

HEAT PUMP BDP



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1. BDP HEAT PUMP DESCRIPTION

1.1. - INTRODUCTION.

Due to natural evaporation, the pool loses steam continuously to environment. For example, a pool of 32 m² evaporates an average of 110 litres a day (27° C water), with people occupation in the pool this evaporation increases.

In this way, quickly forming a wet environment in excess and it has the following effects:

1. – Quick deterioration of conventional materials.
2. - Unpleasant and unhealthy environment, favouring the growth of mildew and microorganisms.

Optimal Thermo-hygrometric conditions for these sites considered for materials and people are:

Air (between 28° C - 30° C)
65% R.H
Water 2°C (below air)

Indoor Air Máximum Temperature = 36°C

Indoor pools used a considerable amount of thermal energy, much of which was lost, because the heated wet air is continuously removed from the building and is replaced by hot, dry air.

BDP heat recovery system is designed to almost completely eliminate this type of loss.

This device must not be used by persons (including children) with reduced physical, sensory or mental capabilities, or lacking inexperienced or knowledge, unless they have been supervised or instructed about the use of the device by someone responsible for their safety. Children should be supervised to ensure they do not play with the device.

If the electrical inlet wire is damaged it must be replaced by the manufacturer, the after-sales service or by qualified persons to avoid possible damage.

A HEAT RECOVERY SYSTEM REDUCES OPERATING COSTS.

On air cooling, the hot wet air is removed from the pool room below the dew point of cold battery (EVAPORATOR) the air is dehumidified and dried in a hot coil (CONDENSER).

During the dehumidification process heat is recovered and reused to increase the temperature of the room air pool, and the pool water.

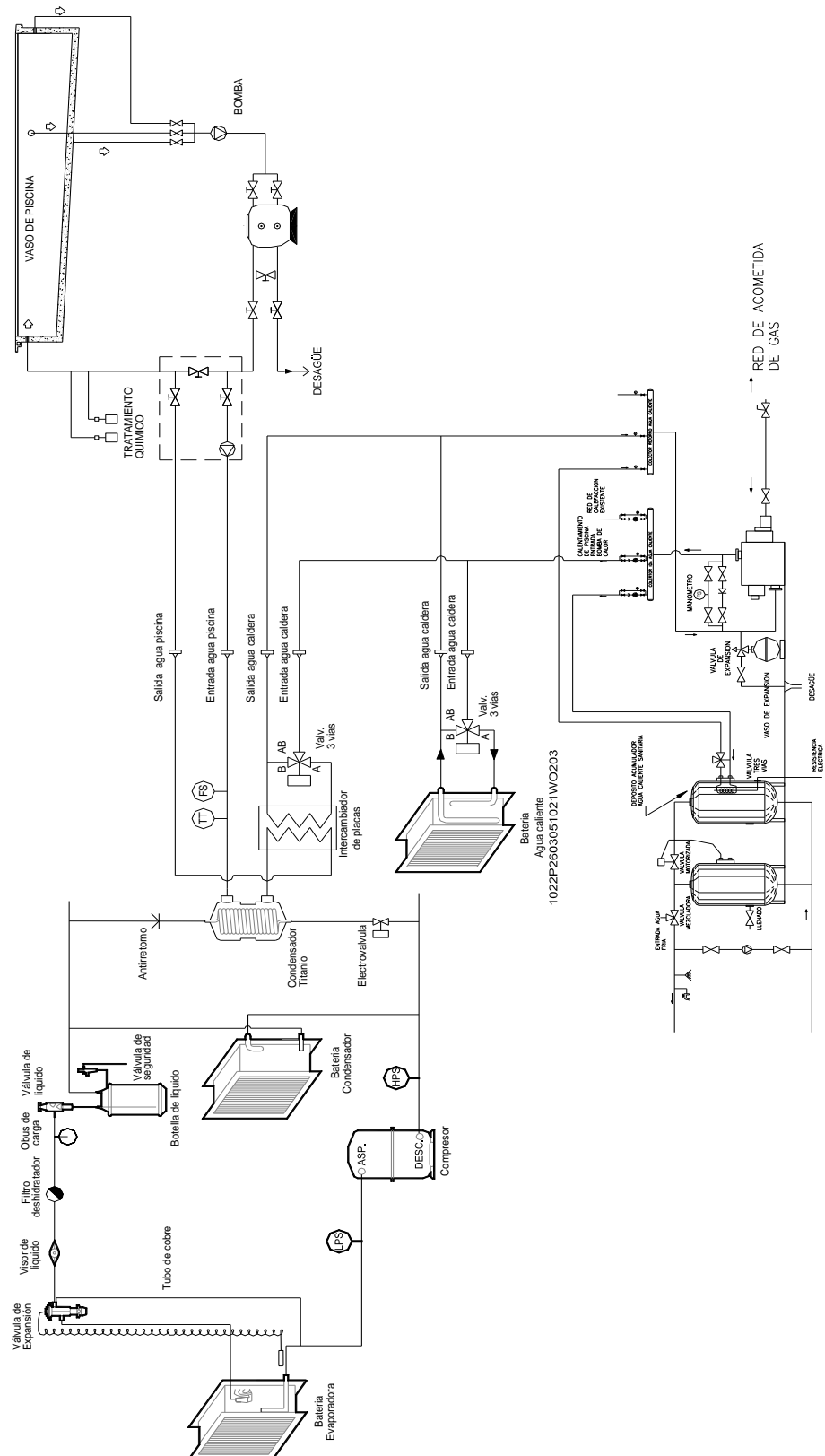
This system can recover 100% of the energy expended to dehumidify.

Electrical power consumption to operate the system is less than the recovered thermal energy. Generally for each kW of electrical power, would recover 3-4 KW of thermal energy.

In winter and cold season, the return air, even after being cooled and dehumidified, will have higher heat content than the air outside. During this period, most part of the return air would be heated with a small amount of outside air and returned to the pool room.

In summer and periods of milder temperatures, the outside air will sometimes higher heat content than the return air dehumidified. During this period, the return air would be expelled and only outside air would be supplied, properly dehumidified and heated (or the most appropriate mix in Mixture Chamber) to the pool room.

