



**BALTIMORE  
AIRCOIL COMPANY**



## **SP Adiabatic Cooler**

### **RIGGING AND INSTALLATION INSTRUCTIONS**





# About rigging and installation

The BAC equipment should be rigged and installed as outlined in this bulletin.

These procedures should be thoroughly reviewed prior to the rigging and operation to acquaint all personnel with the procedures to be followed and to assure that all necessary equipment will be available at the job site. Be sure to have a copy of the unit certified drawing available for reference. If you do not have a copy of this drawing or if you need additional information about this unit, contact the local BAC Baltimore representative. His name and phone number can be found on the [www.BaltimoreAircoil.eu](http://www.BaltimoreAircoil.eu). The model type and serial number of your equipment are indicated on the unit nameplate.

## Recommended maintenance and monitoring programme

Checks and adjustments	Start-Up	Every month	Every 3 months	Every 6 months	Every start of adiabatic season, Spring
Adiabatic pre-cooler water flow	X		X		X
Tighten electrical connections	X			X	X
Rotation of fan(s)	X				
Motor voltage and current	X			X	X
Unusual noise and/or vibration	X		X		X

Inspections and monitoring	Start-up	Every month	Every 3 months	Every 6 months	Every start of adiabatic season, Spring
General condition of the equipment	X		X		X
Adiabatic pre-cooling pads	X		X		X
Heat transfer coil	X			X	
Water distribution pipe	X			X	X
City water strainer	X	X			X

Cleaning procedures	Start-up	Every month	Every 3 months	Every 6 months	Every start of adiabatic season, Spring
Adiabatic pre-cooling media	X		X		X
Adiabatic gutter system				X	X



Auxiliary equipment integrated in the cooling system may require additions to the table above. Contact suppliers for recommended actions and their required frequency.

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## About engineering and application practices

This bulletin only refers to the assembly of the unit. To ensure a proper operation, a correct integration of the unit in the overall installation is mandatory. For good engineering and application practices on layout, levelling, connecting pipework, etc., please refer to our website:

<http://www.baltimoreaircoil.eu/knowledge-center/application-information>.

## Shipping

BAC cooling equipment is factory assembled to assure uniform quality and minimum field assembly. The adiabatic pre-cooler sections of the SpartiumCooler unit are factory installed.

## Inspection before rigging

When the unit is delivered to the job site, it should be checked thoroughly to ensure all required items have been received and are free of any shipping damage prior to signing the bill of lading.

The following parts should be inspected:

- Exterior panels and covers
- Fans
- Heat exchanger
- Adiabatic pre-cooler sections

## Unit weights

Before rigging any BAC equipment, the weight of each section should be verified on the unit certified drawing.



These weights are **approximate** and should be confirmed by weighing **before lifting** when available hoisting capacity provides little margin for safety.



### CAUTION

**Before an actual lift is undertaken, ensure no water, snow, ice or debris has collected in the sump or elsewhere in or on the unit. Such accumulations will add substantially to the equipment's lifting weight.**

In the event of extended lifts or where hazards exist, the lifting devices should be used in conjunction with safety slings placed under the unit.

## Anchoring

The unit must be properly anchored in place.

Refer to the suggested support details on the certified drawing for locations of the mounting holes. Anchor bolts must be provided by others.

Holes suitable for 19 mm bolts are provided in the bottom flange of the cooler support structure for bolting the unit to the support beams.

## Leveling

The unit must be level for proper operation and ease of piping.

The unit should be level to 0,5 mm/m over the unit length and width.

Support beams must also be level as shims should not be used between pan and support beams to level the unit.

## Connecting pipework

All piping external to BAC cooling equipment must be supported separately.

In case the equipment is installed on vibration rails or springs, the piping must contain compensators to eliminate vibrations carried through the external pipework.

## Purge requirements

The installer of BAC closed circuit cooling towers must ensure a proper air purging of the system prior to operation.

Entrained air can restrict the capacity of the cooler, resulting in higher process temperatures.

