



## Contents

1. Introduction.....	5
2. Operating mode.....	5
3. Operating limits.....	5
4. Technical characteristics.....	6
5. Safety recommendations.....	7
6. Unit identification.....	7
7. Transport.....	7
8. Location and assembly.....	8
Location designation.....	8
Anchorage for antivibrators.....	9
Minimum free space for commissioning and maintenance operations.....	10
9. Checking before commissioning.....	11
Electrical connections.....	11
Air ducts connections.....	11
Checks in the centrifugal fan.....	11
Condensates drain connection.....	12
Hydraulic connections.....	12
10. Options.....	15
Hot water coil.....	15
Electrical heater.....	15
Exchanger for boiler water.....	15
Mixing boxes for free-cooling.....	15
Manual external air intake damper.....	15
11. Safety devices.....	16
High pressure pressostat.....	16
Low pressure pressostat.....	16
Compressors and fans safeties.....	16
Compressor anti-short-cycle timer.....	16
Magnetothermals for line protection.....	16
Control circuit automatic switch.....	16
Main door switch.....	16
Anti-fire safety.....	16
Differential pressostat for fouled filters (optional).....	16
Return air temperature probe.....	16
Pool vessel temperature probe.....	16
HWC water temperature.....	16
PWA discharge temperature probe (optional).....	16
12. Commissioning.....	17
Operating temperature of the pool.....	17
13. Components distribution.....	18
14. Maintenance.....	19
15. Control and analysis of breakdowns.....	22



# Pool air handling units



## 1. INTRODUCTION

**Air Master BCP Series** are dehumidification units by cooling circuit, with total condensing heat recovery, specially designed for conventional covered pools and other dehumidification applications.

These units have been designed for indoor or outdoor installations.

**After manufacturing, all units are charged with refrigerant and are tested at the factory, verifying the correct operation of all their components within the operating range for which they are intended.**

The units comply with standards: EN 60-204 - EN 378-2, and directives: Machines 2006/42 CE - CEM 2004/108/CE - DBT 2006/95 CE - DESP 14/068 CE (Category 2).

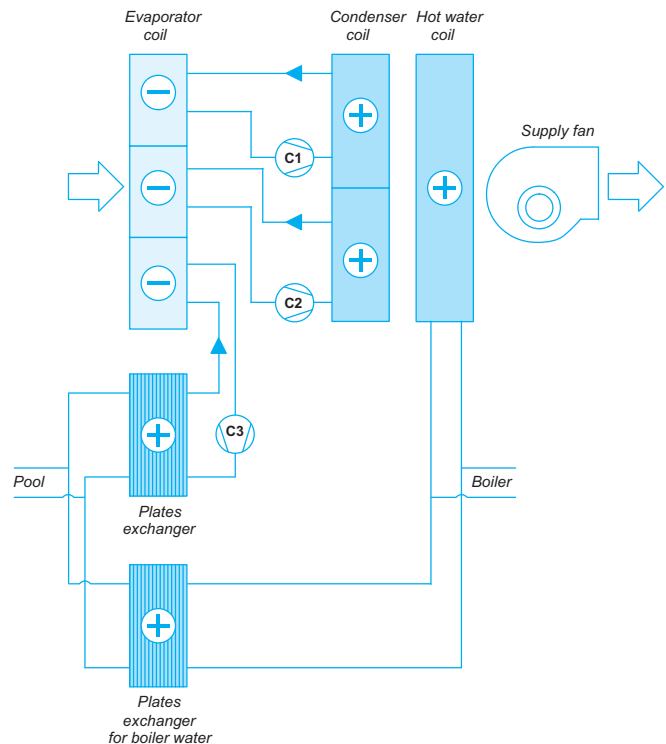
Those in charge of the installation, commissioning, operation and maintenance of the unit must know the instructions contained in this brochure and the specific technical characteristics of the installation place.

## 2. OPERATING MODE

Air Master BCP units consist of three dehumidification stages by three cooling circuits:

- one of the circuits condensates on a plates exchanger of SMO 254 steel, with high resistance against corrosion in presence of chlorides, which recovers part of the energy consumed in the evaporation process.
- the other two circuits condensate on two air coils installed at the outlet of air from evaporator, heating the cold and dry air from it, before discharging it to the optional hot water coil.

These units can incorporate a removable plates exchanger to facilitate cleaning for commissioning with boiler water and maintenance of vessel temperature. This standard exchanger is of AISI 316L stainless steel and and nitrile joints and, optionally, titanium plates and butyl joints.



## 3. OPERATING LIMITS

### Air inlet dry temperature

Maximum: 35°C (65% RH - 29°C WB)

Minimum: 18°C (90% RH - 17°C WB)

### Condenser water inlet temperature

Maximum: 35°C

Minimum: 20°C

### 4. TECHNICAL CHARACTERISTICS

Air Master BCP		320	360	400	440	480	555	610
Air circuit	Dehumidification capacity ① (kg/h)	66,5	77,8	82,8	93,1	100	116,2	126,5
	Heating capacity (kW)	69,5	85,5	94	111,9	109,7	124,2	148,7
	Cooling capacity ② (kW)	92,1	109,8	115	132,2	138,4	160	179,9
	Power input ③ (kW)	22,6	26,3	29,3	31,2	33,1	36,9	45
	Nominal air flow (m³/h)	16.000	18.000	20.000	22.000	24.000	27.775	30.000
	Available static pressure (mm.w.c.)	19,1	17,5	19,7	16,6	17,2	16,5	18,8
	Fan type / Number	Centrifugal / 1						
	Power (kW)	5,5	5,5	7,5	7,5	7,5	7,5	11
High flow air circuit (optional)	Nominal air flow (m³/h)	24.000	27.000	30.000	33.000	36.000	41.625	43.000
	Available static pressure (mm.w.c)	16,9	21,9	18,9	15,8	18,2	17,4	19,4
	Fan type / Number	Centrifugal / 1						
	Power(kW)	7,5	11	11	11	11	15	18,5
Water condenser	Heating capacity ④ (kW)	39,7	43,1	42,8	44	54,2	65,1	65,2
	Nominal water flow (m³/h)	6,8	7,4	7,4	7,6	9,3	11,2	11,2
	Pressure drop (m.w.c.)	0,6	0,8	0,8	0,7	0,8	0,7	0,8
	Hydraulic connections	DN-50 Ø 1 1/2"					DN-63 Ø 2"	
Hot water coil (optional)	Heating capacity ⑤ (kW)	130,2	138,4	145,1	165,3	179,3	211,3	216,7
	Nominal water flow (m³/h)	6,8	7,2	7,5	8,6	9,4	11	11,3
	Pressure drop (m.w.c.)	1,6	1,8	1,2	1,2	1,4	1,7	1,6
	Hydraulic connections	2"						
Plates exchanger for boiler water (optional)	Heating capacity ⑤ (kW)	200		350			500	
	Flow (17°C thermal jump) (m³/h)	10,6		17,7			25,3	
	Pressure drop (m.w.c.) (pool side and boiler side)	0,9		0,8			0,8	
	Threaded hydraulic connections	2"		2 1/2"				
Compressor	Threaded hydraulic connections	Scroll						
	Compressors / stages number	3 / 3						
	Air circuit / recovery circuit number	2 / 1						
	Oil volume (l)	3,3+1,7/3,3	3,3+3,3/3,3	4,0+3,3/3,3	4,0+4,0/3,3	4,0+4,0/4,0	6,2+6,2/6,2	8,0+6,2/6,2
Electrical characteristics	Electrical power supply	400 V / III ph / 50 Hz (±10%)						
	Power supply	3 Wires + Ground + Neutral						
Maximum absorbed current (A)		87,1	99,1	102,2	102,2	102,2	120,2	144,5
Refrigerant	Type	R-407C						
	Global warming potential (GWP) ⑥	1.774						
	Charge (kg)	18,1	23,2	23,6	28,2	28,2	33,5	34,3
	Environment impact (t CO2e)	31,6	40,5	41,2	49,2	49,2	58,4	59,8
Dimensions	Length (mm)	4.640 (2.865 + 1.775)						
	Width (mm)	2.204						
	Height (mm)	1.603		1.822			2.138	
Weight (kg)	2.690	2.865	2.940	3.360	3.385	3.950	4.050	
Condensate outlet Ø		1 1/4"						

① Unit cooling dehumidification capacity. For unit selection, it should be taken into account the dehumidification which provides fresh air of ventilation (UNE 100011).

② Cooling capacity for air inlet temperature conditions of 28°C and 65% RH.

③ Total power input by compressor and motorfans under nominal conditions.

④ Heating capacity for recovery circuit water 28 / 33°C.

⑤ Water from boiler for hot water coil 82 / 65°C.

⑥ Climate warming potential of one kg of greenhouse-effect fluored gas relative to one kilogram of carbon dioxide over a period of 100 years.

## 5. SAFETY RECOMMENDATIONS

To avoid any risk of accident during installation, commissioning or maintenance, it is obligatory to take into consideration the following specifications for the units: refrigerated circuits under pressure, refrigerant presence, electrical voltage presence and implantation place.

Because of all of this, only qualified and experienced personnel can perform maintenance tasks or unit repairs.



It is required to follow the recommendations and instructions in the maintenance brochures, the labels, and the specific instructions. It is necessary to comply with the norms and regulations in effect.



The compressor and line surfaces can reach temperatures above 100°C causing burns to the body. In the same fashion, under certain conditions these surfaces can reach very cold temperatures that can cause freezing risks.



Use safety goggles and gloves on the job. Be careful with sharp parts or elements in the unit.



**Caution:** Before intervening in the unit, verify that the main power to the unit is cut off. An electric shock can cause personal damage.



**Note:** In order to recycle these units follow the stipulations of Directives (EC) No. 96/2002 and No. 108/2003 regarding electrical and electronic equipment and the management of the resulting waste.

### Refrigerant leaks:

A periodical check must be performed for refrigerant gas leaks as per Regulation (CE) N°517/2014 over **certain greenhouse effect fluoride gases**. Please, consult the frequency of checks in chapter of "Maintenance".

