# AIR – LIQUID COOLERS

***MODELS BRD (BRDT, BRDS, BRDL, BRDQ) – BRM (BRMT, BRMS, BRML, BRMQ) – BRC (BRCT, BRCS, BRCL, BRCQ)***

# *INSTRUCTIONS MANUAL*

IM100520-EN 2013 Rev 02

# *INDEX*



***How to contact Alfa Laval***

*The contact information for each country, is constantly updated in our website.*

*Visit www.alfalaval.com to get this information.*

THE TECHNICAL INFORMATION SUPPLIED AND OTHER MINOR CHANGES CAN BE MODIFY WITHOUT NOTIFICATION

# TO THE USER

This instructions' manual is intended to be your permanent guide for the different situations you may encounter when using this equipment.

Alfa Laval recommends you to study it carefully and mainly to make it available for the personnel who normally install, operate and maintain the equipment.

This manual will be useless if cannot be reached by the personnel who may need it.

In the unlikely case that you may have some problem not contemplated in this manual, don't hesitate to contact the closest Alfa Laval's representative. We can offer you our help wherever you may be located.

**NOTE!**

**Alfa Laval won't become responsible for any equipment failure if the user misinterpret the instructions of this manual.**

# SYSTEM WARRANTY

This equipment is designed to operate properly and produce rated capacity when installed in accordance with accepted industry standards. Failure to meet the following conditions may result in voiding of the system warranty:

- System piping must be installed following industry standards for good piping practices.
- Inert gas must be charged into piping during welding.
- System must be thoroughly leak checked and evacuated before initial charging.
- The electrical connections must comply with the following conditions:
    - All voltages must not exceed ± 10% of nameplate ratings. Frequency 50-60 Hz.
    - Current absorption per phase imbalance not to exceed 2%.
- Factory installed wiring must not be changed without written Alfa Laval's approval.

**NOTE! FREEZING RISK**

**A standard dry cooler cannot be fully drained simply by opening the drain fitting orifices. Anyhow add the anti-cooling mix as further explained.**

# NORMATIVE REFERENCE

The equipment is in compliance with the following standards:

**EN 61000-6-4:2007-01**
**EN 55014-1:2006-12**
**EN 61000-4-2:2009-03**
**EN 61000-4-3:2006-05 + EN 61000-4-3/A1:2008-02**
**EN 61000-4-6:2007-06 + EN 61000-4-6/EC:2007-08**
**EN 61000-4-4:2004-12**
**EN 61000-4-5:2006-11**
**EN 61000-4-11:2004-08**
**EN 61000-4-8:1993-09 + EN 61000-4-8/A1:2001-02**

The manufacturer of or company operating the overall plant where this component will be integrated is responsible for compliance with the EMC Directive 2004/108/EEC

# SAFETY

***The hazardous operations and other important information are emphasized in this section. The warnings are highlighted by means of special signs.***

**Always read this manual before using the equipment!**

**ATTENTION!** Indicate that special procedures **must be** followed to avoid serious injuries to people.

**BE CAREFUL!** Indicate that special procedures should be followed to avoid serious damages to the equipment.

**NOTE!** Indicate important information to simplify the operations or to make them more understandable.

---

**Warning signs:**

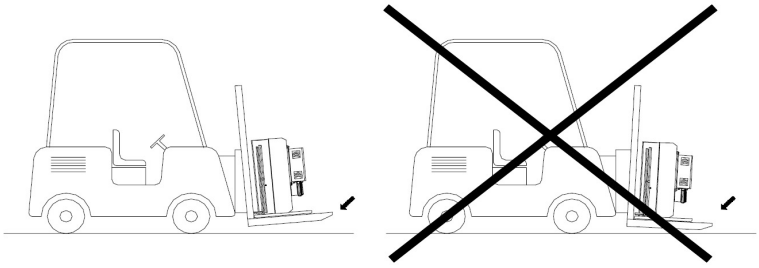
*In this page all the warning signs of those assembly instructions*

| | |
|---|---|
|  | ***General precaution sign*** |
|  | ***Danger loads in movement sign*** |
|  | ***Danger parts in movement sign*** |
|  | ***Electrical danger sign*** |
|  | ***Important information*** |

***Pay attention to the following instructions to avoid serious injuries to people and / or damages to the equipment.***

## Operation for the transportation of the equipment

Lifting forks should be placed under appropriate areas of the packing for proper handling; **damage may result if the forks come in direct contact with the equipment**.