## Freeze protection

These products must be protected against damage and/or reduced effectiveness due to possible freeze-up by mechanical and operational methods. Please contact your local BAC Balticare representative for recommended protection alternatives.

## Safety precautions

All electrical, mechanical and rotating machinery constitutes a potential hazard, particularly for those not familiar with its design, construction and operation. Accordingly, adequate safeguards (including use of protective enclosures where necessary) should be taken with this equipment both to safeguard the public (including minors) from injury and to prevent damage to the equipment, its associated system and the premises.

If there is doubt about safe and proper rigging, installation, operation or maintenance procedures, contact the equipment manufacturer or his representative for advice.

When working on operating equipment, be aware that some parts may have an elevated temperature. Any operations on elevated level have to be executed with extra care to prevent accidents.



## AUTHORIZED PERSONNEL

The operation, maintenance and repair of this equipment should be undertaken only by personnel authorized and qualified to do so. All such personnel should be thoroughly familiar with the equipment, the associated systems and controls and the procedures set forth in this and other relevant manuals. Proper care, personal protective equipment, procedures and tools must be used in handling, lifting, installing, operating, maintaining and repairing this equipment to prevent personal injury and/or property damage. Personnel must use personal protective equipment where necessary (gloves, ear plugs, etc...)

## MECHANICAL SAFETY

Mechanical safety of the equipment is in accordance with the requirements of the EU machinery directive. Depending upon site conditions it also may be necessary to install items such as bottom screens, ladders, safety cages, stairways, access platforms, handrails and toe boards for the safety and convenience of the authorized service and maintenance personnel.

At no time this equipment should be operated without all fan screens in place.

Since the equipment operates at variable speeds, steps must be taken to avoid operating at or near the installation's "critical speed".

For more information consult your local BAC Balticare representative.

## ELECTRICAL SAFETY

No service work should be performed on or near the fans unless motors are electrically isolated.

## LOCAL REGULATIONS

Installation and operation of cooling equipment may be subject to local regulations, such as establishment of risk analysis. Ensure regulatory requirements are consistently met.

## LIFTING



### CAUTION

**Failure to use designated lifting points can result in a dropped load causing severe injury, death and/or property damage. Lifts must be performed by qualified riggers following BAC published Rigging Instructions and generally accepted lifting practices. The use of supplemental safety slings may also be required if the lift circumstances warrant its use, as determined by the rigging contractor.**

## Non-walking surfaces

Access to and maintenance of any component needs to be performed in accordance with all local applicable laws and regulations. If the proper and required access means are not present, temporary structures need to be foreseen. Under no circumstance can one use parts of the unit, that are not designed as an access mean, unless measures can be taken to mitigate any risks that might occur from doing so.

## Modifications by others

Whenever modifications or changes are made by others to the BAC equipment without written permission of BAC, the party who has done the modification becomes responsible for all consequences of this change and BAC declines all liability for the product.

## Warranty

BAC will guarantee all products to be free from manufactured defects in materials and workmanship for a period of 24 months from the date of shipment. In the event of any such defect, BAC will repair or provide a replacement. For more details, please refer to the Limitation of Warranties applicable to and in effect at the time of the sale/purchase of these products. You can find these terms and conditions on the reverse side of your order acknowledgement form and your invoice.

## General notes

1. The equipment arrives on site by truck.  
A crane must always be used to unload the unit from the truck. Do not attempt to unload the unit using a forklift.
2. Spreader bars of the full width of the section must be used between the lifting cables to prevent damage to the section.
3. For extended lifts or where hazards exist, it is recommended to use the lifting devices in conjunction with safety slings placed under the unit.
4. For each unit, only one lift is required. Lifting ears are foreseen on each unit.
5. Attach the lifting devices to the unit as per rigging methods below. Do not use lifting hooks to lift the unit, use shackles (max. Ø 39 mm) as shown on below picture. Unload the unit from the truck.