The refrigerant leaks could cause:

- Displacement of the available oxygen, its inhalation could cause arrhythmias (work in well ventilated areas).
- By contact they can cause ocular irritations and burns (it should be used suitable protection glasses).

These units operate with refrigerant gas **R-407C**.

Components of the R-407C	R-32	R-125	R-134A
Chemical formula	CH2F2	CHF2CF3	CH2FCF3
Weight ratio	23%	25%	52%
Unitary global warming potential (GWP)	675	3.500	1.430
Global warming potential (GWP)	1.774		

## 6. UNIT IDENTIFICATION

Check the condition of the equipment upon delivery.

Check that the details on the label, the packing and the data plate match the order. If equipment has been damaged, or there is a shortfall in delivery, notify accordingly.



**Note:** The serial number must be used in all communications regarding the unit.

All units bear, legibly and indelibly, a data plate located in a prime space, as appears in the attached image: Check that this plate matches the correct model.

Ref. Produit\Item Nbr		Designation\Description	
Order Nbr		Model	
An. Year	No Serie\Serial Nbr	No Produit	
Refrigerant		Manufacturing Nbr	
Refrigerant type	kW Absorbee\Input kW	Poids\Weight	
Refrigerant kg	Tension\Voltage	Weight in operation	
	Line voltage	Temperature Maxi C	
BP Mini PSM\MMOP	Intensité\Current A	IP	
Low pressure			
HP Maxi PSM\MMOP	Int. Kit Elect.	No CE	
High pressure	Electrical kit current		

30, av JeanFalconnier  
01350 CULOZ  
Tel : 33(0)4 79 42 42 42

Made in Spain

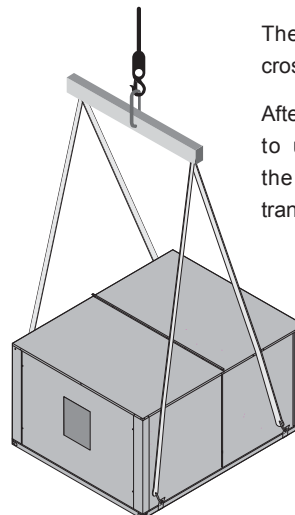
## 7. TRANSPORT

Air Master BCP units are modular construction units. Their composition range from one module for the standard unit to three modules including all the options.

The modules should be handled with care in order to avoid damages in its transport. For this reason it is advisable:

- Use appropriate transports according to the dimensions of these units until the installation site.
- For transport in container, it should be used those containers with an easy loading/unloading to the installation site.
- Do not remove the unit from its packing until it has been transported to its final location.
- Transport the different modules by a lifting slings only applied to the lifting holes of the unit. Each module has two spars on the base with two grips each one (solidly screwed) in order to make easy the transport and the lifting by the crane.

Check that the grips are perfectly screwed in before attaching the slings.



The slings should be separated by a crossbar to avoid damaging the casing.

After positioning the unit, it is suggested to unclamp the grips, to facilitate the maintenance. Assemble again if transporting the unit.

### Grip detail:



- When the different modules are in their definitive location, just by fastening these modules the unit is assembled, without making no type of weld.

### 8. LOCATION AND ASSEMBLY

#### Location designation

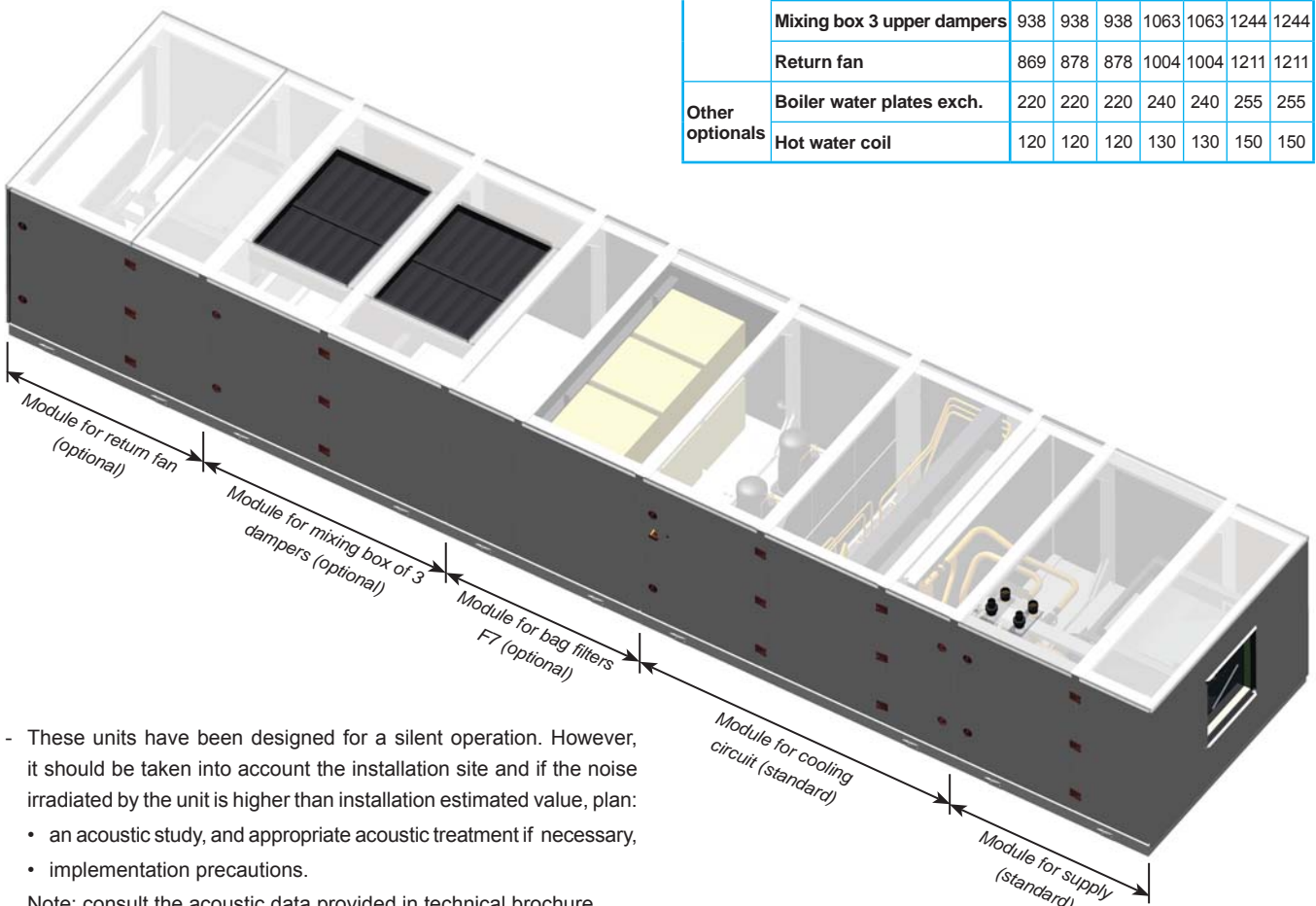
Before moving the unit, make sure that all panels are fixed in their place. Lift and lower carefully.

For the choice of the location, whatever it is the chosen form, it should be taken into account the following points:

- It is imperative to fulfill UNE-EN 378-3 Standard about Environmental and Safety Requirements. Part 3: Installation "in situ" and people protection.
- Make sure that the structure is strong enough for supporting the weight of the unit (see weight in chart of technical characteristics).
- The area where the unit is located should be perfectly accessible for cleaning and maintenance (consult minimum space for maintenance).
- Provide for anti-vibratory supports in all the installation, in order to avoid the transmission of noises and vibrations
- All models can be installed on the floor or over a mount or steel profile. In any case, check that the unit remains perfectly levelled.
- For outdoors installation, in the installation on a mount, take special care of average height that reaches the snow in that region.
- There must be no obstacle at the outlet or return of air.
- The discharge and return grilles location should be studied carefully to avoid the air recirculation.

#### Weights by modules (kg)

Air Master BCP		320	360	400	440	480	555	610
<b>Nominal flow</b>								
Standard unit	Supply module	725	735	775	885	885	1040	1070
	Cooling circuit	1965	2130	2165	2475	2500	2910	2980
Optional modules	Bag filters module	795	795	795	900	900	1055	1055
	Mixing box 2 dampers	840	840	840	955	955	1125	1125
	Mixing box 3 side dampers	780	780	780	875	875	1025	1025
	Mixing box 3 upper dampers	945	945	945	1070	1070	1250	1250
	Return fan	810	815	855	980	985	1160	1160
Other optionals	Boiler water plates exch.	220	220	220	240	240	255	255
	Hot water coil	120	120	120	130	130	150	150
<b>High flow (optional)</b>								
Standard unit	Supply module	774	803	824	940	940	1089	1213
	Cooling circuit	1962	2127	2161	2473	2495	2909	2980
Optional modules	Bag filters module	795	795	795	900	900	1055	1055
	Mixing box 2 dampers	840	840	840	955	955	1125	1125
	Mixing box 3 side dampers	778	778	778	874	874	1021	1021
	Mixing box 3 upper dampers	938	938	938	1063	1063	1244	1244
	Return fan	869	878	878	1004	1004	1211	1211
Other optionals	Boiler water plates exch.	220	220	220	240	240	255	255
	Hot water coil	120	120	120	130	130	150	150



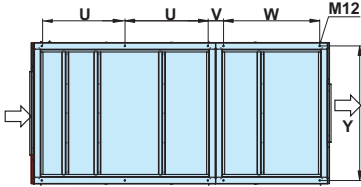
- These units have been designed for a silent operation. However, it should be taken into account the installation site and if the noise irradiated by the unit is higher than installation estimated value, plan:
  - an acoustic study, and appropriate acoustic treatment if necessary,
  - implementation precautions.

Note: consult the acoustic data provided in technical brochure.

