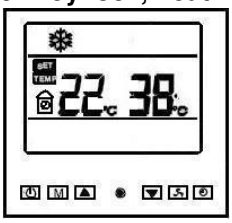


Figure 20: Key lock, cooling mode.

5.2.12. Sensor temperature display.

SERIES BP heat pumps are equipped with 4 temperature sensors that continuously read pool water, ambient[24], compressor and plate heat exchanger temperatures[25].

[23] **Operating mode not included in model BP-xxWS-B (xx=35, 50).**
[24] **Not included in model BP-xxWS-B (xx=35, 50) where the sensor is not installed.**
[25] **Not included in model BP-xxWS-B (xx=35, 50) where the sensor is not installed.**

The temperature read by each sensor can be displayed by pressing (for model BP-xxWS-B (xx=35, 50), press) and hold down for 3 seconds with the pump is running, see Paragraph 5.2.4. To display temperatures read by the various sensors, press (for model BP-xxWS-B (xx=35, 50), press). The temperature read by the sensor is displayed for 10 seconds, if no other key is pressed, or press to return usual information to the display, see Figure 13 and Figure 14.

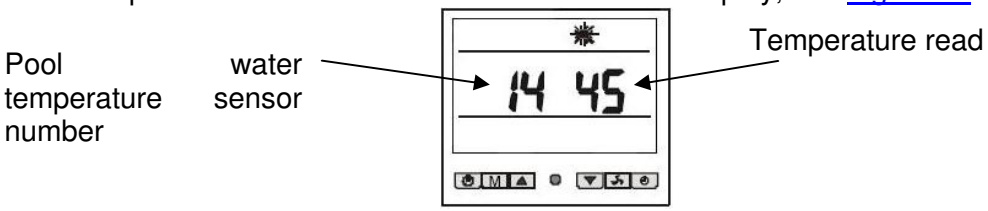


Figure 21: Pool water temperature sensor.

Figure 21

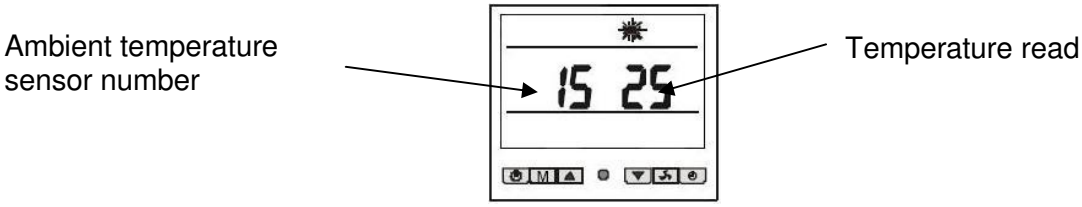


Figure 22: Ambient temperature sensor[26].

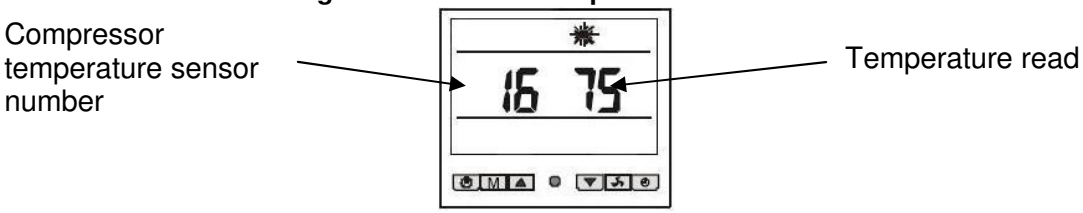


Figure 23: Compressor temperature sensor.

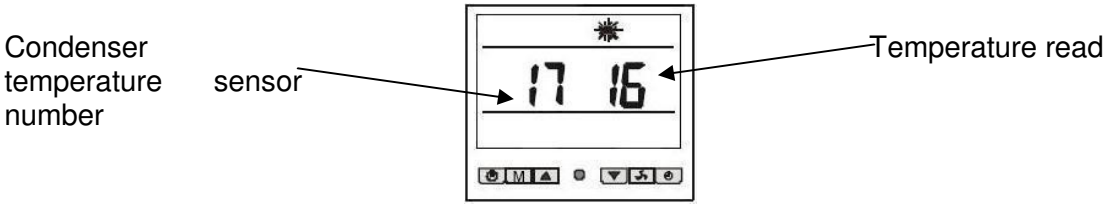


Figure 24: Condenser temperature sensor.