The total effect of recovery returned air thermal energy while it's drying, with air recirculation dehumidified, is to provide a drastic reduction in power consumption and therefore operating costs.



HEAT PUMP BDP THE SOLUTION FOR HEATING AND AIR CONDITIONING IN THE POOL

The BDP heat pump (dehumidifier unit), is used for dehumidification of indoor pools environment, using the latent heat of vaporization and the own performance of the equipment, to heat pool water and air from the pool room.

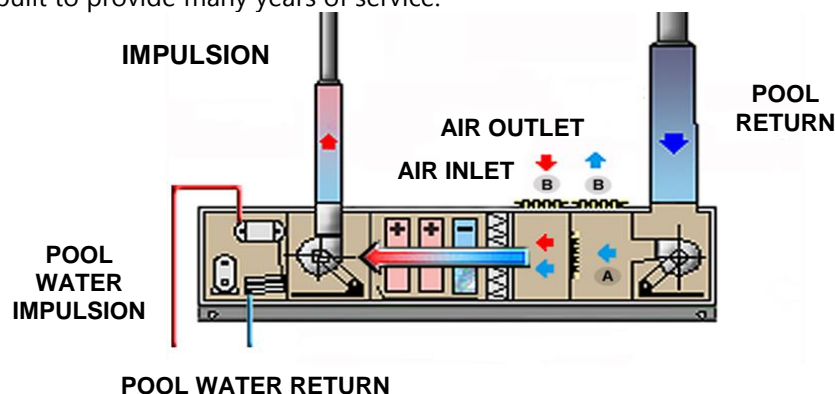
Installations require systems that heat the water and air. Our equipment carry an air reheat battery and / or support exchanger for heating water, both powered by hot water from a heat source. (Optionally both air reheat exchangers can be electric).

Otherwise, outdoor air module can optionally also include when temperature and humidity conditions are favourable, stopping the cooling circuit. This option would provide 10% of new air requiring by installations. Free-Cooling with a tested and sophisticated control system based on proportional enthalpy control, automatically detects and keeps the pool room conditions with minimum energy consumption in the building.

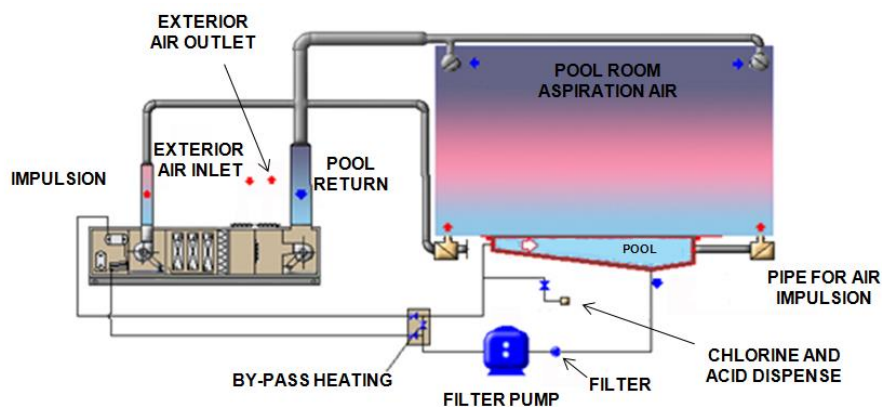
Energy savings reached with these systems against traditional air conditioning makes their placement essential in order to heat an indoor pool.

The **BDP heat pump**, air / water monoblock is a fully automated device that includes all components of a total heat recovery system, and to be completely protected from the weather (on request), it is also suitable for outside installation.

All components have a high performance with tested reliability through many years, and is designed and built to provide many years of service.



OPERATION PRINCIPLE



1.2. - COMPONENTS

1.2.1 - CASING

The BDP Heat Pumps casing, attends especially to the following criteria: waterproof, strength, accessibility and aesthetics.

Waterproof is achieved by coated galvanized steel panels with plastic coated on the outside (plastic film PVC) or aluminium (see options) also thermo-acoustic protection (profiled foam) and anticorrosive inside (5μ thickness primer paint, made of thermosetting epoxy resin and oven-dried).

Sound absorbent plate, shaped or pyramidal, inside of the panels is made of polyurethane absorbent foam whose surface forms were made (pyramidal or shaped) to provide a higher sound absorption than equal thickness smooth materials.

These special forms increase the collection surface noise, allowing obtaining a considerable improvement compared to typical values of untreated materials.

The panels are joined to a extruded aluminium frame, which is terminated by plastic junctions. The structure that is achieved is high strength and high resistance to bending and shear stresses. Profiles torques are absorbed by the aluminium parts of the vertices of the unit.

The panels are easily removable to allow access to the inside of the machine for maintenance or for removal of any component thereof.

The aesthetics of the BDP heat pump is achieved by coating aluminium profiles.

Heat pumps can be built in modules for later assembly on site, by transport conditions and / or accessibility to the installation. Our Technical Department will consider the right solution in each case.

1.2.2 – FILTERS SECTION.

To clean the air of impurities is necessary to use filter elements studied specifically for each application.

To extend the life of the filters is necessary that the ventilation of the machine not stop more than 4 hours a day.

In standard models, the battery filter is assembled on the front panel of the machine, so that it is easily replaced or cleaned. The machine also includes F6 and F8 filters according to RITE. These filters will be adapted to the regulations of each country.

1.2.3 – COILS SECTION

The pushed or aspired air goes through a reheat coil (hot water) and/or condenser and evaporator coils (refrigeration gas). According to the relative temperatures of the two fluids will produce a cooling and/or heating air.

- **Reheat coil** often is used with steam or hot water, although there are other electric resistors. Normally the resistors are made of steel tubes and rectangular fins to improve heat radiation.

In our standard models the heating fluids is water, reheat coils use copper pipes and coated aluminium fins in order to resist in corrosive environments.

- **Condenser coil** is used for drying and warming the air due to R-407C refrigerator

Condenser coil are made of **copper pipes** and **coated aluminium fins** in order to resist in corrosive environments.

- **Evaporator coil** have a stainless steel condensation tray on the bottom, including a drain pipe to outside.