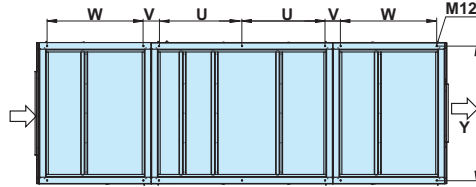
## Anchorage for antivibrators

Due to the modular conception of these units, depending on the combination of modules selected, there are 8 possible configurations of mounts. These configurations are the following ones:

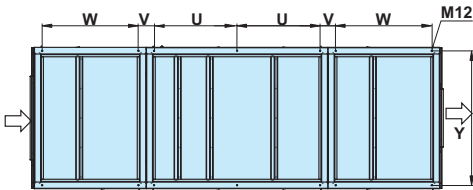
Standard Air Master BCP (2 modules)



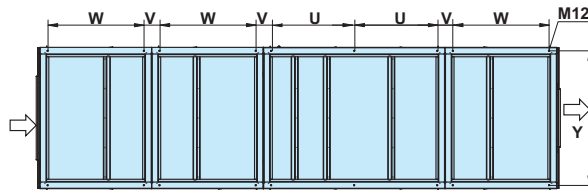
Air Master BCP with bags filter (3 modules)



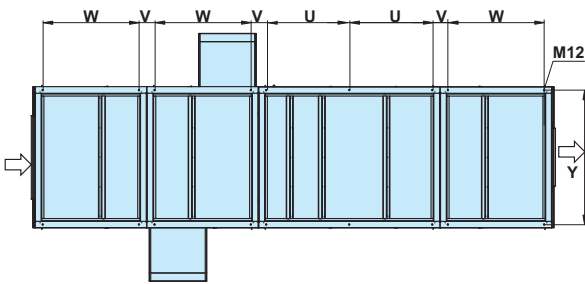
Air Master BCP with mixing box of 2 dampers (3 modules)



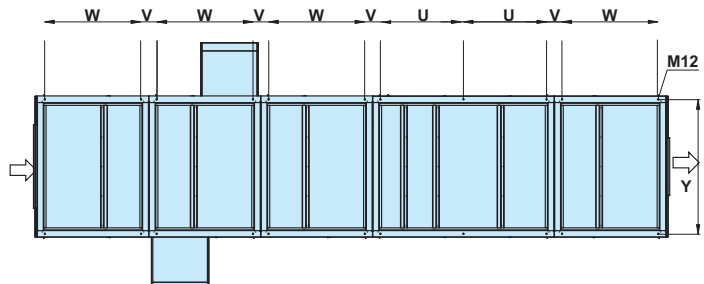
Air Master BCP with bag filters and mixing box of 2 dampers (4 modules)



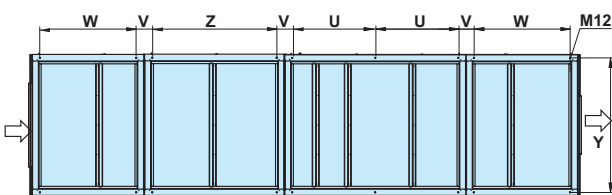
Air Master BCP with mixing box of 3 lateral dampers and return fan (4 modules)



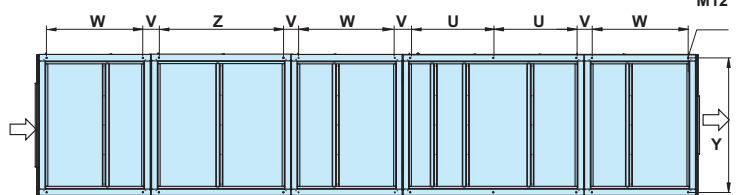
Air Master BCP with bag filters, mixing box of 3 lateral dampers and return fan (5 modules)



Air Master BCP with mixing box of 3 upper dampers and return fan (4 modules)



Air Master BCP with bag filters, mixing box of 3 upper dampers and return fan (5 modules)



### Distances between drills (mm):

Air Master BCP	U	V	W	Z	Y
Distance (mm)	1296	243	1502	1938	2095

### Size of different modules (mm):

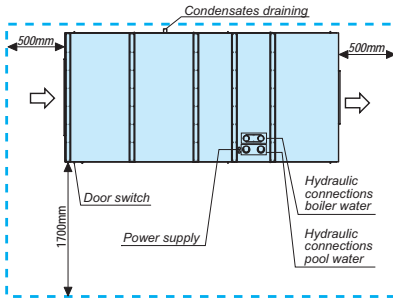
Air Master BCP		Width	Length
Cooling circuit	standard unit	2204	2865
Supply module		2204	1775
Bag filters F7		2204	1744
Mixing box of 2 dampers		2204	1744
Mixing box of 3 side dampers		2204	1744
Mixing box of 3 upper dampers		2204	2178
Return fan		2204	1744

### Minimum free space for commissioning and maintenance operations

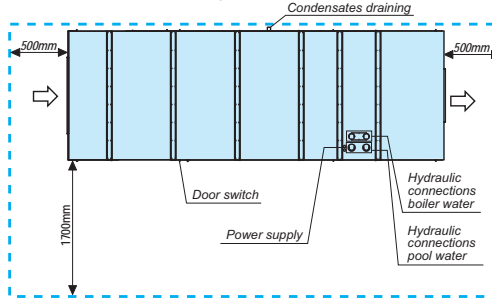
Overview:

- Access to components by the two laterals of the unit.
- Hinged doors for accessing the different sections of the unit.
- All doors and panels have built-in lockings with rubber joint ensuring watertightness.
- Depending on the configuration chosen, the technical space around the unit will change.

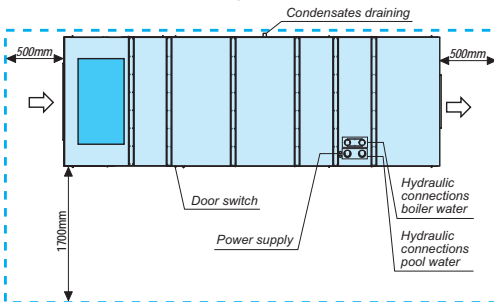
Air Master BCP standard



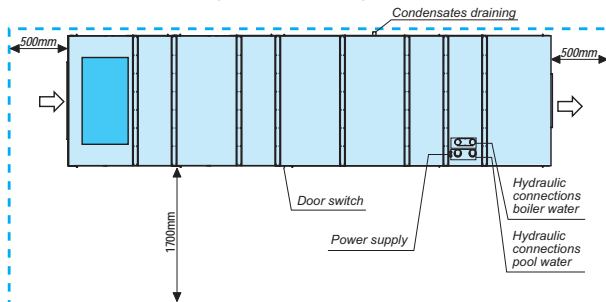
Air Master BCP with bag filters



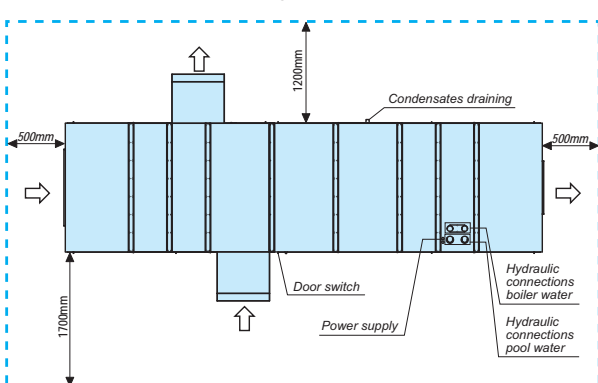
Air Master BCP with mixing box 2 damper



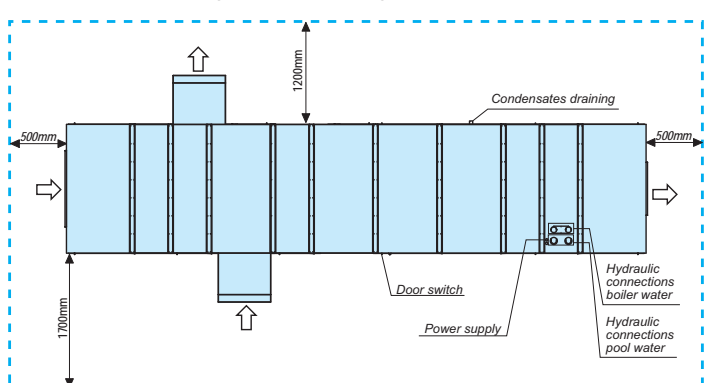
Air Master BCP with bag filter and mixing box 2 dampers



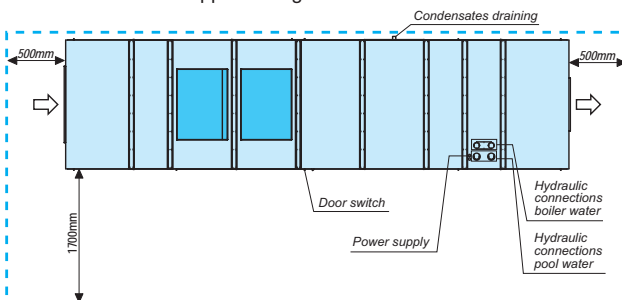
Air Master BCP with side mixing box and return fan



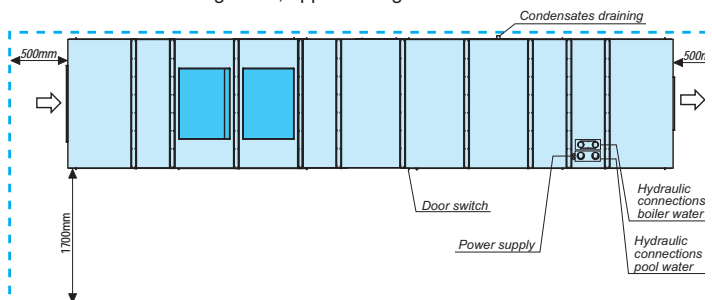
Air Master BCP with bag filters, side mixing box and return fan



Air Master BCP with upper mixing box and return fan



Air Master BCP with bag filters, upper mixing box and return fan



Important: Although Air Master BCP units do not provide access on the left (in the sense of air flow), it is necessary to leave a minimum space to realize the siphon in the condensates pan draining.