*Use shackles (max. Ø 39 mm) to lift the unit*

6. Install the unit in its final position and anchor to the support beams (supplied by others).



### CAUTION

**When the unit is installed, all metal parts created by drilling, fastening self tapping screws, grinding, welding or other mechanical works must be removed from the unit. If they remain on the unit (typically on the double break flanges) this could lead to corrosion and eventually coating damage.**



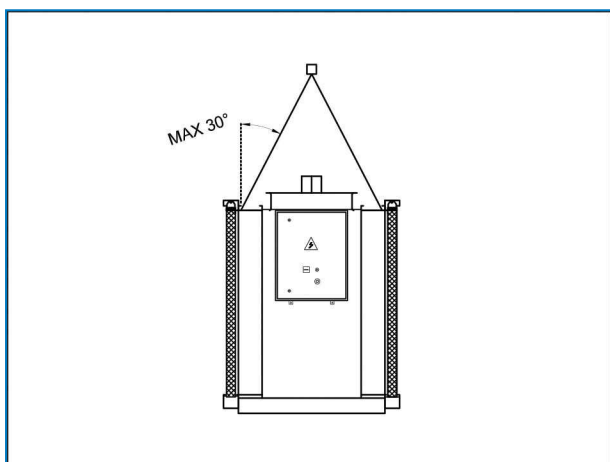
**CAUTION**

Before an actual lift is undertaken, ensure no water, snow, ice or debris has collected in the unit. Such accumulations will add substantially to the equipment's lifting weight.

## Rigging method

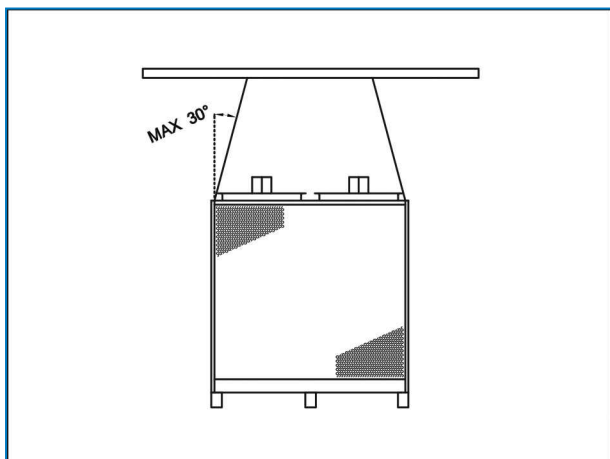
To avoid damage during hoisting, a spreader beam should be used and the angles shown in the diagrams below must be observed.