Usually designed for low air speeds with a limit around 2.7 m/s maximum speed recommended to avoid droplet condensation.

1.2.4 – VENTILATION SECTION.

BDP Heat pumps assemble one or more radial centrifugal fans. The fans layout can push air upwards, in front or behind, and optionally to false ceiling. They can change available standard pressure and flow.

Fans are the elements to produce air flow. By definition, are devices that produce lower differential pressures under 0.25 Kg/cm², at sea level.

1.2.5 – COOLING CIRCUIT.

Depending on the model can have one or two circuits; optionally you can include more circuits. Each consists:

- * SCROLL compressors, hermetic or semi-hermetic with internal protection.
- * Evaporator coil made of copper tube and aluminium fins for chlorinated air.
- * Battery condenser copper tube and aluminium fins for chlorinated air.
- * Titanium condenser pool water.
- * High Pressure and Low Pressure (LP / HP) switches with manual reset.
- * Expansion valve.
- * Drier filter.
- * Liquid Viewer.
- * Liquid Deposit/s.

In some models whose compressors have a power higher than 7.5 hp per circuit are installed the following:

- * Shut-off valves to prevent excessive migration of oil to the compressor.
- * Replaceable drier filter.
- * High and low pressure gauges.

Standard models condense in water and air (40% water and 60% on air), after reaching the air set point.

1.2.6 – HYDRAULIC CIRCUIT

BDP heat pump models have a titanium condenser for heating water pool and have a flow switch in the condenser inlet. In case of having no water flow, machine would pass to condense 100% air.

You can optionally add tubular or plate heat exchanger powered by hot water from a power plant, or electric exchanger.

"Any component or method for heating the water additional to the ones already installed in our machine, has to be installed (mandatory) after the pool water outlet (hydraulic circuit) of the dehumidifier"

1.2.7 - OPTIONS

1. FREE COOLING. MIXTURE CHAMBER. consists of two chambers, the first, return / extraction fan discharge, provided with a gate to the expulsion air, and the second a mixer section with outside air gate and return gate.

The gates listed above allow, by suitable control, to use the heat recovery system known, **Free-cooling**.

Gates are driven by servomotors with proportional enthalpy control.

Filter efficiency 83% -90% set in rechargeable frame.

2. HOT WATER COIL for air heating made of copper tube and aluminium fins coated to resist chlorinated air. Three-way valve in hot water inlet regulated according to air temperature.

3. WATER-WATER EXCHANGER, special for swimming pool water heating. Three-way valve in hot water inlet regulated according to inlet pool water temperature.

4. ELECTRIC EXCHANGER for pool water heating in If you cannot have support of a thermal plant.

5. ENTHALPY CONTROL, fully automatic, regulated by control unit, digital display and can be connected to computer with SIEMENS/ TREND control system.

DIGITAL CONTROLLER
PROGRAMMABLE DISPLAY
ENVIRONMENT SENSOR
PIPE SENSOR
IMMERSION SENSOR
AIR DIFFERENTIAL PRESSURE
CONNECTION KIT

6. IMPULSION PLENUM, built in aluminium and laminated sheet, with the possibility to incorporate several double deflection grilles and flow control, for pools in which you cannot build a network of air distribution ducts.

7. RETURN PLENUM built in aluminium and laminated sheet, with the possibility to incorporate several aspiration grilles, for pools in which you cannot build a network of air distribution ducts.