## 9. CHECKING BEFORE COMMISSIONING

### Electrical connections

#### Installation norms

When carrying out the electrical connections of the unit: wires inlet, wires section and calculation of the same ones, protections, etc..., consult the information provided in this document (see technical characteristics), the electrical scheme which is sent with the unit and effective regulations which regulate the installation of air-conditioners and electrical receivers. Verify that the power supply corresponds to which it appears on the nameplate and that the voltage keeps constant.



Check that the electrical connections are correct and well tight (each unit has its own electrical diagram and legend).



In order to prevent electrical shocks, all electrical wirings should be carried out before feeding the unit. Check that the automatic switch is closed, in order to avoid personal damages. Make the ground connection before any other electrical wiring.



**Warning: All electrical wirings in the installation are responsibility of the installer.**



It is necessary that the wiring of the installation comply with the applicable regulation. The installer should place elements of line protection according to the effective legislation.

#### Electronic control

**CIATpool** is an electronic module designed to control and supervise swimming pool dehumidification units through a microprocessor.

This control is basically composed of a  $\mu$ PC MEDIUM control plate, a pGD1 graphical terminal, a TCO user terminal (optional), and sensors.

Please refer to this control brochure to obtain more detailed information about its operation.

#### Connection chart

Air Master BCP		110 to 355
Main power supply	400 III ( $\pm 10\%$ )	3 + N + Gnd
Remote connection of the pGD1 terminal (by default on the electric panel) ①		telephone cable 6 wires standard (RJ12 connector)
Terminal connection for TCO user in the electric panel (optional) ②		2 wires for power supply 230V + 1 shielded cable for communication type AGW20 / 22 (1 braided pair + drainwire + shielding)
Remote off/on (optional)		2 wires
Main failure signal (optional)		2 wires
pCO web card to BMS (optional)		Ethernet

- ① In this case, the TCO terminal can be installed in the electric panel.  
 ② The same power supply used for powering the control board must also be used for powering the terminal.

### Air ducts connections

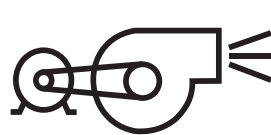

Air supply and return ducts should be calculated depending on the nominal flow and the unit available pressure (see table of technical characteristics). The calculation and design of ducts should be carried out by qualified technical personnel.

It is advisable to have the following recommendations:

- Curves in the fan discharge must be avoided. It is recommendable to have a straight section of duct measuring approximately 1 metre. If it is not possible, they must be as smooth as possible, using indoor deflectors when the duct is of large dimensions.
- When making the ducts, direction sharp changes must be avoided since they can generate occasional pressure drops, which affect the available pressure and the flow. The location of discharge and aspiration grilles must be studied carefully to avoid the air recirculation and the transmission and generation of noises to the interior.
- No matter the type of ducts type to use, these must be insulated and must not be composed of materials that propagate fire nor expel toxic gases in the event of a fire. The internal surfaces must be smooth and should not pollute the air that circulates within them. In any case, the effective legislation about this issue must be respected.
- Flexible connections must be made between the ducts and the unit that avoid the noise and vibration transmission.

### Checks in the centrifugal fan

- Before commissioning, check the blade rotation direction and that the axis turns without strokes nor vibrations
- Once running, check the operation conditions: pressures, flows and consumptions.
- The coupling of characteristic curves of the fan and the room is very important, so that the flows and pressures provided to the duct network are as required.

**ACHTUNG:** VOR DER ÖFFNUNG DIESER PANEEL STROM ABSCHALTEN UND 2 MIN. WARTEN.

**WARNING:** BEFORE OPENING THIS PANEL SWITCH OFF THE ELECTRIC SUPPLY AND WAIT FOR 2 MIN.

**ATTENTION:** AVANT L'OUVERTURE DE CE PANNEAU COUPER L'ALIMENTATION ÉLECTRIQUE ET ATTENDRE 2 MIN.

**ATTENZIONE:** PRIMA DE APRIRE QUESTA PARETE INTERROMPERE L'ALIMENTAZIONE ELETTRICA E ASPETTARE 2 MIN.

**ATENCIÓN:** ANTES DE ABRIR LA PUERTA CORTAR LA ALIMENTACIÓN ELÉCTRICA Y ESPERAR 2 MIN.

V220086

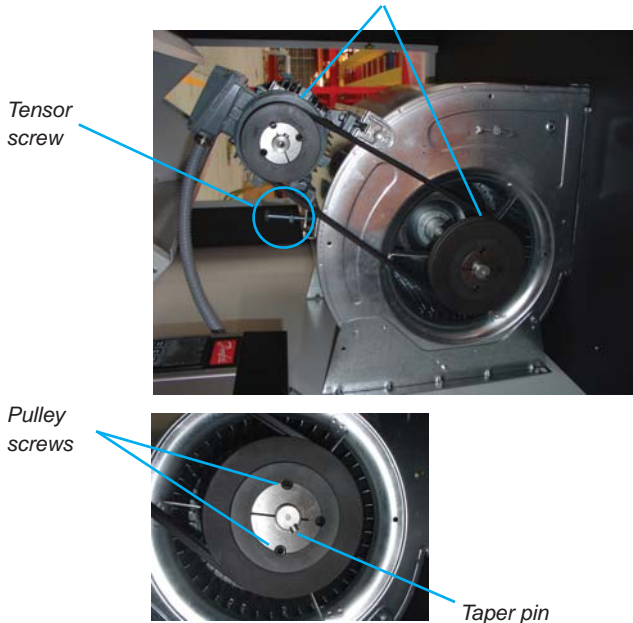


### Pulley and belt calibration

Centrifugal motorfans are coupled with pulleys and belts. In this type of fans, the following must be taken into consideration:

- The pulleys must be on the same plane, so it is important to check them with the help of a ruler or a laser aligner.
- In case they are not aligned, remove the pulley screws, remove the pulley and, after removing the taper pin, it can be slid over the axle (this action can be performed both in the motor as well as in the fan).
- After fixing the pulleys on the same plane, the belt tension is made by tightening the tensor screw.
- The belt tension must be checked after 24 hours of motor operation.

Pulleys must stay on the same plane



**Attention:** Before performing these operations, it is necessary to verify that the unit is disconnected from mains.

### Condensates drain connection

All models built-in a stainless steel condensates drain pan, sloped to facilitate water circulation down to the drainage, avoiding sanitary problems.

Drainage pipe diameter of M3/4" in bronze, it is located in the right lateral of Air Master BCP unit (in the air flow direction). Although the unit is not provided of access through this lateral, we must leave a minimum space between the wall and the unit to realize the unit.

**CONNECT SIPHON  
METTRE SIPHON  
PONER SIFON**

### Siphon installation norms

All water drain tubes must be provided with a siphon to avoid bad smell and water spills.

#### • Pan in overpressure:

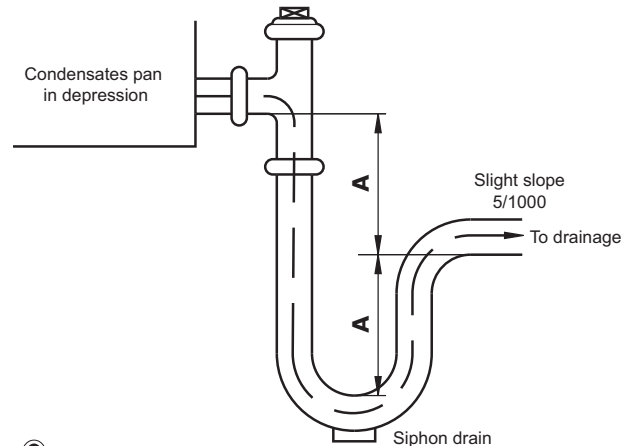
It's installed to avoid the access through the drain piping of bad smells.

#### • Pan in underpressure:

Water must be suctioned from the pan because of the depression with respect to the motorfan assembly.

Perform the siphon assembly as per the scheme of the attached starting diagram:

- For the correct siphon design, the "A" height must be at least twice that of the underpressure (mm.w.c) where the condensate pan is placed.
- Check that the condensate outlet is not clogged.
- The drain piping must be slightly sloped to ease circulation towards the drain.
- The original diameter of the piping must be respected. No reduction can be made.
- With outdoor temperatures which are lower than 0°C, the necessary precautions must be taken to prevent the water in the drain ducts from freezing.



Check the watertightness of the connection.

### Hydraulic connections

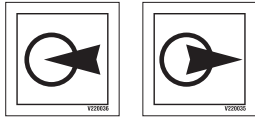
#### Installation hydraulic scheme:

Follow these recommendations:

- The diameters of hidraulic connections can be consulted in the next table.

Pipe diameter	Boiler water circuit			Pool water circuit	
	With hot water coil	With plates exchanger	With hot water coil + plates exchanger	With heat recuperator	With plates recuperator + plates exchanger
320 / 360 400	2 1/8" Cu threaded	2 1/8" Cu threaded	2 5/8" Cu threaded	DN-50 PVC threaded	DN-63 PVC threaded
440 / 480	2 1/8" Cu threaded	2 5/8" Cu threaded	3" St flange	DN-50 PVC threaded	DN-75 PVC threaded
555 / 610	2 1/8" Cu threaded	2 5/8" Cu threaded	3" St flange	DN-63 PVC threaded	DN-90 PVC threaded

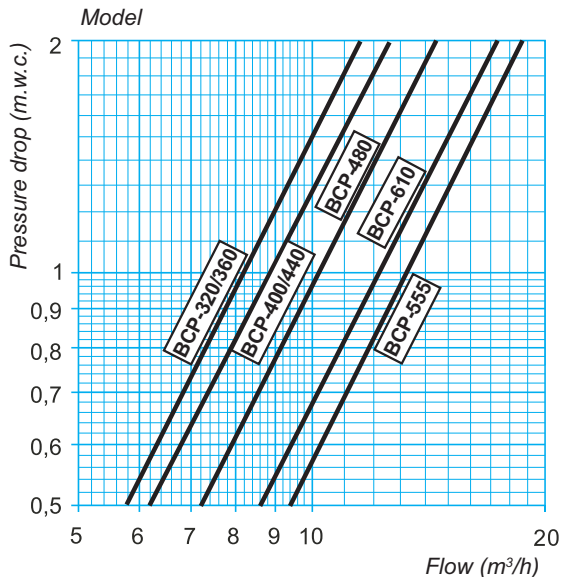
- Respect the water flow direction indicated on the unit.