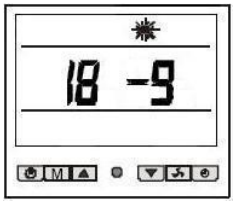


Figure 25: Sensor not used[27].

5.2.13. Functional parameter settings.

⚠ **This paragraph is exclusively reserved to specialised technicians in charge of heat pump installation. Changing functional parameters, if incorrectly performed, can compromise correct heat pump operations.**

When the pump is in standby, see Paragraph 5.2.2, press and hold down for 3 seconds to access programming parameters. Press to select the required parameter and change the value using keys (increase), (decrease). If no

[26] **For model BP-xxWS-B (xx=35, 50), parameter 15 indicates the compressor temperature sensor.**
[27] Not used for SERIES BP heat pump control.

key is pressed within 10 seconds or if ⏻ is pressed, usual standby mode information is displayed, see Paragraph 5.2.2.
Each parameter is marked by an identification number. The following table lists for each parameter:

- Identification number
- Description.
- Admissible value range.
- Default settings (set at heat pump assembly).

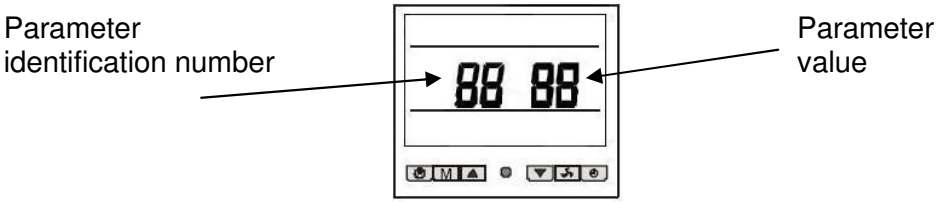


Figure 26: Parameter programming.

⚠ Some of the parameters listed in the following table may not be used for SERIES BP heat pump control.

BP-xxHS-A (xx=50, 85, 100, 160) models.				
Identification number	**Description.**	**Admissible value range.**	**Editable**	**Default value**
0	Pool temperature regulation range	0÷1	**No**	0
1	Automatic defrost start temperature	-20÷10 [°C]	Yes	-7 [°C]
2	Automatic defrost stop temperature	5÷45 [°C]	Yes	12 [°C]
3	Automatic defrost repetition time	30÷150 [min]	Yes	F0 (150 [min])
4	Defrost duration	1÷15 [min]	**No**	3 [min]
5	Compressor protection temperature	70÷110 [°C]	Yes	95 [°C]
6	Parameter not used	0÷60 [°C]	**No**	7 [°C]
7	Parameter not used	0/1	**No**	1
8	Automatic restart	0/1	**No**	1
9	Operating mode	0/1/2/3	**Not recommended**	1
10	Maximum deviation from set temperature	1÷10 [°C]	Yes	3 [°C]
11	Control mode	0/1	**No**	0
BP-xxWS-B (xx=35, 50) model.				
Identification number	**Description.**	**Admissible value range.**	**Editable**	**Default value**
0, see previous table parameter 10	Maximum deviation from set temperature	1÷10 [°C]	Yes	3 [°C]
1, see previous table parameter 5	Compressor protection temperature	70÷110 [°C]	Yes	95 [°C]
2, see previous table parameter 8	Automatic restart	0/1	**No**	1

Table 2: Parameter description table.

5.2.13.1. Pool temperature regulation range[28].

Parameter 0 sets the water temperature regulation range. One of the following two ranges can be selected:

0. 5÷45 [°C];
1. 5÷60 [°C].

With default settings, pool temperature can be regulated in the range 5÷45 [°C]. For further information, see Paragraph 1.4.

⚠ **Do not change this parameter.**

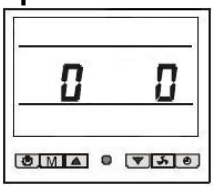


Figure 27: Parameter 0 settings, default settings.