8. FLOW AND PRESSURE INCREASE in standard models, when due to the dimensions of the pool room, you must move more flow.

9. MIXTURES CHAMBER built with aluminium profile and plastic coated sheet to outside air inlet.

10. CROSS FLOW HEAT RECOVERY

11. HEAT PIPE COILS, to energy saving.

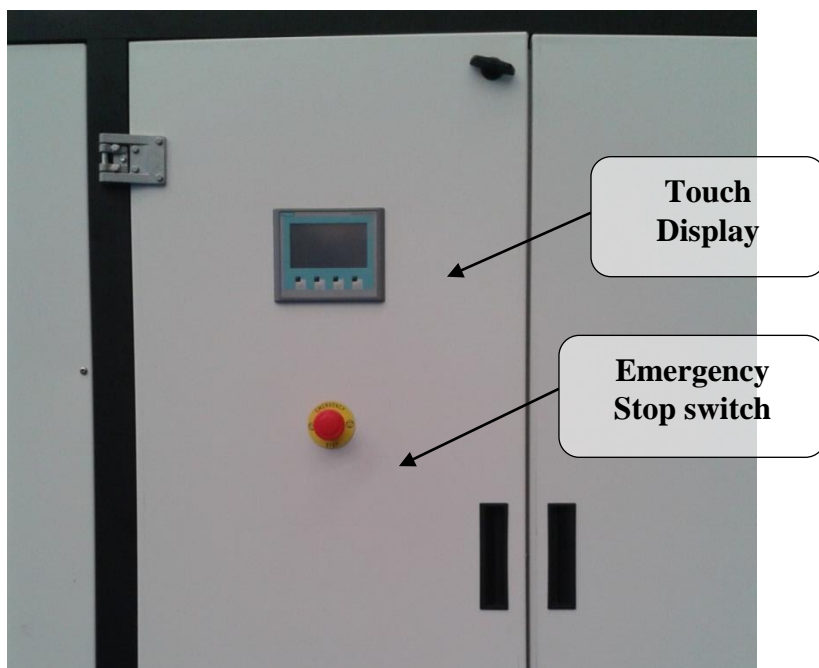
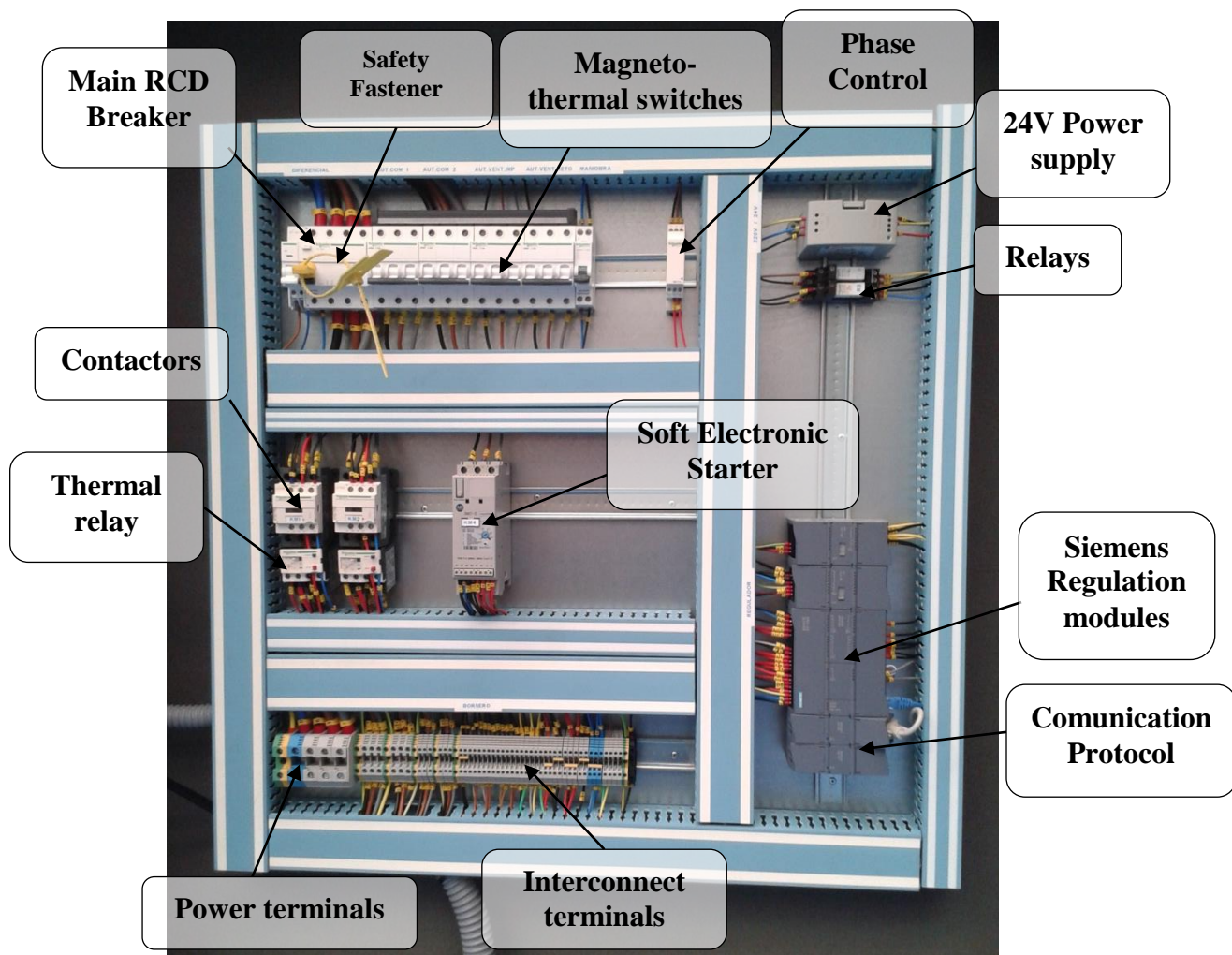
1.2.8 – CONTROL SECTION.

Full system, installed and tested to ensure optimal performance with minimal power consumption at all times.

The **electric box** in standard models is composed of:

- * Main RCD switch.
- * Magneto-thermal switch
- * Phase Control.
- * Contactors and thermal relays.
- * Internal Wiring
- * Interconnect terminals and ground.
- * Power Terminals.
- * Earth leakage switches.
- * Electronic Starter for fans
- * Communication protocol
- * Relays
- * Siemens regulation modules

BDP SERIES



The **control panel** in standard models is mounted on the machine front (depending on model), with the following components (depending on model):

- * Emergency stop switch.
- * Touch Display Controller

All devices include adjustable enthalpy control unit fully automatic with proportional control of the gates in free-cooling models, and possibility to network (BARNET, MODBUS, and LON communication protocol).

2. PERFORMANCE MANUAL, INSTALLATION AND MAINTENANCE

2.1- INSTALLATION

2.1.1. – MACHINE INSTALLATION

These units are supplied fully assembled, with complete electrical wiring and its definitive load of refrigerant charge. Furthermore, every machine has been tested in factory before being packaged and shipped. (It is assembled and tested in the installation when the factory test is not possible).

The compressor contains its own oil charge (depending on model).

The hydraulic circuit of the unit has been carefully emptying to avoid residual water in the casing of the evaporator and prevent any risk of corrosion in case of prolonged storage of the heat pump.

For any information or queries regarding the unit, you need to inform us the model, serial number and manufacture year.

2.1.2. - PROPERLY MACHINE LOCATION

1 – It must be placed on a slab, strong enough to support the weight, avoiding water contact with the bottom of the unit.

2 - It must take all cautions for avoid any vibration transmission on the floor, in the condenser linkages or pipes:

- Rubber or antivibration materials under the chassis of the unit.
- Flexible hoses on suction and impulsion air (units with centrifugal fans).
- Antivibration hoses on hydraulic connections (depending on model).

3 - It must be ensured the air flow in coils.

The layout of the air ducts must be properly sized and the value of pressure loss does not exceed the available pressure in fans.

4 - The air outlet and inlet of the unit will be installed at a sufficient distance from each other in order to avoid air mixture.

5 - It would also provide for a door or removable part on outside air inlet in order to check the state of coil dirt and it can be cleaned.

6 – It is necessary to keep enough room (**Minimum 1 m.** free to the walls or to other items of the installation) around the machine to allow maintenance of it.

WARNING: All pipe installation should be carefully cleaned and rinsed. The filters should be cleaned and rinsed or replaced if necessary. If an acid is used to clean the circuit, the evaporator must be BYPASSED. Then, the circuit will be carefully rinsed with water or with a mild product.

WARNING: The hydraulic circuit must not be made of galvanized steel. We do not responsible for the damage that you could cause ignoring these indications.

2.1.3. - WATER CAPACITY HYDRAULIC CIRCUIT

The amount of water contained in the circuit should be at least about 15 liters per kW of cooling capacity provided by the unit. The maximum hydraulic pressure is 0.35 MPa. Include a buffer reservoir in the hydraulic circuit if it is necessary.