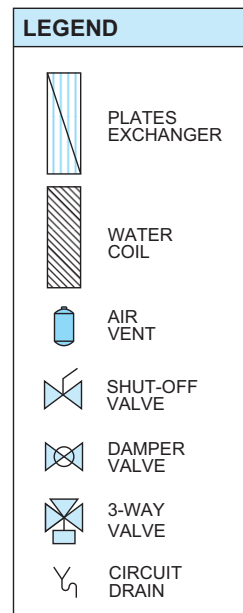
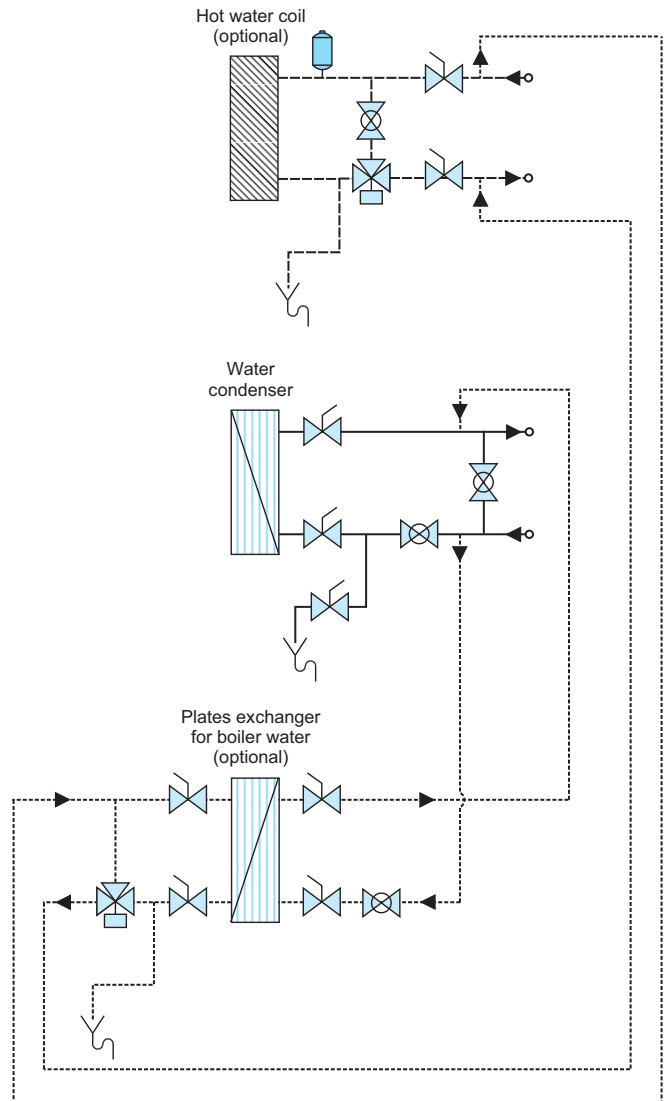
- Pipes must be measured with the smaller number of curves to diminish pressure drops and must be adequately fitted to avoid force excessively the exchanger connections.
- Carry out a preliminar control to check that there are not pressure drops in the installation, before insulating pipes and load the system.
- Avoid the possible transmission of vibrations or efforts of the pipes to the water exchanger.
- Flexible couplings are recommended for connecting pipework to the unit, in order to avoid possible transmission of vibrations, breakages and efforts in the unit or in the pipes. These couplings are compulsory when the unit is mounted on a frame or on antivibratory supports.
- Provide the accessories necessary on each hydraulic circuit (expansion vessel, air vents, safety valves, shut-off valves next to components which need maintenance, etc.).
- Install, or at least anticipate the temporary introduction, thermomanometers at the inlet and outlet of the unit, to carry out the installation supervision.
- **A water mesh filter is compulsory to be placed at the inlet of pool pump (for particles of  $\varnothing > 1$  mm), in order to avoid the soiling of the unit hydraulic circuit.** A good maintenance of this filter will avoid corrosion problems in the exchanger, and it will improve the heat efficiency of the unit. Not fulfill this recommendation could make useless the plates exchanger of the unit.

### Pressure drops in the condenser

The hydraulic circuit design must respect the operating conditions (flows - pressure drops).



### Hydraulic circuit, principle scheme



### Corrosion behaviour

Water content	Concentration (mg/l or ppm)	Time limits (analyze before)	SMO-254
Alkalinity (HCO <sub>3</sub> <sup>-</sup> )	< 70	No limit	+
	70 - 300		+
	> 300		+
Sulphate ① (SO <sub>4</sub> <sup>2-</sup> )	< 70	No limit	+
	70 - 300		+
	> 300		+
HCO <sub>3</sub> <sup>-</sup> / SO <sub>4</sub> <sup>2-</sup>	> 1.0	No limit	+
	< 1.0		+
Electrical conductivity	< 10 μS/cm	No limit	+
	10-500 μS/cm		+
	> 500 μS/cm		+
pH ②	< 6.0	Within 24h	0
	6.0 - 7.5		+
	7.5 - 9.0		+
	> 9.0		+
Ammonium (NH <sub>4</sub> <sup>+</sup> )	< 2	No limit	+
	2 - 20		+
	> 20		+
Chlorides (Cl <sup>-</sup> )	< 100	No limit	+
	100 - 200		+
	200 - 300		+
	> 300		+
Free chlorine (Cl <sub>2</sub> )	< 1	Within 5 horas	+
	1 - 5		0
	> 5		-
Hydrogen sulfide (H <sub>2</sub> S)	< 0.05	No limit	+
	> 0.05		+
Free (aggressive) carbon dioxide (CO <sub>2</sub> )	< 5	No limit	+
	5 - 20		+
	> 20		+
Total hardness (°dH)	4.0 - 8.5	No limit	+
Nitrate ① (NO <sub>3</sub> <sup>-</sup> )	< 100	No limit	+
	> 100		+
Iron ③ (Fe)	< 0.2	No limit	+
	> 0.2		+
Aluminium (Al)	< 0.2	No limit	+
	> 0.2		+
Manganese ③ (Mn)	< 0.1	No limit	+
	> 0.1		+

The plates exchangers of Air Master BCP units are made up of SMO-254 stainless steel, and the material used for the plates welding is pure copper.

The attached table indicates the behaviour to corrosion for stainless steel SMO-254 with respect to different compositions of water. Values outside these ranges may suppose corrosion problems.

#### Important recommendations:

- If the pool water is introduced directly into the unit water condenser, the addition of chlorine should **never** be carried out before the inlet to this condenser.
- These exchangers should **never** be used in swimming pools with electrolysis efficiency treatment. In these cases it is necessary to install intermediate titanium exchanger, otherwise serious corrosion problems may occur.
- In the case of a longer standstill, leave the exchanger full of water pool without flowing or empty may cause corrosion problems. During periods of inactivity it is **mandatory** to fill up the hydraulic circuit of the exchanger completely with demineralised water. To isolate the hydraulic circuit of the rest of the installation, it incorporates two shut-off valves in the input and output connections of the pool water, as well as another shut-off valve for emptying the circuit.

① Sulfates and nitrates work as inhibitors for piping corrosion caused by chlorides in pH neutral environments.

② In general, low pH (below 6) increases corrosion risk and high pH (above 7.5) decreases the corrosion risk.

③ Fe<sup>3+</sup> and Mn<sup>4+</sup> are strong oxidants and may increase the risk for localised corrosion on stainless steels.

SiO<sub>2</sub> above 150 ppm increase the risk of scaling.

#### Legend:

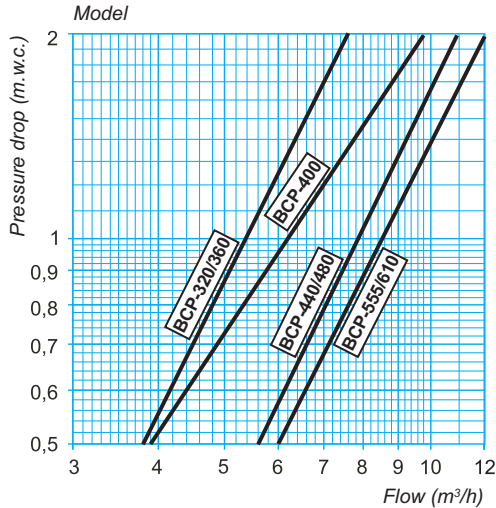
+ Good resistance under normal conditions.

0 Corrosion problems may occur specially when more factors are value 0.

- Use is not recommended.

## 10. OPTIONS

### Hot water coil



- **Characteristics:**
  - Assembly inside the unit.
  - Connections through the upper part of the unit. The diameters can be consulted on the table of the paragraph “Hydraulic connections”. Optionally, flexible couplings except in connections with flange.
  - Hot water coil, with 3 ways valve managed by the electronic control of the unit.
- **Coil filling:**
  - Coil filling should be carried out with the air vent open, until the water leaks, moment of closing it.
  - Cut the water supply and thus the generated bubbles rise to the highest point of the coil, coincident with the air vent, and eliminate opening it.
  - Introduce water in the circuit again and repeat the previous steps.
  - Drive the water pump (provided by the installer) and repeat the previous steps until air noises are not listened in the pipe, at that moment the filling of the installation will have been completed correctly.
- **Operation:**
  - It's used as support in heating mode to raise the ambient temperature.