5.2.13.2. Automatic defrost start temperature[29].

Parameter 1 sets the ambient temperature at which automatic defrost starts. The value can be selected from range -20÷10 [°C].

Default settings are -7 [°C]. This value can be adjusted according to ambient conditions. We recommend:

- -10 [°C] if the machine is installed in a very cold country (i.e.: Northern Europe);
- -5 [°C] if the machine is installed in a very hot country (i.e.: Southern Europe).

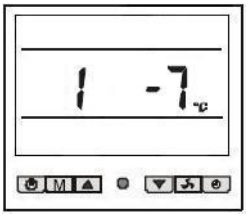


Figure 28: Parameter 1 settings, default settings.

5.2.13.3. Automatic defrost stop temperature[30].

Parameter 2 sets the plate heat exchanger temperature at which automatic defrost starts. The value can be selected from range 5÷45 [°C].

Default settings are 12 [°C]. This value can be adjusted according to ambient conditions. We recommend:

- 15 [°C] if the machine is installed in a very cold country (i.e.: Northern Europe);
- 10 [°C] if the machine is installed in a very hot country (i.e.: Southern Europe).

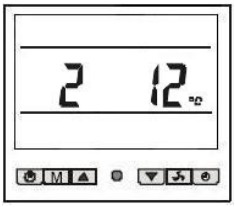


Figure 29: Parameter 2 settings, default settings.

[28] **Not included in model BP-xxWS-B (xx=35, 50).**

[29] The defrost process only starts when both conditions set in parameters 1 and 3 are met. **Not included in model BP-xxWS-B (xx=35, 50).**

[30] The automatic defrost process only stops when one of the conditions set in parameters 2 or 4 are met. **Not included in model BP-xxWS-B (xx=35, 50).**

5.2.13.4. Automatic defrost repetition time[31].

Parameter 3 is used to select when the automatic defrost process is started. The value can be selected in range 10÷150 minutes.

Default settings are 150 minutes (F0). The minimum increase or decrease of this parameter can be 10 minutes. This parameter can be changed according to ambient conditions. Reducing the automatic defrost process in very cold countries (i.e.: Northern Europe) is recommended, 120 minutes (C0).

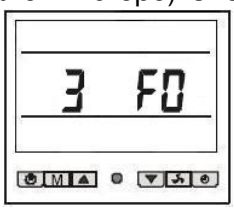


Figure 30: Parameter 3 settings, default settings.

5.2.13.5. Defrost duration[32].

Parameter 4 is used to select automatic and manual defrost duration. The value can be selected from range 1÷15 minutes. Default settings are 3 minutes.

⚠ **Do not change this parameter.**

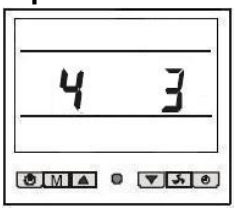
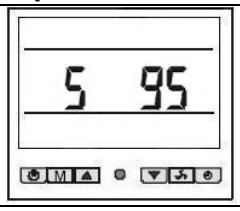


Figure 31Parameter 4 settings, default settings.

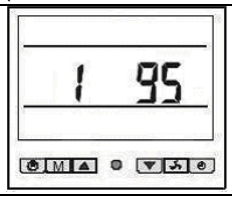
5.2.13.6. Compressor protection temperature.

Parameter 5 (Parameter 1 for model BP-xxWS-B (xx=35, 50)) is used to select the maximum compressor temperature. This temperature is continuously monitored by a specific sensor, see Paragraph 5.2.12. The value can be selected from the range 70÷110 [°C]. Default settings are 95 [°C].

⚠ **Do not change this parameter.**



BP-xxHS-A (xx=50, 85, 100, 160) models.



BP-xxWS-B (xx=35, 50) model.

Figure 32: Parameter 5 settings (Parameter 1 for model BP-xxWS-B (xx=35, 50)), default settings.