### End View

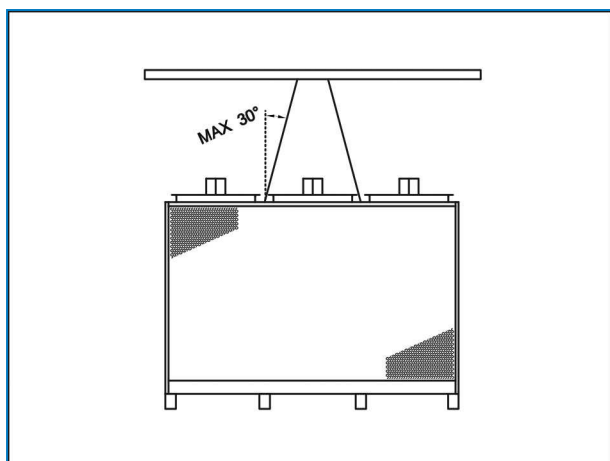


End view

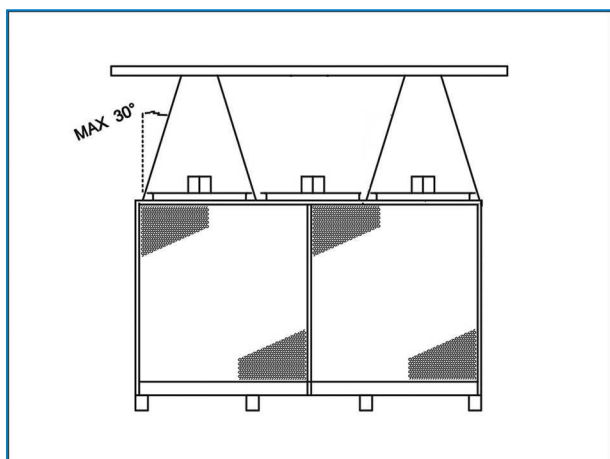
### Side View



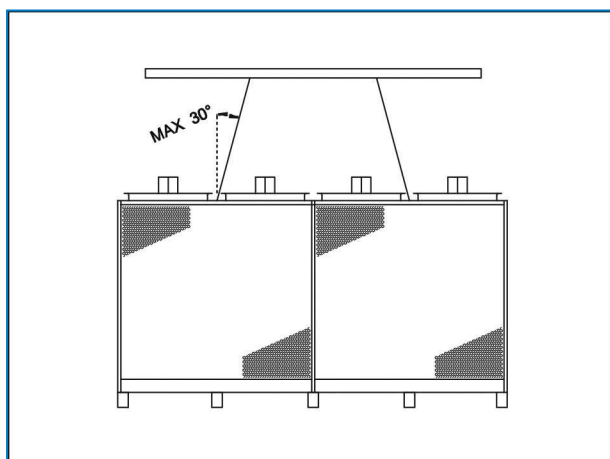
All 2-fan units



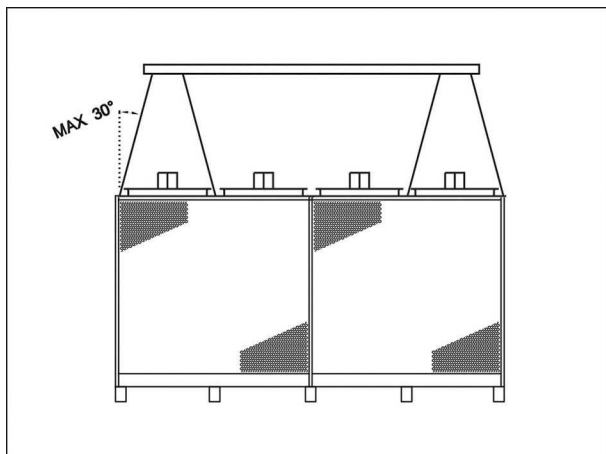
3-fan units (A-models – Fan diameter 910 mm)



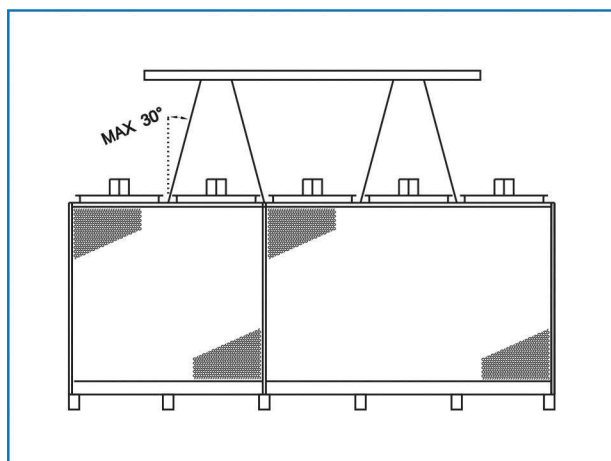
3-fan units (B-models – Fan diameter 1250 mm)



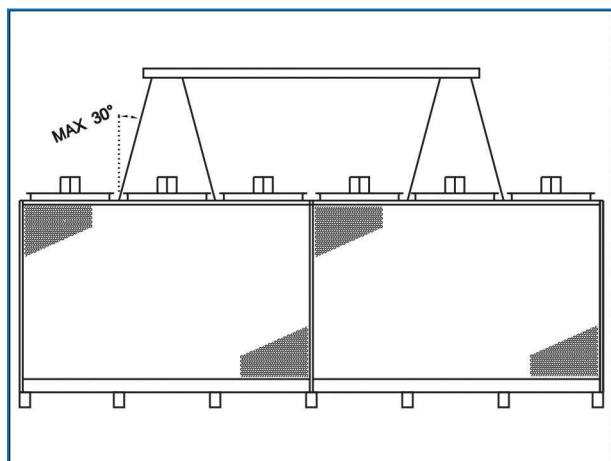
4-fan units (A-models – Fan diameter 910 mm)