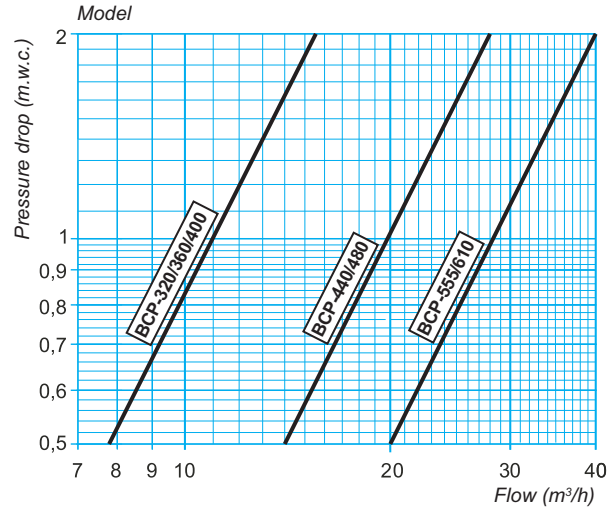
Note: Please refer to the CIATpool control brochure to obtain more detailed information about its operation.

### Electrical heater

- **Characteristics:**
  - Assembly inside the unit.
  - 1 or 2 stages electrical heaters, with built-in control.
  - It's used as support in heating mode to raise the ambient temperature.

Note: Please refer to the CIATpool control brochure to obtain more detailed information about its operation.

### Exchanger for boiler water



- **Characteristics:**
  - Plates exchanger of AISI 316L stainless steel and nitrile joints to warm-up and maintenance of vessel temperature (PWA), by 3 ways proportional valve with control depending on the temperature of vessel water.
  - \* Optionally titanium plates.
  - \* Optionally butyl joints.
- **Operation:**
  - This optional is the only enabled to operate during the warming-up of the pool vessel.
  - During the maintenance of vessel temperature will operate as first stage this optional, and if necessary, as second stage the water condenser circuit.

### Mixing boxes for free-cooling

- **Characteristics:**
  - Mixing box for free-cooling with 3 motorized dampers. Available in two configurations:
    - \* 2 dampers boxes, with upper external intake.
    - \* 3 dampers boxes, upper intakes and centrifugal return fan.

Note: Please refer to the CIATpool control brochure to obtain more detailed information about its operation.

### Manual external air intake damper

- This damper is dedicated to the continuous air renovation, with no need of free-cooling. The user will manually fit the external air flow that he considers necessary for the renovation.
- It is located in the right lateral access door to the compressors (in the sense of air flow), previous to the section of filters. If the unit incorporates the module of bags filters, this damper is located in this module, previous to bags filter.
- (See chapter of “Components distribution”).

### 11. SAFETY DEVICES

#### High pressure pressostat



Connected in the compressor discharge, this will stop the compressor when the pressure on this point reaches the set point value. This pressostat disconnects at 29 bar. Automatic reset.

In Air Master BCP will be kept operating: the internal fan, the external air control and in the compressor of water condenser circuit, the circulation pump.

#### Low pressure pressostat



Connected in the compressor intake, this will stop the compressor when the pressure on this point decreases under the measured value (caused by cloggings in the circuit, excessive soiling in

the filters, fan stop or frost in the evaporator). It disconnects at 0,5 bar. Automatic reset.

In Air Master BCP will be kept operating: the internal fan, the external air control and in the compressor of water condenser circuit, the circulation pump.

#### Compressors and fans safeties

Both fans and compressor have a built-in motor thermal protection device. This device protects the motor against overheating due to an overcurrent.

If a failure is detected in the discharge fan, the unit will stop automatically. If the failure is detected in the compressor, the compressor in question will stop.

#### Compressor anti-short-cycle timer

The compressor does not start-up until the anti-short-cycle time delay has lapsed from its last stop.

#### Magnetothermals for line protection

They are located at the beginning of the power lines for the compressors and motor fan(s) to protect them.

#### Control circuit automatic switch

Magnetothermal switch which protects the circuit so much against continuous overcurrents as high short currents (shortcircuits).

#### Main door switch

By means of a mechanical locking impedes the access to the electrical panel when the unit is with voltage.

DO NOT OPEN WITH VOLTAGE  
NE PAS OUVRIR SOUS TENSION  
NO ABRIR CON TENSION

V220007

#### Anti-fire safety

With the optional return air probe, the electronic control can activate an anti-fire safety device that detains the unit when the return air surpasses a temperature of 60°C (by default). It cannot return to operation until the temperature has dropped to below 40°C.

#### Differential pressostat for fouled filters

##### (optional)

This air differential pressostat connected to electronic control generates an alarm indication. This signal indicates that it is necessary to make a filter maintenance. Automatic reset.

#### Return air temperature probe

The failure of this probe stops the unit.

#### Pool vessel temperature probe

A failure detected in this probe will cause the stop of compressor of water condenser circuit.

If exists plates exchanger for boiler water PWA (optional), this stops until the alarm reset takes place.

#### HWC water temperature

If an antifreeze alarm is generated in the hot water coil:

- In HEATING mode: this closes outdoor air damper and opens HWC valve.
- In COOLING mode: this stops compressors and closes outdoor damper.

#### PWA discharge temperature probe (optional)

If exists plates exchanger for boiler water PWA (optional), this stops until the alarm reset takes place.

## 12. COMMISSIONING



**Warning: the commissioning of the installation should be carried out by CIAT personnel. Please, communicate with personnel of technical assistance when the previous works have been concluded.**

### Operating temperature of the pool

After seasonal shutdowns of the unit follow these steps for the run up:

- Check that all wirings, hydraulic connections and all pipings have been properly connected and in good condition.

#### **WICHTIG: WIEDERBEHEIZUNG DER OLWANNE**

BEIDER ERSTEN INBETRIEBSETRUNZ ORDER NACH EINER LANGEN STROMUNTER-BRECHUNG BRINGEN SIE DIE MASCHINE UNTER SPANNUNG 24 STRUNDERLANG BEVOR SIE DEN(DIE) KOMPRESSOR(EN) EINSCHALTEN KOENNEN.

#### **IMPORTANT: CRANKCASE HEATING**

FOR THE FIRST START OR AFTER ALONG TIME OUT OF VOLTAGE PUT THE MACHINE ON LIVE 24 HOURS BEFORE TO ALLOW THE COMPRESSOR(S) STARTING

#### **IMPORTANT: SURCHAUFFE CARTER D'HUILE**

AU PREMIER DÉMARRAGE OU APRÈS UNE ABSCENCE DE COURANT PROLONGÉE, METTRE LA MACHINE SOUS TENSION 24 HEURES AVANT D'AUTORISER LE DÉMARRAGE DU(DES) COMPRESSEUR(S).

#### **IMPORTANTE: RISCALDARE IL CARTER DELL'OLIO**

AL PRIMO AVVIAMENTO U DOPO UNA INTERRUZIONE PROLUNGATA DELLA ALIMENTAZIONE ELETTRICA, LASCIARE LA MACCHINA SOTTO TENSIONE PER 24 ORE PRIMA DI AUTORIZZARE L'AVVIAMENTO DEL(DEI) COMPRESSORE(I).

#### **IMPORTANTE: RECALENTAMIENTO DE ACEITE DEL CÁRTER**

ANTES DEL PRIMER ARRANQUE O DESPUÉS DE UNA AUSENCIA DE CORRIENTE POR UN LARGO PERIODO DE TIEMPO, CONVIENE QUE LA UNIDAD ESTÉ CONECTADA UN MÍNIMO DE 24 HORAS.

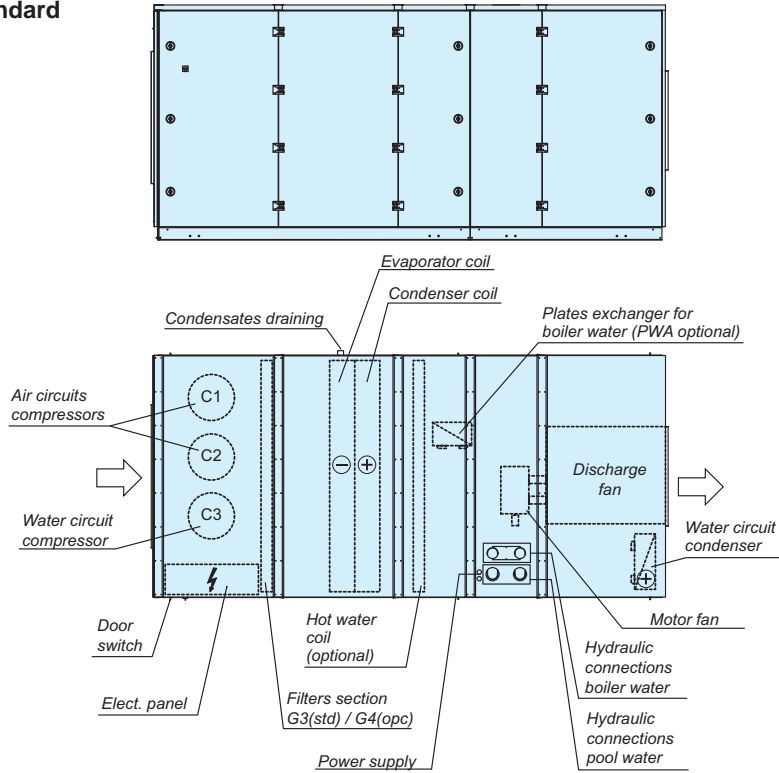
V220084

- Once the above verifications have been carried out, the control circuit is supplied with voltage by the automatic control switch. It is necessary to leave the compressor crankcase heater with voltage for 24 hours before starting the compressor.
- When starting-up the compressor, if the refrigerant load has not been completed and lower than the required, the intake pressure will be quite lower than the normal one. The low pressure pressostat connected at the compressor intake, will stop its operation when the pressure on that point decreases under the setting value (disconnects at 0,5 bar and automatic reset).
- Ensure that there is no refrigerant leak or air in the circuit.
- Measure temperatures of liquid line and intake line, as well as discharge and intake pressure temperatures. Check that undercooling and overheating values are within the allowable limits.
- Check that the unit operates correctly and verify that the current absorbed by each motor is normal.
- Check all safety devices operate correctly. If a safety is active, is necessary to find the failure and then reset the safety.
- Check the selected values for humidity and temperature set points in the control panel. Please refer to the CIATpool control brochure to obtain more detailed information.
- The differential between air and water temperatures should be checked. The air temperature should be about 2 or 3°C higher than water temperature avoiding condensations on walls and windows inside the room.
- Check by-pass gate position of manual setting, adjusting the opening percentage to the installation needs.
- Doors and windows must be closed to facilitate the increase of air and water temperature. Free-cooling gates (optional) must be placed on the position of minimum opening.
- Check motorized damper of free-cooling (optional).