2.1.4. - WATER TREATMENT

We recommend call a specialist water service to decide if this treatment is necessary for installation.

We decline any responsibility for the disasters that could cause to our parts water that is not treated or inadequately treated.

WARNING: The assembled parts in standard models are designed to function with clear water, no pollution or additives and PH between 7.2 and 7.6. The parts leave the factory without any protection against the ice. Therefore, it is necessary to drain it during periods of non-use.

2.1.5- ELECTRICAL CONNECTIONS

Our machine has been manufactured to use electrical power according to customer national rules. Standard power supply required by all our products is 380 v. phase - 50 Hz + T + N. They can be any other power supplies. Please consult us.

The customer or his installer must do the following tasks:

- To route the appropriate cable from the main switchboard to the machine. The cable will be a 5 wires cable (3 phases + ungrounded+ground), properly sized (see technical features).

- In the main switchboard, the connection must be protected by the following switchgear elements properly sized:

- Thermal magnetic current device.
- Break-circuit RCD.

- In machines with electronic fans, the installation earth leakage switch that protects the machine should be a suitable Class B differential super-immunized

- The device must be installed according to the national electric rules.

2.2. – SET UP

2.2.1. – GOODS RECEPTION

It is important to check the goods at arrival, when the carrier is still in place. In case of damage, notify it on the delivery note.

Please check that goods are according to your order and to the delivery note.

Handling facilities must be according to the size and weight of the machine

2.2.2. – DEVICE EMPLACEMENT

Check the placement of the unit, their level and the measures provided for maintenance are respected.

BEFORE CONNECTING TO ELECTRICAL SUPPLY

HYDRAULIC CIRCUIT

Check no leaks in water pipes, joins, valves, etc.

Check thermometers set-up.

Check for pressure connections or a pressure gauge with isolating valve on the water inlet and outlet to measure water loss from the evaporator and check that it is in accordance with that shown in our documentation or our proposition.

Verify the performance of the water pump (rotation direction).

Check that the installation has been carefully cleaned, and the filters are clean.

Check that there is a flow switch in the system water.

Check that the probes of thermostats or safety devices in their positions.

ELECTRIC EQUIPMENT

Check that the voltage at the line beginning corresponds to the power contained in the construction features sticker, wiring diagrams and other documents of the unit.

Standard Power Required: 380 v. / 3 Ph / 50 Hz + N + T.

Our warranty does not cover damage to our materials for maltreatment, wrong electrical connections, wrong operation, bad or unsuitable use, etc.

Control wiring: cable section, disconnectors and fuse cuts, according to the installation.

Inspect all electrical installations. They must be clean and properly adjusted. Systematically adjust and make sure electrical cords are sufficiently tightened.

Make sure that the electrical wiring is in accordance with the wiring diagram supplied with the unit.

Check security switch (Hp switch, antifreeze thermostat ...) are rearmed. If necessary, reset boxes in the devices.

OTHERS

FAN

Manually check that the electric motor and the fan turbine rotate freely.

FINNED COIL

Check the general condition of the finned coil.

Check that the fins are not damaged and that no foreign object disturbs the fluid and air flow over them. If necessary, clean and straighten the fins with the help of a suitable material (fin comb).

INSTALLATION AND STARTING UP OF EXTERNAL CONDENSER

1. External condenser pipeline design.
2. Claping elements placement.
3. Set up pipes from the machine to the external condenser.
4. Set up wiring from the machine to the external condenser.
5. Weld the connections from the external condenser pipes to the machine.
6. Put chargeobus in the input and outpu pipes of the machine.
7. The gas outlet pipe is welded to the machine.
8. The liquid return pipe isnot welded for now.
9. Clean the pipes installed with nitrogen.
10. Block the pipeline before the machine anddo leakage test.
11. After leaks checking, weld this pipe to the machine.
12. Make vacuum through the obuses installed.
13. Once, vacuum test is successfully done, start the machine.
14. Put a very low temperature setpoint (to open the solenoid external condenser)
15. Check the correct solenoids operation.
16. Adjust the gas charge
17. Check machine performance.
18. Put the machine in normal operating setpoints.

OPTIONS

This list is no exhaustive. The installer may proceed to any check that he considered appropriate.

STARTING

The installer will follow the instructions described in the previous pages before calling the After-Sales Service for starting.

Also must be checked:

- The hydraulic circuit is ready to operate, filled with water, drained and its filter has been cleaned after a minimum of two hours operation of the water circulation pump.
- The oil compressor level is correct.
- That there is sufficient thermal load the day when our staff goes for the unit starting.
- The condenser water circuit is completed and ready to being used.
- That the reserved clearance around the unit is sufficient and allows free access to all these components.

PRELIMINARY OPERATIONS

All heat pumps leave our factory after a vacuum test, dehydrated and with the correct refrigerant charge before shipment.

WARNING: Check that the suction valves and discharge of each compressor are well opened and the liquid outlet valves are also opened. Severe damage can occur if the compressor starts with their valves closed.

2.2.3. – STARTING THE MACHINE

Water circulation pump in operation:

Heat Pump starts turning the switch "ON / OFF" this includes in its aluminum dashboard.

If the unit does at not start check:

- The water flow controller switch.
- The water circulation pump fixing structure.
- The thermostat control is calibrated at the working temperature.

After unit start, let it run for about ten minutes to stabilize pressure, then check:

- The compressor oil level.
- Absorbed current.
- The compressor operating pressures.
- The sight glass in the liquid line.
- The evaporator superheat.
- The liquid subcooling.
- The inlet and outlet water temperatures.

WARNING: A very low superheat (expansion valve very open) can bring on liquid into the compressor and cause deterioration. Inadequate value is corrected by adjusting the valve superheat expansion.

WARNING: Excessive compressor oil indicates the presence of dissolved refrigerant as a result of insufficient lubrication of the compressor. Stop the coolant and look for the cause.

WARNING: Once the equipment has been launched, STOP / START, The machine must be turned ON/OFF through the controller (do not use the main switch).