[31] The defrost process only starts when both conditions set in parameters 1 and 3 are met. **Not included in model BP-xxWS-B (xx=35, 50).**

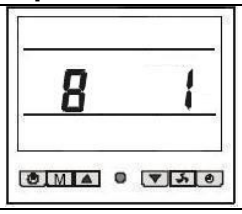
[32]The automatic defrost process only stops when one of the conditions set in parameters 2 or 4 are met. **Not included in model BP-xxWS-B (xx=35, 50).**

5.2.13.7. Automatic restart.

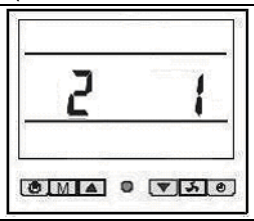
Following a black out, the parameter enables automatic restart of the operating mode prior to the black out. Example: When parameter 8 (Parameter 2 for model BP-xxWS-B (xx=35, 50)) is 1, when a black out occurs with the heat pump running, see Paragraph 5.2.4, the heat pump automatically restarts when power returns. Vice versa, when parameter 8 (Parameter 2 for model BP-xxWS-B (xx=35, 50)) is 0, the heat pump is in standby when power returns, see Paragraph 5.2.2. The pump must be manually started, see Paragraph 5.2.4.

The pump is set to automatic restart by default.

⚠ **Do not change this parameter.**



BP-xxHS-A (xx=50, 85, 100, 160) models.



BP-xxWS-B (xx=35, 50) model.

Figure 33: Parameter 8 settings (2 parameter for model BP-xxWS-B (xx=35, 50)), default settings.

5.2.13.8. Operating mode[33].

Parameter 9 is used to select the heat pump operating mode. The following operating modes are possible:

0. water heating only;
1. water heating and cooling;
2. water cooling only;
3. tank (not applicable in this application).

Default settings include both heating and cooling modes.

⚠ **Do not change this parameter.**

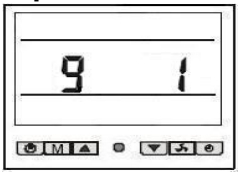


Figure 34: Parameter 9 settings, default settings.

5.2.13.9. Maximum deviation from set temperature.

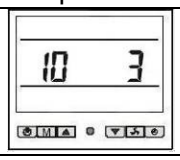
Parameter 10 (Parameter 0 for model BP-xxWS-B (xx=35, 50)) is used to select the maximum deviation from the set temperature, see Paragraph 5.2.6. The value can be selected from range 1÷10 [°C].

Default settings are 3 [°C] and this value can be changed based on user need.

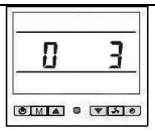
⚠ Before changing this parameter, please read Paragraph 1.5. Remember that the lower the parameter, the higher the energy consumption. Default

[33] **Not included in model BP-xxWS-B (xx=35, 50).**

parameter settings were selected to guarantee maximum comfort and minimum energy consumption.



BP-xxHS-A (xx=35, 50, 100, 100, 160) models.



BP-xxWS-B (xx=35, 50) model.

Figure 35: Parameter 10 settings (0 parameter for model BP-xxWS-B (xx=35, 50)), default settings.

5.2.13.10. Control mode[34].

Parameter 11 is used to select one of the two control modes[35]:

0. heat pump;
1. heater.

Heat pump operations are default settings.

⚠ **Do not change this parameter.**

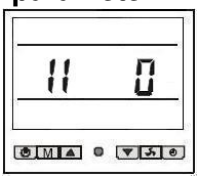


Figure 36: Parameter 11 settings, default settings.

5.3. Manometer use.

SERIES BP heat pumps are equipped with a manometer that displays refrigerant fluid pressure in the high pressure circuit.

Typical pressure values are the following:

- Heat pump off or in standby, the indicated pressure is between 14÷16 [bar] ([kg/cm^2]);
- Heat pump running, the indicated pressure is between 21÷35 [bar] ([kg/cm^2]).

When defrosting, refrigerant fluid pressure is increased to make refrigerant fluid hotter so that it heats the plate heat exchanger during circulation to defrost. Defrosting lasts several minutes.

6. Control and safety devices.

6.1. Control devices

6.1.1. Ambient[36] and pool temperature sensors.

SERIES BP control pumps are equipped with sensors that continuously check ambient and pool water temperatures. The sensors are located as illustrated in the following figures.

[34] **Not included in model BP-xxWS-B (xx=35, 50).**

[35] The control board used for SERIES BP heat pumps is designed to be used in various applications. This parameter lets the user select the type of control.