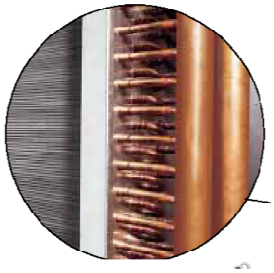
## Lifting operation

| | |
|---|---|
|  | **ATTENTION!**<br>Before lifting the equipment:<br>• Attach the belts or hooks, only to the provided elements the equipment is equipped with.<br>• Be sure that the belts or the slings with hooks will lift the equipment in a balanced way. |

## Installation and maintenance operations

| | |
|---|---|
|  | **ATTENTION!**<br>Before performing any maintenance operation, the power supply from the general board should be switched off and the safety switch should be in the OFF position to avoid accidents. |
|  | **ATTENTION!**<br>For no reason, a person should walk or step over the equipment, since besides the damage, it can generate an accident or a risky situation. |
|  | **ATTENTION!**<br>Whenever fans maintenance task should be carry out, be sure they are not running and the security switch is in the OFF position. When the operation is completed, place back the corresponding protection. |

# GENERAL DESCRIPTION



Thanks to the combination of the innovative waviness of the fins (developed by Alfa Laval) and the use of copper pipes for fluid flow, the heat exchanger guarantees an excellent heat transfer.

# EQUIPMENT DESCRIPTION

Innovative heat exchanger gives excellent heat transfer.
In the standard execution, heat exchanger manufactured from copper tubes and aluminum fins.

Casing made with AZ150 steel sheets, painted as option.
The new design frame provides high rigidity also for heavy applications.

These units are available in four noise levels fan motor:
(T) high performance, (S) standard, (L) low, (Q) quiet.

# RECEPTION

The condition of the unit should be verified at the moment of reception: the equipment has left the factory in perfect condition; eventual damages should be claimed immediately to the transportation company in writing in the Document of Delivery before being signed. Alfa Laval or its Agents should be informed as soon as possible about the significance of the damage. The Client should complete a written report including photographs concerning each relevant damage.

# STORAGE

If the equipment has to be stored before its installation (one or more months) it is convenient to take the following precautions:

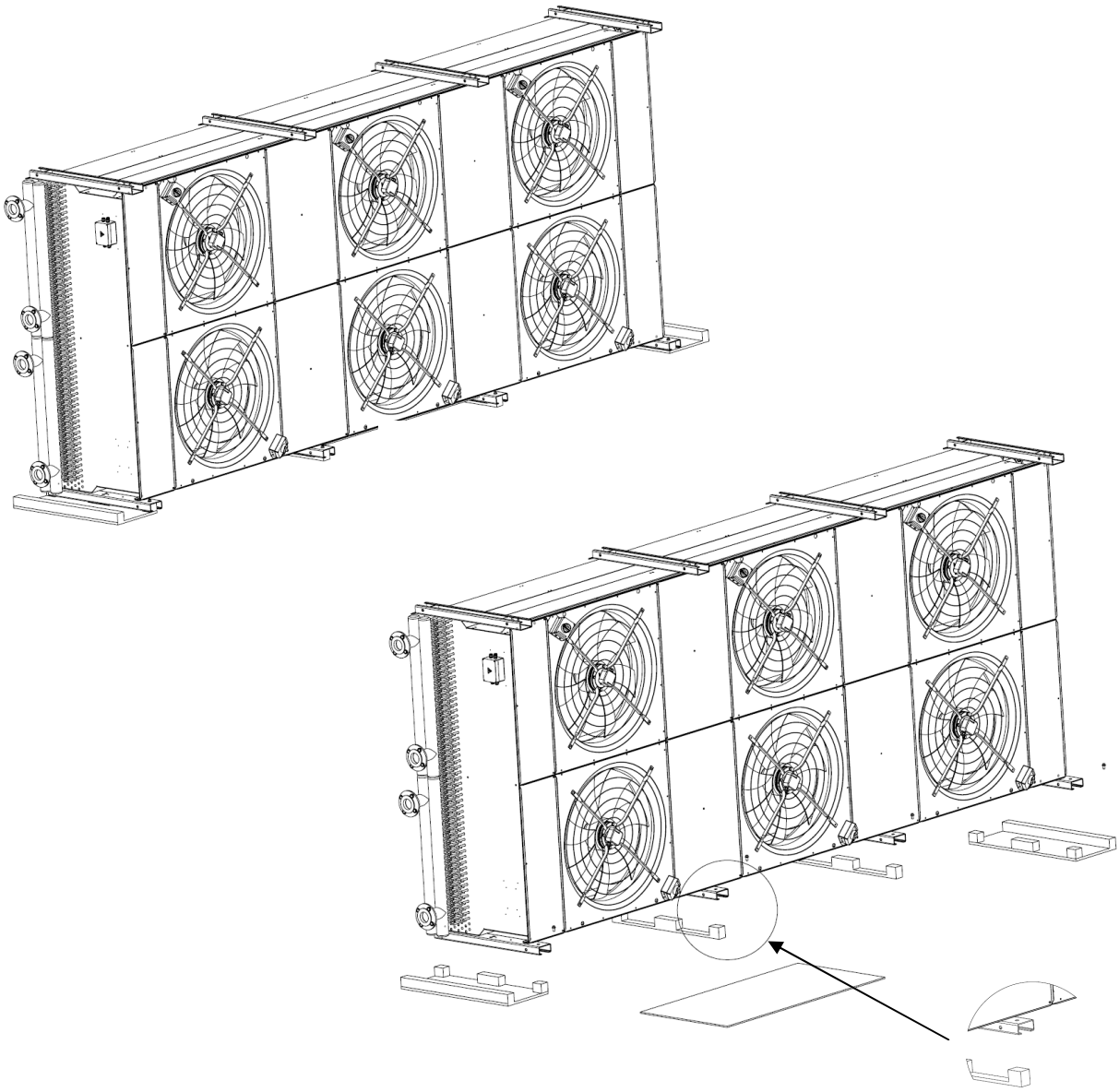
- Leave the equipment in its packing.
- Store it indoors, in a room with adequate conditions, temperature (15 to 25ºC) and humidity (50 to 70%).
- In an environment without corrosive liquids or vapors.