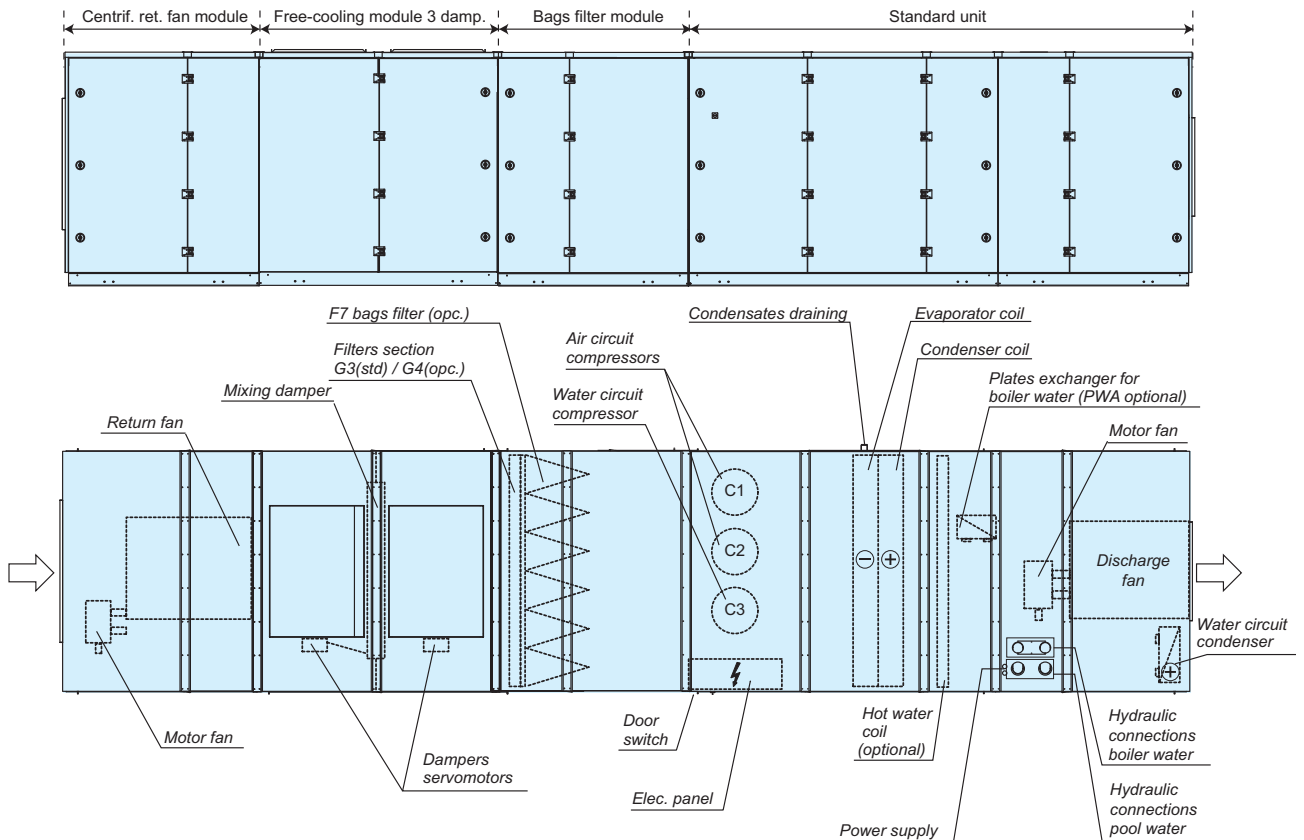


### 13. COMPONENTS DISTRIBUTION

Air Master BCP standard



Air Master BCP with bag filters module, free-cooling 3 dampers and return fan



Note: in any configuration with bags filter module, the position of gravimetric filters change, locating in front of bags filter (in the air flow sense).

## 14. MAINTENANCE

The minimal maintenance operations and their periodicity will be made according to the national regulations.

Any intervention on the electric cooling components must be made by a qualified and authorized technician.

Technicians who intervene with the unit must use the necessary safety equipment (gloves, goggles, insulating clothing, safety shoes, etc.). Furthermore, if working around sources of significant noise, we recommend the use of noise-dampening headgear.



**Caution: Before intervening in the unit, cut off main power.**



**Important: All accesses are at the right, in the sense of air flow.**

### Recommendations

- Do not lean on the unit. A platform must be used to work on a level.
- Do not lean on the copper refrigerant tubes.
- Keep the unit clean.
- Keep the space surrounding the unit clean and cleared in order to avoid accidents and ensure the proper ventilation of the coil.
- Perform a visual (remains of water or oil below or around the unit) and auditory inspection of the entire installation.
- In general, a corrosion control must be performed on the metallic parts of the unit (frame, bodywork, exchangers, electric panel, etc.).
- Check that the insulation foam is not unstuck or torn.
- All the electric connection states must be checked as well, as well as the air tightness of the different circuits.

### Oil

Oils used for cooling machines do not pose any threat to one's health if used while following the usage guidelines:

- Avoid any unnecessary manipulation of the elements covered in oil. Use protection creams.
- Oils are flammable and must be stored and handled with precaution. "Disposable" rags or towels used for cleaning must be kept away from open flames and must be discarded by using the appropriate procedure.
- Jugs must be kept closed. Avoid using oil from an already-open jug kept in poor conditions.

Both the oil type as well as the volume needed for each model are stated in the characteristics table in chapter 4.

- Check the oil level and aspect. In case of a colour change, check

the oil quality using a contamination test.

- In the case of the presence of acid, water or metallic particles, replace the affected circuit oil, as well as the dehydrant filter.
- In the event of an oil charge change, only new oil will be used, which will be identical to the original oil and taken from a jug tightly closed until the moment of the charge.

### Refrigerant

Only qualified personnel must perform a periodic tightness control, in accordance with the regulation (CE) **N° 517/2014**.

- The frequency of checks is no longer related to the load of refrigerant but to its global warming potential:

$$\text{Load kg x GWP} = \text{t CO2e}$$

Carbon dioxide equivalency (t CO2e ) is a quantity that describes, for a given mixture and amount of greenhouse gas, the amount in tonnes of CO2 that would have the same global warming potential (GWP).

Please, consult data of carbon dioxide equivalency (t CO2e) provided in the technical characteristics table (chapter 4).

- Operators shall ensure that the unit is checked for leaks ad minima according to the following frequency:
  - t CO2e < 5 .....not subjected
  - t CO2e 5 to 50 .....every year
  - t CO2e 50 to 500 ...every 6 months
  - t CO2e > 500 .....every 3 months
- Where a leakage detection system has been installed the frequency of checks is halved.

Note: Never forget that the cooling systems contain liquids and vapours under pressure.

- All necessary precautions must be taken during the partial opening of the cooling circuit. This opening entails the discharge of a certain amount of refrigerant to the atmosphere. It is essential to limit this quantity of lost refrigerant to a minimum by pumping and isolating the charge in some other part of the circuit.
- The refrigerant fluid at low temperature can cause inflammatory injuries similar to burns when contacting the skin or eyes. Always use safety goggles, gloves, etc. when opening ducts that may contain liquids.
- The refrigerant in excess must be stored in appropriate containers and the amount of refrigerant stored at the technical rooms must be limited.
- Refrigerant barrels and deposits must be handled with precaution and visible warning signs must be placed to attract attention over the risks of intoxication, fire and explosion linked to the refrigerant.
- At the end of its useful life, the refrigerant must be retrieved and recycled as per the current regulations.

### Access to the unit's components:

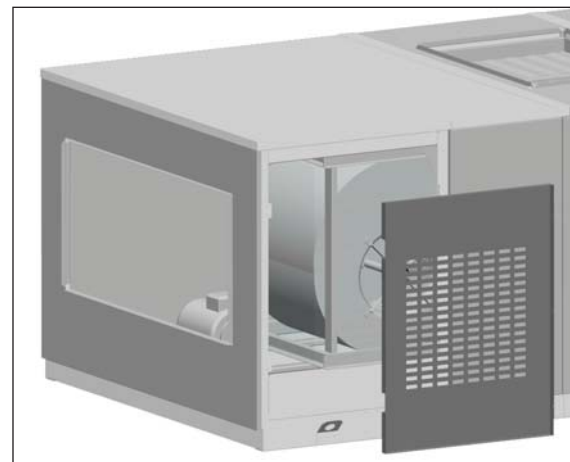
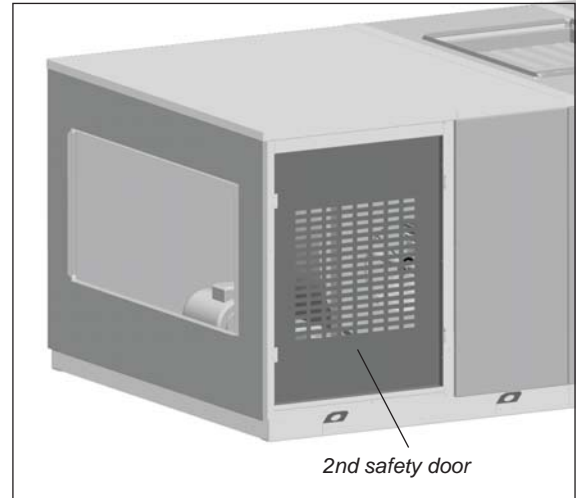
Next, some recommendations are stated for performing the maintenance and cleaning of the unit's components:

### Access to discharge fan:

- In first place, put the door switch in 0 position.
- Later, turn the locks of the fan access door. The fan is also protected with a second screwed door that must be removed.



- Follow the same maintenance recommendations as for the discharge fan.