[36] **Not included in model BP-xxWS-B (xx=35, 50).**

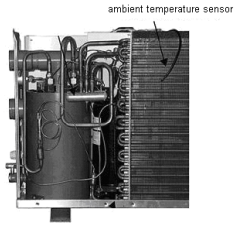


Figure 37: Ambient temperature sensor.

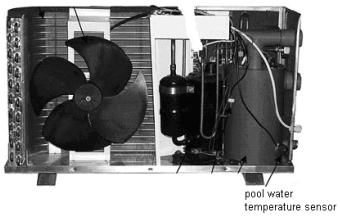


Figure 38: Pool water temperature sensor.

Temperature sensors are connected to connector CN4 (ambient temperature and water temperature) as indicated in the wiring diagram, see Figure 10. Sensor operations can be checked by measuring the resistance when temperature changes. Usual values are indicated in Paragraph 6.3.

6.1.2. Flow sensor.

SERIES BP control pumps are equipped with a flow sensor that continuously reads water flow. The sensor is located as illustrated in the following figure.

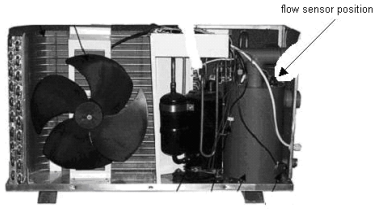


Figure 39: Flow sensor position.

6.2. Safety devices.

6.2.1. Compressor and plate heat exchanger temperature sensors[37].

SERIES BP heat pumps are equipped with 2 temperature sensors that continuously read compressor and plate heat exchanger temperatures. The sensors are located as illustrated in the following figures.

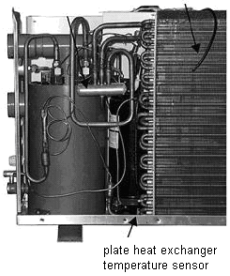


Figure 40: Plate heat exchanger temperature sensor.

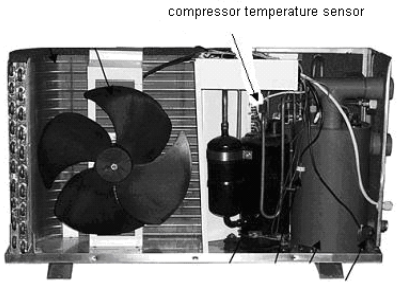


Figure 41: Compressor temperature sensor.

Temperature sensors are connected to connector CN4 (compressor temperature and copper sensor) as indicated in the wiring diagram, see Figure 10. Sensor operations can be checked by measuring the resistance when temperature changes. Usual values are indicated in Paragraph 6.3 and Paragraph 6.4.

6.2.2. High pressure sensor.

The high pressure sensor stops the compressor when supply pressure, in the refrigerant circuit high pressure section, exceeds the calibration value.

⚠ The high pressure sensor signal is not considered during either manual or automatic defrost. For further information see Paragraph 5.2.10 and Paragraph 5.3.

Trigger pressure is 4.2 [bar]. After a high pressure alarm, see Paragraph 7.5, the heat pump must be manually restarted, see Paragraph 5.2.4.

[37] **Not necessary in model BP-xxWS-B (xx=35, 50) since there is no plate heat exchanger defrost process.**

6.2.3. Low pressure sensor.

The low pressure sensor stops the compressor when suction pressure in the high pressure section is under the calibration value.
Trigger pressure is 0.05 [bar]. After a low pressure alarm, the heat pump must be manually restarted, see Paragraph 5.2.4.

Figure 42: High pressure sensor.

Figure 43: Low pressure sensor.