2.2.4. – PERFORMANCE FAULTS

COOLING CYCLE:

A) COMPRESSOR DOESN'T START

| TROUBLE DETECTED | PROBABLE CAUSES | SOLUTIONS |
|--|---|------------------------|
| No power supply | Main switch, emergency stop is opened | Check and connect. |
| No voltage at the compressor terminals. | El automático ha saltado. | Tighten or replace. |
| Contacts of one security switch opened | The automatic switch is opened Thermal relay is opened | Reset. |
| Voltage at the compressor terminals , but it don't run | Compressor Burned or seized up. | Repair or replacement. |

B) COMPRESSOR STOPS

| TROUBLE DETECTED | PROBABLE CAUSES | SOLUTIONS |
|--|---|--|
| High pressure switch switched off. | See F | See F |
| Low pressure switch switched off. | See I. | See I. |
| Internal compressor protection switched off. | a.- Voltage too low b. - Current absorbed too high due to a too high condensation temperature. | a.- Claim to the company b.- See F. |
| Antifreeze switch disconnected | a.- Evaporator water foil decrease | a.- Water flow control |

C) COMPRESSOR OPERATES CONTINUOUSLY

| TROUBLE DETECTED | PROBABLE CAUSES | SOLUTIONS |
|--|---------------------------|------------------|
| The compressor is noisy and high pressure is too low and low pressure is too high. | Compressor valves faulty. | Check compressor |

D) NOISY COMPRESSOR

| TROUBLE DETECTED | PROBABLE CAUSES | SOLUTIONS |
|---|--|--|
| Compressor hit the head | Broken internal compressor parts. | Check compressor |
| Aspiration tubes are abnormally cold. Compressor hit the head | Liquid return | Check overheating and check expansion valve bulb position. |
| Too high HP | a. - Condensing air temperature too high. b. - Insufficient air flow to the condenser. c. - Check for any paper or other objects that block the air inlet to the condenser. d. - Fan turning direction incorrect. | a.- Check condenser b.- Check air flow c.- Remove objects d.- Check turning direction |

E) LOW INSTALLATION PERFORMANCE

| TROUBLE DETECTED | PROBABLE CAUSES | SOLUTIONS |
|--|---|---|
| Expansive valve whistles | Lack coolant | Add coolant |
| Variation of the refrigerant temperature at the height of the filter or expansion valve. | Dirty filter drier | Clean filter |
| Intermittent or continuous operation | a. - Blocked or obstructed expansive valve. b. - Bad regulated superheat. c. - Válvula de expansión averiada. | a. - Repair or replace. b. - Regulate expansion valve and verify superheat. c. - Repair or replace. |
| Water flow decreased | Obstruction in the water circuit. By-pass too open. | Remove the obstruction. Close. |

F) HP TOO HIGH

| TROUBLE DETECTED | PROBABLE CAUSES | SOLUTIONS |
|---|---|--|
| The air from the condenser is too hot. | Condenser air insufficient or very hot. | Check fan function. |
| The air from the condenser is at the inlet temperature. | Condenser and filter is very dirty. | Clean it. |
| Condenser too hot. | Excess of air or refrigerant in installation. | Purge or eliminate refrigerant excess. |

G) LP TOO LOW

| TROUBLE DETECTED | PROBABLE CAUSES | SOLUTIONS |
|-------------------------------------|--|-------------------|
| Air from the condenser is too cold. | Condensing pressure regulating system is not working | Repair or replace |

H) SUCTION PRESSURE TOO HIGH

| TROUBLE DETECTED | PROBABLE CAUSES | SOLUTIONS |
|-----------------------|-----------------------------------|--------------------------------|
| Noisy compressor | Compressor suction valves broken. | Check the valves and remove it |
| High pressure too low | Reversing valve faulty. | Repair or replace |

I) SUCTION PRESSURE TOO LOW

| TROUBLE DETECTED | PROBABLE CAUSES | SOLUTIONS |
|---|--|--|
| Lack of refrigerant | Gas leakage in the refrigerant circuit. | Remove leakage and refill. |
| Refrigerant temperature variation at the filter height. | Liquid filter blocked | Replace filter |
| Refrigerant does not pass through the valve. | The thermostatic element of the expansion valve lost part of the load. | Replace thermostatic element |
| Performance loss | Expansive valve blocked | Clean or replace expansive valve |
| Environmental temperature too cold. | Control thermostat contacts locked in closed position. | Repair or replace the cold control thermostat. |
| Excessive superheat. | Too high pressure drop in the evaporator | Check that the external equalizer is not obstructed. |

HEATING CIRCUIT:**A) COMPRESSOR DOESN'T START**

| TROUBLE DETECTED | PROBABLE CAUSES | SOLUTIONS |
|--|---|------------------------|
| No power supply | Main switch, emergency stop is opened | Check and connect. |
| No voltage at the compressor terminals. | El automático ha saltado. | Tighten or replace. |
| Contacts of one security switch opened | The automatic switch is opened Thermal relay is opened | Reset. |
| Voltage at the compressor terminals , but it don't run | Compressor Burned or seized up. | Repair or replacement. |

B) COMPRESSOR STOPS

| TROUBLE DETECTED | PROBABLE CAUSES | SOLUTIONS |
|---|---|--|
| High pressure switch switched off. | See F | See F |
| Low pressure switch switched off. | See I. | See I. |
| Internal compressor protection switched off | a.- Voltage too low b. - Current absorbed too high due to a too high condensation temperature. | a.- Claim to the company b.- See F. |

C) COMPRESSOR OPERATES CONTINUOUSLY

| TROUBLE DETECTED | PROBABLE CAUSES | SOLUTIONS |
|--|---------------------------|------------------|
| The compressor is noisy and high pressure is too low and low pressure is too high. | Compressor valves faulty. | Check compressor |

D) NOISY COMPRESSOR

| TROUBLE DETECTED | PROBABLE CAUSES | SOLUTIONS |
|---|--|--|
| Compressor hit the head | Broken internalcompressor parts. | Check compressor |
| Aspiration tubes are abnormally cold. Compressor hit the head | Liquid return | Check overheating and check expansion valve bulb position. |
| Too high HP | a.- Condensing air temperature too high. b.- Insufficient air flow to the condenser. C.- Check for any paper or other objects that block the air inlet to the condenser. D.- Fan turning direction incorrect. | a.- Check condenser b.- Check air flow c.- Remove objects d.- Check turning direction |