4-fan units (B-models - Fan diameter 1250 mm)



All 5-fan units



All 6-fan units (A-models - Fan diameter 910 mm)

## Installed adiabatic pre-cooler

### CONNECTION OF DRAINS

The surplus of water distributed over the adiabatic pre-cooling media during adiabatic operation is collected into a gutter and drained to the sewer via one or two different drains per pre-cooler side.

Each adiabatic pre-cooler section is equipped with a separate bottom drain guaranteeing full emptying and drying of the gutter system after each adiabatic cycle.

Refer to the table below for the number of adiabatic pre-cooler sections and number of drains per model.

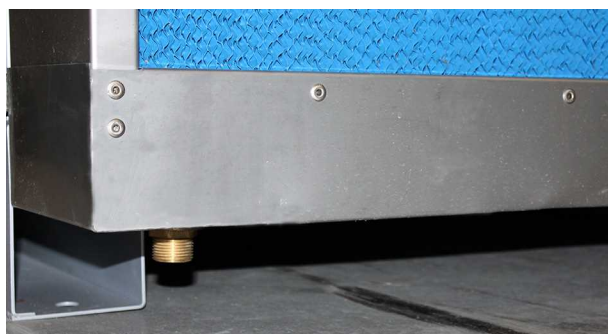
Model	Number & size of fans	Number of adiabatic pre-cooling sections/unit	Number of bottom drains/unit
<b>SP2B*</b>	2 fans 1250 mm	2	2
<b>SP3B*</b>	3 fans 1250 mm	4	4
<b>SP4B*</b>	4 fans 1250 mm	4	4
<b>SP5B*</b>	5 fans 1250 mm	4	4
<b>SP2A*</b>	2 fans 910 mm	2	2
<b>SP3A*</b>	3 fans 910 mm	2	2
<b>SP4A*</b>	4 fans 910 mm	4	4
<b>SP5A*</b>	5 fans 910 mm	4	4
<b>SP6A*</b>	6 fans 910 mm	4	4

*Number of adiabatic pre-cooler sections and drains*

Each pre-cooler section has a sloping pan, assuring complete water drainage and discharge of any floating solids to the sewer. Larger debris will however accumulate and settle in the gutter system and may be too large to drain via the bottom drain and finally may block the bottom drain.



*Draining system – inside*



*Draining system - outside*

It is therefore necessary to regularly clean the adiabatic gutter system to remove all solids. Access for cleaning is given to the inside of the gutter system after removal of the pre-cooling media. For cleaning sequence see table "About rigging and installation" on page 2

## Installation of screw-on flanges

Care must be taken when installing screw-on flanges on the fluid-connections of the unit to make sure no forces are transferred from the flange to the copper header of the unit. These forces may damage the header and result in coil leaks.

Apply the proper opposite force by means of a chain pipe wrench, as shown in the following picture to make sure no force is put on the copper tubes.



*Installing screw-on flange*



SP

## OPTIONAL ACCESSORIES ASSEMBLY

All optional accessories are factory installed.

## Start-up and Commissioning

### ROTATION OF FANS

Fans must rotate without obstruction in the direction indicated by arrows on the equipment.

### MOTOR VOLTAGE AND CURRENT

Check the voltage and the current of all three legs of the fan motors. The current should not exceed the nameplate rating. After prolonged shutdown the motor insulation should be checked with a Megger insulation tester prior to restarting.

The voltage must not fluctuate more than  $\pm 10\%$  and the imbalance between phases must not be greater than  $\pm 2\%$ .