6.3. Pool, ambient and plate heat exchanger temperature sensor resistance values.

water temperature sensor, ambient temperature sensor, coil sensor

temperature (℃)	resistance (K)	temperature (℃)	resistance (K)	temperature (℃)	resistance (K)
--20	37. 4111	9	9. 5794	38	3. 0815
-19	35. 5384	10	9. 1801	39	2. 9733
-18	33. 7705	11	8. 7999	40	2. 8694
-17	32. 1009	12	8. 4377	41	2. 7697
-16	30. 5237	13	8. 0925	42	2. 6740
-15	29. 0333	14	7. 7635	43	2. 5821
-14	27. 6246	15	7. 4498	44	2. 4939
-13	26. 2927	16	7. 1506	45	2. . 4091
-12	25. 0330	17	6. 8652	46	2. 3276
-11	23. 8412	18	6. 5928	47	2. 2493
-10	22. 7133	19	6. 3328	48	2. 1740
-9	21. 6456	20	6. 0846	49	2. 1017
-8	20. 6345	21	5. 8475	50	2. 0320
-7	19. 6768	22	5. 6210	51	1. 9651
-6	18. 7693	23	5. 4046	52	1. 9007
-5	17. 9092	24	5. 1978	53	1. 8387
-4	17. 0937	25	5. 0000	54	1. 7790
-3	16. 3203	26	4. 8109	55	1. 7216
-2	15. 5866	27	4. 6300	56	1. 6663
-1	14. 8903	28	4. 4569	57	1. 6131
0	14. 2293	29	4. 2912	58	1. 5618
1	13. 6017	30	4. 1327	59	1. 5123
2	13. 0055	31	3. 9808	60	1. 4647
3	12. 4391	32	3. 8354	61	1. 4188
4	11. 9008	33	3. 6961	62	1. 3746
5	11. 3890	34	3. 5626	63	1. 3319
6	10. 9023	35	3. 4346	64	1. 2908
7	10. 4393	36	3. 3120	65	1. 2511
8	9. 9987	37	3. 1943	66	1. 2128

Table 3: Pool, ambient and plate heat exchanger temperature sensor resistance values.

6.4. Compressor temperature sensor resistance values

compressor exhaust temperature sensor

temperature (℃)	resistance (K)	temperature (℃)	resistance (K)	temperature (℃)	resistance (K)	temperature (℃)	resistance (K)	temperature (℃)	resistance (K)	temperature (℃)	resistance (K)
-30	866.96	-4	199.98	22	57.104	48	19.368	74	7.5586	100	3.3120
-29	815.70	-3	189.86	23	54.620	49	18.635	75	7.3077	101	3.2150
-28	767.71	-2	180.34	24	52.253	50	17.932	76	7.0667	102	3.1214
-27	722.87	-1	171.33	25	50.000	51	17.260	77	6.8345	103	3.0310
-26	680.87	0	162.81	26	47.857	52	16.616	78	6.6109	104	2.9435
-25	641.59	1	154.78	27	45.817	53	16.001	79	6.3960	105	2.8589
-24	604.82	2	147.19	28	43.877	54	15.410	80	6.1890	106	2.7772
-23	570.34	3	140.00	29	42.027	55	14.844	81	5.9894	107	2.6982
-22	538.03	4	133.21	30	40.265	56	14.302	82	5.7976	108	2.6218
-21	507.74	5	126.79	31	38.585	57	13.782	83	5.6126	109	2.5479
-20	479.34	6	120.72	32	36.987	58	13.284	84	5.4346	110	2.4764
-19	452.68	7	114.96	33	35.462	59	12.807	85	5.2629	111	2.4072
-18	427.67	8	109.51	34	34.007	60	12.348	86	5.0974	112	2.3403
-17	404.17	9	104.34	35	32.619	61	11.909	87	4.9379	113	2.2755
-16	382.11	10	99.456	36	31.297	62	11.487	88	4.7842	114	2.2128
-15	361.35	11	94.826	37	30.034	63	11.083	89	4.6359	115	2.1522
-14	341.86	12	90.426	38	28.827	64	10.694	90	4.4931	116	2.0934
-13	323.53	13	86.262	39	27.677	65	10.321	91	4.3552	117	2.0365
-12	306.29	14	82.312	40	26.578	66	9.9628	92	4.2222	118	1.9814
-11	290.06	15	78.561	41	25.528	67	9.6187	93	4.0939	119	1.9280
-10	274.78	16	75.001	42	24.524	68	9.2882	94	3.9700	120	1.8764
-9	260.40	17	71.625	43	23.566	69	8.9706	95	3.8506	121	1.8263
-8	246.85	18	68.416	44	22.648	70	8.6655	96	3.7351	122	1.7778
-7	234.08	19	65.368	45	21.773	71	8.3723	97	3.6238	123	1.7308
-6	222.02	20	62.474	46	20.935	72	8.0903	98	3.5162	124	1.6852
-5	210.69	21	59.719	47	20.134	73	7.8193	99	3.4123	125	1.6411

Table 4: Compressor temperature sensor resistance values.