E) LOW INSTALLATION PERFORMANCE

| TROUBLE DETECTED | PROBABLE CAUSES | SOLUTIONS |
|--|--|---|
| Expansive valve whistles | Lack coolant | Add coolant |
| Variation of the refrigerant temperature at the height of the filter or expansion valve. | Dirty filter drier | Clean filter |
| Intermittent or continuous operation | a.- Blocked or obstructed expansive valve. b.- Bad regulated superheat. C.- Válvula de expansión averiada. | a. - Repair or replace. b. - Regulate expansion valve and verify superheat. c. - Repair or replace. |
| Water flow decreased | Obstruction in the water circuit. By-pass too open. | Remove the obstruction. Close. |

F) HP TOO HIGH

| TROUBLE DETECTED | PROBABLE CAUSES | SOLUTIONS |
|---|---|--|
| The air from the condenser is too hot. | Condenser air insufficient or very hot. | Check fan function. |
| The air from the condenser is at the inlet temperature. | Condenser and filter is very dirty. | Clean it. |
| Condenser too hot. | Excess of air or refrigerant in installation. | Purge or eliminate refrigerant excess. |

G) HP TOO LOW

| TROUBLE DETECTED | PROBABLE CAUSES | SOLUTIONS |
|-----------------------------------|--|--|
| Condenser inlet water is too cold | Regulating condensation pressure valve does not act. | Check Valve, control unit and sensor. Repair or replacement. |

H) SUCTION PRESSURE TOO HIGH

| TROUBLE DETECTED | PROBABLE CAUSES | SOLUTIONS |
|-------------------------|-----------------------------------|--------------------------------|
| Noisy compressor | Compressor suction valves broken. | Check the valves and remove it |
| High pressure too low | Reversing valve faulty. | Repair or replace |

I) SUCTION PRESSURE TOO LOW

| TROUBLE DETECTED | PROBABLE CAUSES | SOLUTIONS |
|---|--|------------------------------|
| Lack of refrigerant | Gas leakage in the refrigerant circuit. | Remove leakage and refill. |
| Refrigerant temperature variation at the filter height. | Liquid filter blocked | Replace filter |
| Refrigerant does not pass through the valve. | The thermostatic element of the expansion valve lost part of the load. | Replace thermostatic element |

| | | |
|-------------------------------------|--|--|
| Performance loss | Expansive valve blocked | Clean or replace expansive valve |
| Environmental temperature too cold. | Control thermostat contacts locked in closed position. | Repair or replace the cold control thermostat. |
| Excessive superheat. | Too high pressure drop in the evaporator | Check that the external equalizer is not obstructed. |

J) CHANGE SUMMER OR WINTER MODE OR VICEVERSA

| TROUBLE DETECTED | PROBABLE CAUSES | SOLUTIONS |
|----------------------------|---------------------------|-----------------------|
| Inverse valve does not act | Solenoid valves don't act | Check valve and relay |

2.2.5. - REGULATION ELEMENTS

High Pressure switch controls condenser performance. A poor performance resulting from condensation pressures too high, it is usually caused by:

- Dirty condenser.
- Reduced air flow.

Low Pressure switch monitors the pressure at which the refrigerant evaporates in the evaporator tubes. A low evaporation pressure is usually caused by:

- Lack of refrigerant.
- Thermostatic expansion valve faulty.
- Filter Drier obstructed.
- Compressor discharge system inoperative (Power reduction).

Cold water thermostat regulates the temperature of cold water to the evaporator inlet. The most common causes of water temperature in this area are:

- Reduced water flow.
- Thermostat regulating at very low temperatures.

The oil pressure switch detects the difference between back pressure pump compressor oil (semi-hermetic compressors), and the prevailing pressure in the compressor crankcase. This difference is the net pressure of the oil or the oil pressure chamber. Weak oil effective pressure is usually the result of:

- Lack of oil.
- Faulty oil pump.
- Reheating defective crankcase, causing condensation of the coolant in the crankcase bottom.
- Thermostatic expansion valve incorrectly set.

2.3. - PREVENTIVE MAINTENANCE

WARNING: When the unit will be stopped for long time, we recommend removing the equipment from the installation or periodically ventilate the room where it is located. Due to wet and chlorinated environment where it is emplacement, causing fast deterioration of the electronic components. Warranty does not cover those cases where the product may be damaged by prolonged exposure to wet and chlorinated environment.

To extend the life of the filters is necessary that the ventilation of the machine not stop more than 4 hours a day.

WEEKLY:

- Check visually the cleanness of the batteries. Check the free pass and proper evacuation of condensates. If it is necessary, clean it with water at low pressure and neutral soap.
- Clean air filter. It is necessary replace it.
- Check that there is not water in the plate below the batteries. If there is water, clean the drain.
- Check the pressure gauge read in the HP and LP of each circuit.

In operation, the temperature at the scale of R-407C LP gauge must not fall below 0 °.

- Check the lack of bubbles in the sight glass positioned in the liquid line.
- Control of the temperatures in the thermometer placed in the inlet and outlet.

MONTHLY:

In addition to the weekly visit, we must check when the machine is running at full power:

- Current absorbed by each power group.
- Inlet and outlet water temperature.
- Pressure values at manometers, per circuit HP/LP.
- Dry bulb temperature of the air at battery inlet.

We switch off the machine, we disconnect it at main switch board, and we do the following tasks:

- Tight all the electrical connections.
- Remove dust from electrical components.
- Visually check the condition of the cooler.
- Systematic search for possible leaks in the cooling circuit.
- If necessary, repair and complete the load circuits with refrigerant R-407C.
- Check the color of the oil in the crankcase pilot compressors. Do an extraction and acidity test. If it is necessary, change.
- Clean the filter placed in the air inlet. If necessary, replace it.
- Check operation of gates.

SEMIANNUAL

- Cleaning the finned coil with an appropriate product under pressure to maintain the highest level performance of the coil.
- Visually inspect the dirt on the coil. If necessary, clean it with a suitable product.
- Temperature and humidity sensor should be replaced every 6 months.