### UNUSUAL NOISE AND VIBRATIONS

Unusual noise and/or vibration are the result of malfunctioning of mechanical components or operational problems (e.g. unwanted ice formation). If this occurs, a thorough inspection of the entire unit followed by immediate corrective action is needed. If required, consult your local BAC Balticare representative for assistance.

### PURGE REQUIREMENTS

The installer of BAC closed circuit cooling towers must ensure a proper air purging of the system prior to operation.

Entrained air can restrict the capacity of the cooler, resulting in higher process temperatures.

For water quality guidelines and for calculation of Practical Scaling Index, refer to the Operating and Maintenance Instructions, section Water Care.

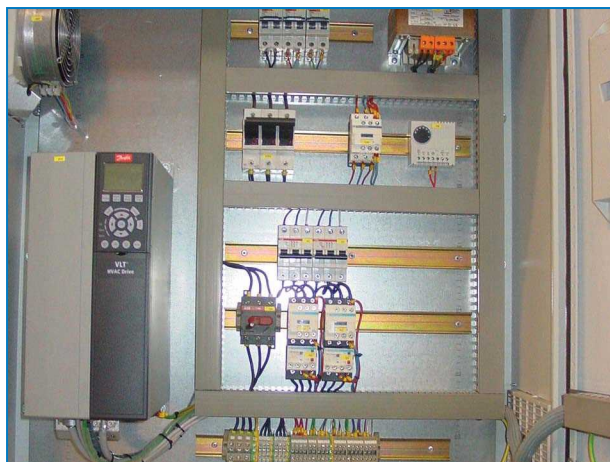
## SpartiumCooler with factory installed control panel with Variable Frequency Drive

### ELECTRICAL PANEL

All units are equipped with an electrical panel with Variable Frequency Drive.



When operating above nominal speed, be aware of the potential risk for overload or mechanical damages.



Control panel with Variable Frequency Drive

The fan speed is controlled on the basis of the actual process fluid temperature at the exit of the unit and the design leaving temperature, ensuring a minimum in electrical consumption and noise levels.

The adiabatic pre-cooling will be activated and stopped on the basis of a pre-programmed logical combination of the fan speed and the ambient temperature (release set-point). Default settings will not activate adiabatic pre-cooling unless all fans are running at maximum permissible speed and the dry-to-adiabatic release set-point is reached.

The adiabatic control logic is pre-programmed and is ready for operation.

Depending on the actual size of the installation, the controller pre-programmed PI process parameters may need to be adjusted.

## ELECTRICAL FIELD WIRING



### CAUTION

**All operations described below must be performed by a licensed electrical technician and must comply with local regulations.**

The equipment is standard provided with a door interlocked main power switch ( $Q_0$ ), which is factory fitted. Connect electrical power to the power switch through a 3-pole cable, with ground, of adequate cross section for the main fuse rating.



The power tension must not fluctuate more than  $\pm 10\%$ . The imbalance between the phases must not be greater than  $\pm 2\%$ .

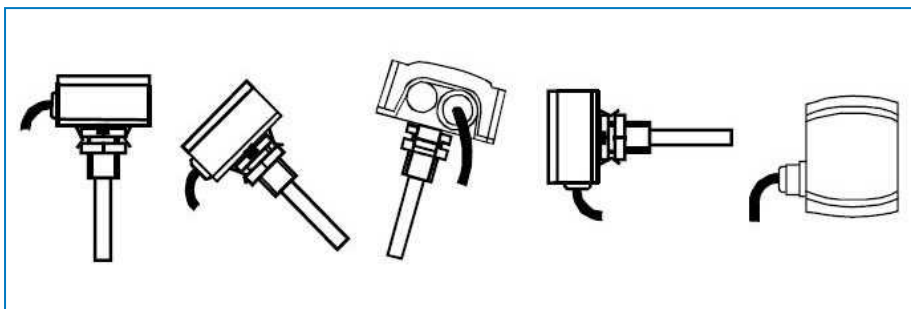
Connect the immersion sensor to the terminal strip as indicated in the wiring diagram.