7. Routine, scheduled and extraordinary maintenance.

⚠ Periodic controls are required to keep SERIES BP heat pumps in good working order and to guarantee the foreseen performance and safety levels. Some controls can be performed by the user while specialised technicians are required for others.

⚠ **During normal operations, the heat pump plate heat exchanger produces condensation. The amount of condensation produced varies according to ambient conditions. The higher the air humidity, the higher the amount of condensation produced. The lower heat pump panel acts as a condensation collection tray. Keep the drain hole clean.**

7.1. User controls.

SERIES BP heat pump users must periodically make sure that:

- Dirt is not accumulated near the heat pump (leaves, paper, etc.). Performing this control weekly is recommended. Use caution when nearing the plate heat exchanger blade since rather sharp.
- ⚠ There are no leaks in the hydraulic circuit. Conduct this control monthly.
- Electrical mains wires and connections are integral, Performing this control monthly is recommended.
- The correct chemical balance in the pool water is guaranteed in order to guarantee hygienic accessibility conditions and long heat pump life. Conducting this control daily with specific retail kits is recommended.
- The pressure values indicated on the manometer are correct. See Paragraph 5.3.
- Make sure the condensation drain hole is open.

7.2. Specialised technician controls.

The following controls must be conducted by a specialised technician at least once a year to guarantee safe and efficient SERIES BP heat pump operations:

- Electrical mains wire and connection integrity.
- Hydraulic system integrity.
- Inspect and clean the plate heat exchanger coil.
- Check correct heat pump operations, start, see Paragraph 5.2.4.
- Check usual pressure values indicated by the manometer, see Paragraph 5.3.
- Make sure there are no oil leaks from the compressor.

7.3. Winter protection.

The following instructions must be observed to protect SERIES BP heat pumps for the winter:

- Disconnect the electrical mains using the protection device and/or contact switch, see Paragraph 5.2.3.
- Drain the heat pump hydraulic system using the cut-off valve, see Paragraph 4.5.
- Protect the plate heat exchanger and fan from dirt accumulation. Do not wrap the heat pump with plastic or other material that can hold heat and/or humidity inside the device.

7.4. Spring commissioning.

The following instructions must be observed for SERIES BP heat pump spring commissioning.

- Remove any protections used for winter protection, see Paragraph 7.3.
- Fill the heat pump hydraulic system using the cut-off valve, see Paragraph 4.5.
- Check the water chemical composition, see Paragraph 7.1, act accordingly if necessary.
- Restore the electrical mains using the protection device and/or contact switch, see Paragraph 4.6.

7.5. Troubleshooting.

The following table can be used to solve main heat pump problems. When a message error is displayed, the following is required to restore operations:

- turn off the heat pump, see Paragraph 5.2.3;
- turn on the heat pump, see Paragraph 5.2.1;
- start the heat pump, see Paragraph 5.2.4.

Problem	Possible cause	1st solution	2nd solution
The heat pump does not turn on, see Paragraph 5.2.1.	The instructions in Paragraph 5.2.1 were not followed.	Follow the instructions in Paragraph 5.2.1	
	The mains connection line protection device fuse is burned out or the contact switch triggered, see Paragraph 4.6.	Reset the switch and/or replace the fuse.	
The heat pump does not start, see Paragraph 5.2.6.	The 3 minutes required for pump start have not elapsed. See Paragraph 5.2.4.	Wait until the 3 minutes required for pump start have elapsed. See Paragraph 5.2.4.	
	Pool temperature is greater than or equal to set temperature. See Paragraph 5.2.6.	The pump will start when the pool temperature is lower than the set temperature. See Paragraph 5.2.6.	
	The pump operating mode is not the required mode. See Paragraph 5.2.5.	Set the required operating mode. See Paragraph 5.2.5.	
The heat pump is running but the water is not heating.	Make sure air exits the front part of the heat pump. See Figure 1.		
	The heat pump was just installed.	24÷48 hours may be required to reach the set temperature. See Paragraph 1.5.	
	Pool water has significantly cooled since the last heat pump use.	24÷36 hours may be required to reach the set temperature. See Paragraph 1.5.	
There is frost on the plate heat exchanger.	Too low ambient temperature and/or a significant amount of humidity in the air.	Start manual defrost. See Paragraph 5.2.10.	
	Pressure refrigerant drop down.	Verify leackage.	Replace refrigenrant.