### Access to electrical panel:

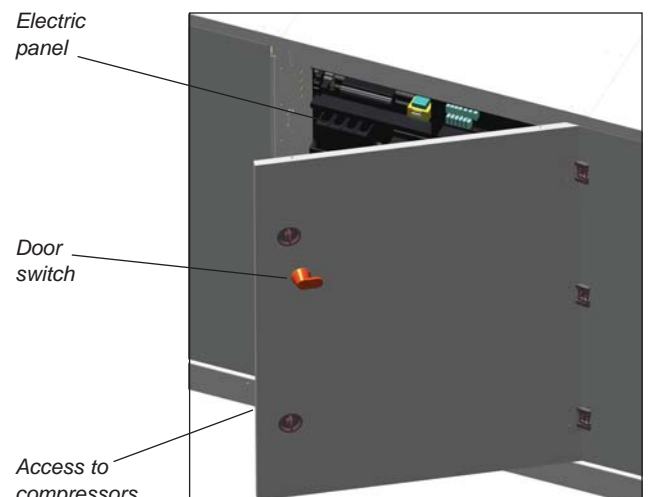
- In first place, put the door switch in 0 position.
- Later, turn the locks of the door where we will find this switch. The electrical panel is located on the upper part.

### Recommendations:

- Check that the turbine and the motor are clean.
- Provide spare fan belts.
- The motor and fan have lubricated and sealed bearings and that, therefore do not need more lubrication.

### Access to return fan (optional):

- In first place, put the door switch in 0 position.
- Later, turn the locks of the fan access door. The fan is also protected with a second screwed door that must be removed.



### Air filters extraction:

For units with no bags filter, the access to the filters is made through the same access door to compressors.

In these units filter extraction is lateral. Simply pull the filter tabs slightly forward to remove the filter. In the following detail appears a filter displaced for removing it:



For units with bag filters, the access to filters is made through the access door to this module.

In these units filter extraction is lateral. Simply pull the filter tabs slightly forward to remove the filter.

Gravimetric filters frame (G3 / G4)

Gravimetric filters frame (F7)



### Recommendations:

- Clean it regularly. Depending on the installation conditions, the state of the filter should be checked to define cleaning periodicity.
- Filters G3 (standard) and G4 (optional): Clean the filter with a vacuum cleaner or wash with water.
- Filters F7 (opcional): Should be replaced. Provide spare bags.

### Access to condensates pan:

Access to condensates drain pan through compressors access panel. To reach the pan, the filters should be disassembled (except for units with bags filter module).

### Recommendations:

- Check that condensates drain pan is clean. As this pan is sloped towards the drainage, water should not remain stagnant.
- Revise that the drainage is not obstructed.
- Wash the pan with water and non abrasive detergent.

### Access to water condenser:

Access to the plates exchanger through the same door that provides access to the supply fan.

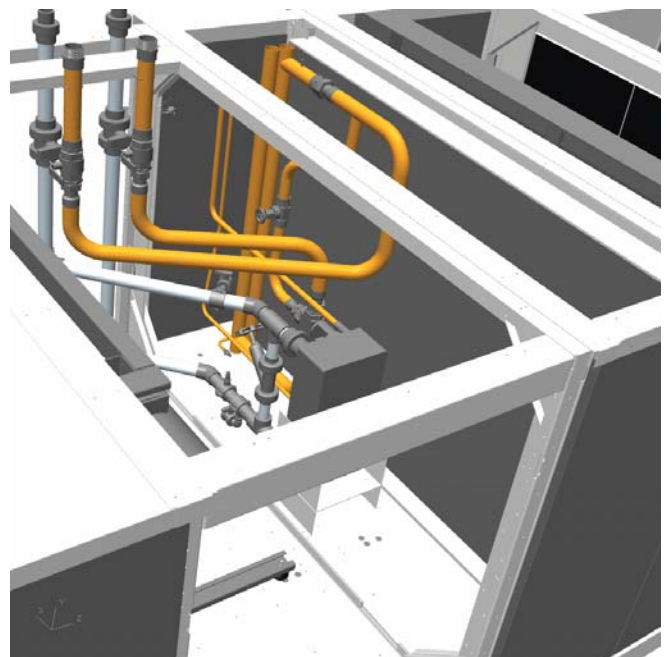
### Recommendations:

During periods of inactivity it is **mandatory** to fill up the hydraulic circuit of the exchanger completely with demineralised water. To do this:

- The hydraulic circuit will be isolated using two shut-off valves located in the input and output connections of the pool water (see picture attached).
- Then, the heat exchanger plates of the unit will be emptied, using the shut-off valve of 1/2" for drainage.
- Several renovations with clean demineralised water prior to definitive filling is recommended.



**Warning:** Leave the exchanger with pool water with no flow or empty may cause corrosion problems in the plates of the exchanger.



### 15. CONTROL AND ANALYSIS OF BREAKDOWNS

Symptom	Cause	Solution
Evaporation pressure very high in relation with the air inlet	<ul style="list-style-type: none"> <li>a) Charge excess</li> <li>b) High air temperature</li> <li>c) Compressor aspiration not air tight</li> <li>d) Cycle reversing valve in middle position</li> </ul>	<ul style="list-style-type: none"> <li>a) Collect refrigerant</li> <li>b) Verify overheating</li> <li>c) Verify compressor state and replace</li> <li>d) Check that the valve is not clogged. Replace if necessary</li> </ul>
Very low condensation pressure	<ul style="list-style-type: none"> <li>a) Gas lack</li> <li>b) Compressor aspiration not air tight</li> <li>c) Cycle inversion valve in middle position</li> <li>d) Liquid circuit plugging</li> </ul>	<ul style="list-style-type: none"> <li>a) Search for leaks, complete charge</li> <li>b) Verify compressor state and replace</li> <li>c) Check that the valve is not clogged. Replace if necessary</li> <li>d) Verify the dehydrating filter and expansion valve</li> </ul>
Condensation pressure very high in relation to the air outlet, high pressostat cutoff	<ul style="list-style-type: none"> <li>a) Insufficient air flow</li> <li>b) Air inlet temperature very high</li> <li>c) Dirty condenser (does not exchange)</li> <li>d) Much refrigerant charge (flooded condenser)</li> <li>e) The condenser fan is broken down</li> <li>f) Air in the cooling circuit</li> </ul>	<ul style="list-style-type: none"> <li>a) Verify the air circuits (flow, filter cleanliness...)</li> <li>b) Verify the control thermostat readjustment</li> <li>c) Clean it</li> <li>d) Collect refrigerant</li> <li>e) Repair</li> <li>f) Make vacuum and load</li> </ul>
Evaporation pressure too low (low pressostat cutoff)	<ul style="list-style-type: none"> <li>a) Low flow in evaporator. Air recirculation</li> <li>b) Frozen evaporator</li> <li>c) Liquid line as different temperatures at filter inlet and outlet</li> <li>d) Gas lack</li> <li>e) Very low condensation pressure</li> <li>f) Evaporator fan broken down</li> </ul>	<ul style="list-style-type: none"> <li>a) Verify the air circuits (flow, filter cleanliness...)</li> <li>b) Verify defrost</li> <li>c) Replace filter</li> <li>d) Search for leaks, complete charge</li> <li>e) Temperature of air or water in condenser very low (air or water flow very high), adjust flow</li> <li>f) Repair</li> </ul>
Compressor does not start, does not make noise (humming)	<ul style="list-style-type: none"> <li>a) No power</li> <li>b) The contacts of a control element are open</li> <li>c) Timing of anti cycle short does not allow the starting</li> <li>d) Open contact</li> <li>e) Contactor coil burnt</li> <li>f) Indoor Klixon open</li> </ul>	<ul style="list-style-type: none"> <li>a) Check differential, fuses</li> <li>b) Verify the safety chain of the electronic control</li> <li>c) Verify electronic control</li> <li>d) Replace</li> <li>e) Replace</li> <li>f) Wait for reactivation, verify intensity absorbed</li> </ul>
Compressor does not start, motor sounds intermittently	<ul style="list-style-type: none"> <li>a) Electrical power supply very low</li> <li>b) Power cable disconnected</li> </ul>	<ul style="list-style-type: none"> <li>a) Control line voltage and locate voltage drop</li> <li>b) Verify connections</li> </ul>
Repeated compressor starts and stops	<ul style="list-style-type: none"> <li>a) Because of high pressure</li> <li>b) Control differential too short (short cycle)</li> <li>c) Gas lack, cutoff because of low pressure</li> <li>d) Dirty or frosted evaporator</li> <li>e) The evaporator fan does not work, cuts off the low pressostat</li> <li>f) Expansion valve damaged or clogged by impurities (cuts off low pressostat)</li> <li>g) Dehydrating filter clogged (cuts off low safety)</li> </ul>	<ul style="list-style-type: none"> <li>a) Verify charge</li> <li>b) Increase differential</li> <li>c) Search for leak, reload unit</li> <li>d) Clean, verify evaporator air circuit</li> <li>e) Replace or repair</li> <li>f) Replace, as well as filter</li> <li>g) Replace</li> </ul>
The compressor makes a noise	<ul style="list-style-type: none"> <li>a) Loose attachment</li> <li>b) Oil lack</li> <li>c) Compressor noise</li> </ul>	<ul style="list-style-type: none"> <li>a) Fix</li> <li>b) Add oil to recommended level</li> <li>c) Replace</li> </ul>
Noisy operation	<ul style="list-style-type: none"> <li>a) Unit installed without antivibration protection</li> </ul>	<ul style="list-style-type: none"> <li>a) Place base over shock absorbers</li> </ul>
Alarm or reading error in the humidity probe	<ul style="list-style-type: none"> <li>a) Dirt in the humidity sensor</li> </ul>	<ul style="list-style-type: none"> <li>a) Disassembly the probe encapsule</li> <li>b) Proceed to clean the sensor with some soft cotton element and non-abrasive fluid, without pressing it</li> <li>c) Reassemble the casing, checking that the cable is in contact externally with the metallic mesh</li> </ul>