## PRE-COMMISSIONING

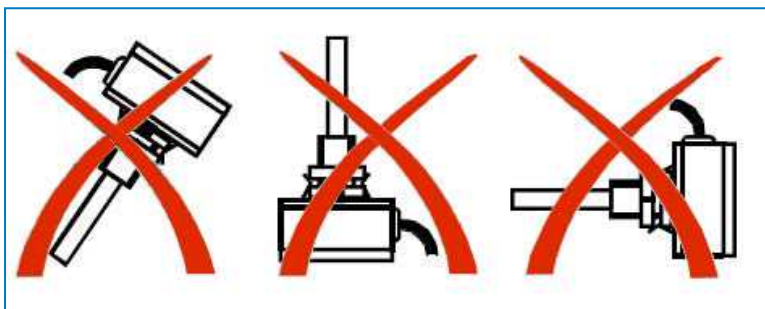
1. With main power switch open, check all electrical connections in electrical panel to be sure that they are tight and provide good electrical contact. Although connections were tightened at the factory, they may have loosened enough in shipment to cause a malfunction.
2. Check and inspect all water piping. Make sure flow direction is correct in counterflow, as shown by the arrows on the connectors.
3. Check that the immersion sensor is properly located in the main cold water pipe so that the water is well mixed where the temperature is measured.
4. The immersion sensor needs to be installed in such a way that any risk of water ingress is minimised.



## Mounting Positions:



Permitted positions for mounting VFD sensor



Not permitted positions for mounting VFD sensor

## LEGEND

<b>Q<sub>0</sub></b>	Main power switch
<b>FINV</b>	Inverter's fuses
<b>FA<sub>1</sub></b>	Auxiliary fuses - Transformer T <sub>1</sub>
<b>FA<sub>2</sub></b>	Auxiliary fuses - 230 V supply
<b>FA<sub>3</sub></b>	Auxiliary fuses - 24 V supply
<b>T<sub>1</sub></b>	Transformer 400/ 0 – 230 - 24 V
<b>F<sub>1</sub>, F<sub>2</sub>, F<sub>3</sub>, etc.</b>	Circuit breakers
<b>DVW</b>	Pad maintenance switch
<b>DINV</b>	Control operation switch
<b>TH</b>	Electrical panel ventilation thermostat
<b>MF</b>	Electrical panel ventilator
<b>Q<sub>1</sub>, Q<sub>2</sub>, Q<sub>3</sub> etc.</b>	Thermal overload relay
<b>K<sub>1</sub>, K<sub>2</sub>, K<sub>3</sub> etc.</b>	Fan contactor relay
<b>INV</b>	Inverter
<b>VH<sub>1</sub></b>	City water solenoid valve

<b>VD<sub>1</sub></b>	Drain solenoid valve
<b>QAC</b>	Ambient air sensor
<b>QAE</b>	Fluid temperature sensor
<b>S<sub>0</sub></b>	Emergency stop switch
<b>S<sub>01</sub></b>	Power failure reset
<b>C<sub>01</sub></b>	Power failure relay
<b>H<sub>0</sub></b>	Indicating lamp
<b>QBO</b>	Power inverter by-pass switch (optional)
<b>F<sub>0</sub></b>	Main fuses (with optional inverter by-pass switch)