Problem	Possible cause	1st solution	2nd solution
Water leaks from the heat pump.	Probable accumulation of condensation. See Paragraph 4.3.	Put the heat pump in standby, see Paragraph 5.2.2, if the leak stops, this is normal condensation.	
	Possible water leak from the water exchanger or from hydraulic unit connection devices. See Figure 1 and/or Figure 5.	Tighten the fastening nut, for an example, see Figure 5.	
Error message **EE b** is displayed.	Insufficient water flow	Increase water flow in the hydraulic circuit that supplies the heat pump. After 2 minutes restart.	
	Flow sensor incorrectly connected or defective.	Check connections and replace if necessary.	Replace the control board.
Error message **EE c** is displayed.	Ambient temperature under -15 [°C]. See Paragraph 5.2.7.	Wait until ambient temperature rises to start the heat pump.	
	Ambient temperature lower than minimum working temperature. See Paragraph 5.2.7.	Set minimum working temperature again, see Paragraph 5.2.7, or wait until ambient temperature rises to start the heat pump.	
Error message **EE d** is displayed.	Functional parameter changes. Parameter 9 is not set to 0.	Set correct parameter values to 1. See Paragraph 5.2.13.7.	Replace the control board. See Figure 9.
The heat pump does not work[38] and error message **EE 1** is displayed**.**	Pool temperature sensor incorrectly connected or defective.	Check the sensor resistance value, see Paragraph 6.1.1, and replace if necessary.	Replace the control board. See Figure 9.
The heat pump does not work[39] and error message **EE 2** is displayed**.**	Ambient temperature sensor incorrectly connected or defective.	Check the sensor resistance value, see Paragraph 6.1.1, and replace if necessary.	Replace the control board. See Figure 9.
The heat pump is running work[40] and error message **EE 3** is displayed**.**	Compressor temperature sensor incorrectly connected or defective.	Check the sensor resistance value, see Paragraph 6.2.1, and replace if necessary.	Replace the control board. See Figure 9.
The heat pump is running[41] and error message **EE 4** is displayed**.**	Automatic defrost did not run correctly.	Increase water flow at pump inlet.	
	Plate heat exchanger temperature sensor incorrectly connected or defective.	Check the sensor resistance value, see Paragraph 6.2.1, and replace if necessary.	Replace the control board. See Figure 9.
Error message **EE 5** is displayed[42].		Replace the control board. See Figure 9.	

[38] Compressor and fan off.
[39] Compressor and fan off.
[40] Compressor and fan on.
[41] Compressor and fan on.
[42] This error message is not used and should not be displayed.

Problem	Possible cause	1st solution	2nd solution
The heat pump does not work[43] and error message **EE 6** is displayed**.**	Compressor temperature too high.	Wait until compressor temperature drops.	
	Refrigerant circuit leak[44].	Check for leaks with a leak detector and replace defective refrigerant circuit parts.	
	Capillary circuit clogged	Replace the capillary circuit.	
The heat pump does not work[45] and error message **EE 7** is displayed**.**	Current dispersion	Replace the defective component: Compressor, fan, four way valve, electronic board.	
The heat pump does not work and error message **EE 8** is displayed**.**	Control board wiring defective.	Check wiring.	Replace the control board.
Error message **EE 9** is displayed.	High or low pressure sensor incorrectly connected or defective.	Check connections and replace if necessary.	
	Pool temperature too high.	Wait until pool temperature drops.	
	Ambient temperature too high.	Wait until ambient temperature drops.	
	Capillary circuit clogged	Replace the capillary circuit.	
	Manual defrost started without frost on plate heat exchanger	Turn off, see Paragraph 5.2.3, turn on, see Paragraph 5.2.1, and start the pump, see Paragraph 5.2.4	

[43] Compressor and fan off.
[44] Manometer in red zone.
[45] Compressor and fan off.