ANNUALLY

- Cleaning of the finned coil and fluid retention tray with bactericide and germicide trying not to damage or destroy the efficiency of the battery.
- Replace filters.

This list is indicative and not definitive. They can add any maintenance as we deemed appropriate.

| REVISION | TIMES/YEAR |
|--|------------|
| Batteries cleaning | 2 |
| Ti Condenser external revision | 1 |
| Gas pressures check | 2 |
| Water pressure check | 2 |
| Valves check | 2 |
| Piping insulation revision | 2 |
| Water installation purge | 2 |
| Gas safety components revision | 2 |
| Main electric box components revision | 2 |
| Water pump revision | 2 |
| Motor fan and fan blades revision | 2 |
| Sensor operation and readings revision | 2 |
| Duct air tightness revision | 1 |
| Condensation water draining revision | 4 |
| Air filter revision/change | 4 |

PRODUCT RECYCLING

This machine has a refrigerant gas and electrical components. When the heat pump ends its useful life, it must be dismantled by a company qualified to do or you can take it to the place where local authorities specify.

ANNEX A-TECHNICAL FEATURES & COOLING CIRCUIT

1. TECHNICAL FEATURES

2. COOLING CIRCUIT-ONE CIRCUIT MODELS

3. COOLING CIRCUIT-DOUBLE CIRCUIT MODELS

ANNEX B- OPTIONAL HYDRAULIC CIRCUIT

1. HOT/COOL WATER COIL

For different temperature increases consult technical features sticker

2. CONDENSER

ANNEX C-MAIN DIMENSIONS

ANNEX D-ELECTRIC DIAGRAM (CONTROL)

ANNEX E-ELECTRIC DIAGRAM (POWER)

ANNEX F-TERMINAL DIAGRAM

ANNEX G-PLUGS

ANNEX H-WARRANTY CERTIFICATE

1. WARRANTY COVERAGE

- 1.1 In accordance with these provisions, the salesman guarantees that the product corresponding to this warranty ("the product") does not present any non-conformance at the moment of its delivery.*
- 1.2 The warranty period of the product is of two (2) years and it will take effect as of the time of delivery to the buyer.*
- 1.3 If a Product non-conformance occurs and the buyer notifies it to the salesman during the Warranty Period, the salesman should repair or replace the Product at his own cost in the appropriate place, unless it is impossible or disproportionate.*
- 1.4 When the Product cannot be repaired nor be replaced, the buyer shall be able to ask for a proportional price reduction or, if the non-conformance is sufficiently important, the discharge of the sales contract.*
- 1.5 The replaced or repaired parts by virtue of this warranty will not extend the warranty term of the original Product, although they will have its own warranty.*
- 1.6 For the effectiveness of this warranty, the buyer will have to credit the acquisition date and delivery date of the Product.*
- 1.7 When the delivery of the Product to the buyer had been more than six months before and the buyer alleges non-conformance with the Product, the buyer will have to prove the origin and existence of the alleged fault.*
- 1.8 The present Warranty Certificate does not limit or prejudices the rights the consumers are entitled by virtue of local prevailing and applicable regulations.*

2. CONDITIONS TO WARRANTY

- 2.1 This warranty covers the products referred to in this manual.*
- 2.2 This Warranty Certificate will be solely applicable in the countries of the European Union.*
- 2.3 For the effectiveness of this warranty, the buyer will have to strictly follow the manufacturer instructions included in the documentation enclosed with the Product, whenever this warranty is applicable according to the Product range and model.*
- 2.4 When a calendar for the substitution, maintenance or cleaning of certain parts or components of the Product is specified, the Warranty will only be valid when the calendar has been observed.*

3. LIMITATIONS

- 3.1 This warranty will be solely applicable to those sales to consumers, being understood "consumers" as those people who acquire the Product with a purpose that does not fall within the scope of their professional activity.*
- 3.2 No warranty is granted referred to the wear and tear caused by the use of the Product. In relation to the parts, components and/or consumable materials such as batteries, light bulbs etc, it will refer to the provisions of the documentation enclosed with the Product, when applicable.*
- 3.3 The warranty does not cover those cases where the Product: (I) has been incorrectly treated; (II) has been repaired, maintained or manipulated by a nonauthorized person, or (III) has been repaired or maintained with nonoriginal pieces.*
- When the non-conformance of the Product is a consequence of an incorrect installation or start-up, this warranty will only cover those installations or start-ups included in the contract of sale of the Product and carried out by the salesman or under his/her responsibility.*

ANNEX I-DECLARATION OF CONFORMITY CE

DECLARATION OF CONFORMITY



We, Manufacturer "Talleres del Agua, S.L.", hereby declare under sole responsibility, that the following equipment:

Product Name: BOMBAS DE CALOR, DESHUMIDIFICADORES, CLIMATIZADORES.
Models: BDP - CL
Manufactured by: Talleres del Agua S.L.
 Polígono Industrial de Barros, parcela 5
 Los Corrales de Buelna 39400, Cantabria
 SPAIN.

The products herewith are in conformity with the following EC Directives, including all amendments:

Machine safety directive 2006/42/UE.

Electromagnetic compatibility directive 2014/30/UE and its modifications.

Low-voltage equipment directive 2014/35/UE.

Directive 2000/14/UE concerning noise produced by equipment for outdoors use, as amended by Directive 2005/88/UE.

Restrictions in the use of certain risky substances in the electrical and electronic instruments 2011/65/UE (RoHS).

Relative to the electrical and electronic waste products 2012/19/UE (RAEE).

Relative to the electrical and electronic instruments and the management of their waste products Spanish R.D. 208/2005 and 219/2013.

The registration, the evaluation, the authorization and the restriction of the chemical substances UE N° 1907/2006 (REACH) as amended by Directive 126/2013 (REACH).

Full name and identification of the person responsible for product quality and accordance with standards on behalf of the manufacturer.



Mr. Jose Manuel Aquilue
 Chief Executive Officer. of B-39390968



Los Corrales de Buelna, Cantabria, Spain, 03-APRIL-2017.



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