*Legend for electrical panel with Variable Frequency Drive*

## START-UP

1. Turn the main power switch Q0, main fuses FINV and auxiliary control circuit fuses FA1, FA2, FA3 to the "off" position. Put the circuit breakers F1, F2, F3 etc. in the "off" position. Measure the mains voltage.
2. Turn the main power switch Q0 and FINV "on" and push power failure reset button S01 to power the inverter; its LCP (Local Control Panel) is energised. Place the main fuses FA1, FA2, FA3, to the "on" position. The amber indicating lamp on the front panel lights up. Put the circuit breakers F1, F2, F3 etc. in the "on" position.
3. **MANUAL INVERTER OPERATION:** by pressing "HAND ON" on the inverter's LCP, the fans start at the minimum rpm at which the inverter was programmed. By pressing arrow key up "↑" on the LCP, the maximum programmed rpm can be reached and by pressing arrow key down "↓" the rpm can be reduced to the minimum programmed rpm. At this stage the fans' rpm are not regulated by any control device. Check the fan rotation (all fans are factory wired to run in the same direction). Change phases if necessary to obtain correct fan rotation, as shown by arrow on the fan cowl.
4. By pressing key "OFF" the inverter stops the fan operation.
5. **AUTOMATIC OPERATION:** the "Remote start" must be wired to the remote operation via terminals Y2:1 and Y2:2 and the control operation switch DINV on the front panel to the A-position (automatic operation) before the inverter is operated through the "AUTO-ON" key. Once the inverter starts, it will now be controlled by the input feed of the immersion temperature sensor, regulating the fan rpm accordingly.
6. The unit will now operate according to the load demand. When the inverter reaches the maximum speed, the controller will activate the adiabatic system by energising/de-energising the appropriate solenoid valves.
7. A set of clean contacts (1,2,3) from the inverter are wired to the Y6 location of the terminal strip, for remote observation of the inverter status.

## EMERGENCY STOP

A red mushroom switch S<sub>0</sub>S<sub>1</sub> on the front panel is provided to allow the unit emergency stop in case of malfunction. The unit can be re-started by rotating the S<sub>0</sub>S<sub>1</sub> emergency switch, as shown by its arrow and then following the starting procedure of the unit.

## WEEK-END OR TEMPORARY SHUTDOWN

The unit must shut down by the inverter's "OFF-STOP" key, or by the "Remote start" off command, or by the control operation switch DINV on the front panel, so that the drain valve VD1 will remain open and the city valve VH1 closed.



If the unit is shut down by the main power switch, all the valves will close, risking stagnant water in the copper tubes.

## Assistance

BAC has established a specialized total care company called Balticare. The BAC Balticare offering involves all elements required to ensure a safe and efficient operation of your evaporative cooling products.

For more details, contact your local BAC representative for further information and specific assistance at [www.BaltimoreAircoil.eu](http://www.BaltimoreAircoil.eu)

## More information

### REFERENCE LITERATURE

- Eurovent 9-5 (6) Recommended Code of Practice to keep your Cooling System efficient and safe. Eurovent/Cecomaf, 2002, 30p.
- Guide des Bonnes Pratiques, Legionella et Tours Aéroréfrigérantes. Ministères de l'Emploi et de la Solidarité, Ministère de l'Economie des Finances et de l'Industrie, Ministère de l'Environnement, Juin 2001, 54p.
- Voorkom Legionellose. Ministerie van de Vlaamse Gemeenschap. December 2002, 77p.
- Legionnaires' Disease. The Control of Legionella Bacteria in Water Systems. Health & Safety Commission. 2000, 62p.
- Hygienische Anforderungen an raumluftechnische Anlagen. VDI 6022.

### INTERESTING WEBSITES

- [www.BaltimoreAircoil.eu](http://www.BaltimoreAircoil.eu)
- [www.eurovent-certification.com](http://www.eurovent-certification.com)
- [www.ewgli.org](http://www.ewgli.org)
- [www.ashrae.org](http://www.ashrae.org)
- [www.uniclima.org](http://www.uniclima.org)
- [www.aicvf.org](http://www.aicvf.org)
- [www.hse.gov.uk](http://www.hse.gov.uk)

### ORIGINAL DOCUMENTATION



This manual is originally made in English. Translations are provided for your convenience. In the event of discrepancies, the English original text shall prevail over the translation.





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COOLING TOWERS

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CLOSED CIRCUIT COOLING TOWERS

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ICE THERMAL STORAGE

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EVAPORATIVE CONDENSERS

---

HYBRID PRODUCTS

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PARTS, EQUIPMENTS & SERVICES

BLUE by nature  
GREEN at heart



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