*If the equipment should remain without operation for long periods (three or more months), it is advisable to operate the fan(s), at least once per month, during 3 to 4 hours each time.*

# UNPACKING

***This operation should be done at the mounting site.***

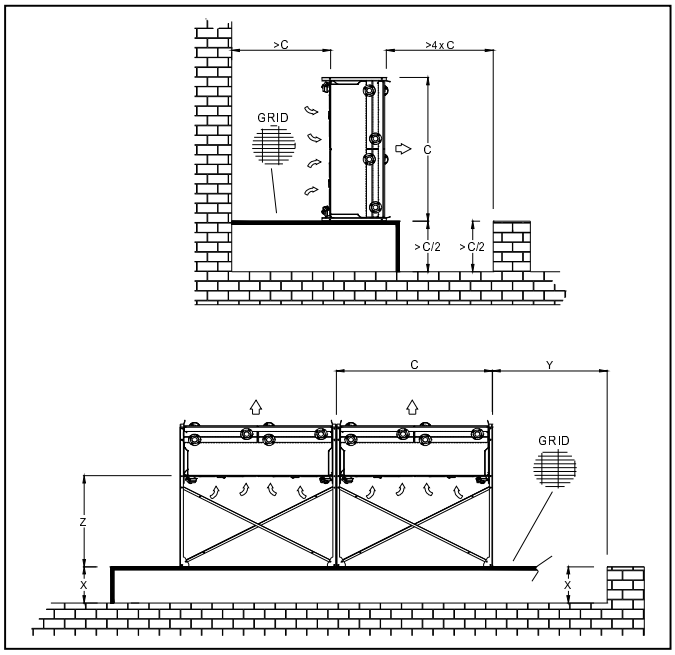
Take off the wrapping cover leaving the equipment on the pallet.



# PROVISIONS FOR MOUNTING

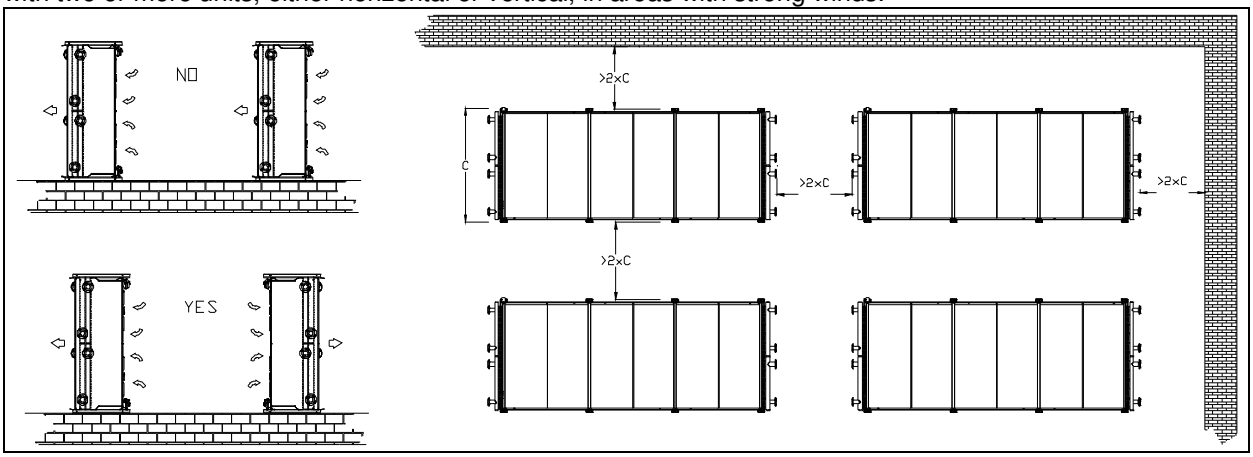
## The following aspects should be considered before mounting:

- Verify the structure supporting capacity regarding the weight of the equipment.
- Avoid the installation in closed locations.
- When walls are present, follow the distances recommended by Alfa Laval.




| N° UNITS | X | Y | Z | |
|---|---|---|---|---|
| | | | BRC BRM | BRD |
| 1 | 0 | C | 1000 | 1500 |
| 2 | C/2 | 2xC | 1000 | 1500 |
| 2 | C | C | 1000 | 1500 |
| 3 | C | 2xC | 1000 | 1500 |

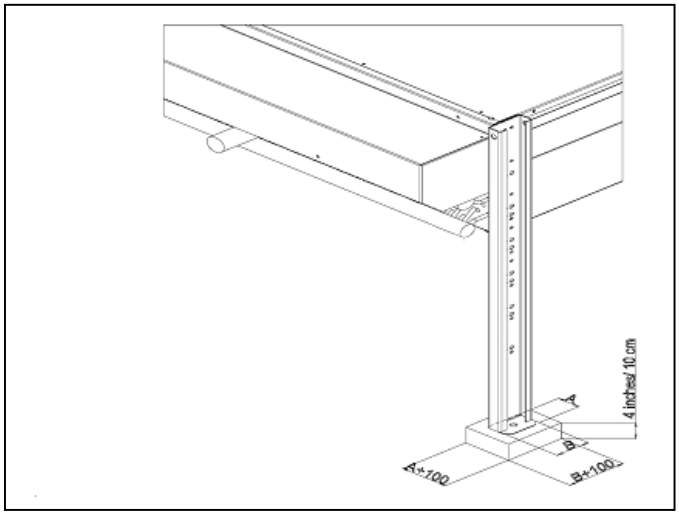
Special care should be taking in following the minimum distances recommended, particularly in cases for installations with two or more units, either horizontal or vertical, in areas with strong winds.



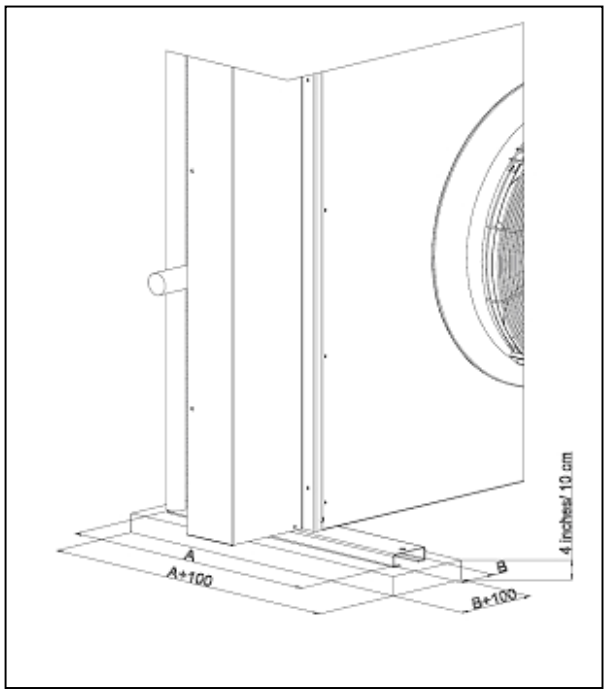
# BASES

To avoid the oxidation of the equipment's legs, it is recommended to lean them on concrete bases of about 4 inches (10 cm) high: one base for each leg. The basement should be oversized in relation to the plate on the foot.

### For horizontal equipment:




### For vertical equipment:



# VIBRATION DAMPERS

For active and passive isolation of vibrations and reduction of noise transmission, Alfa Laval strongly recommends the installation of vibration dampers.

# EXPANSION JOINTS

Alfa Laval,in all those cases in which the transmission of vibration and forces could damage the unit, strongly recommend the use of expansion joints (NOT SCOPE OF SUPPLY), see scheme at page 18.
This allows to insulate the equipment in active and passive way from vibrations and to reduce the transmission of noise.

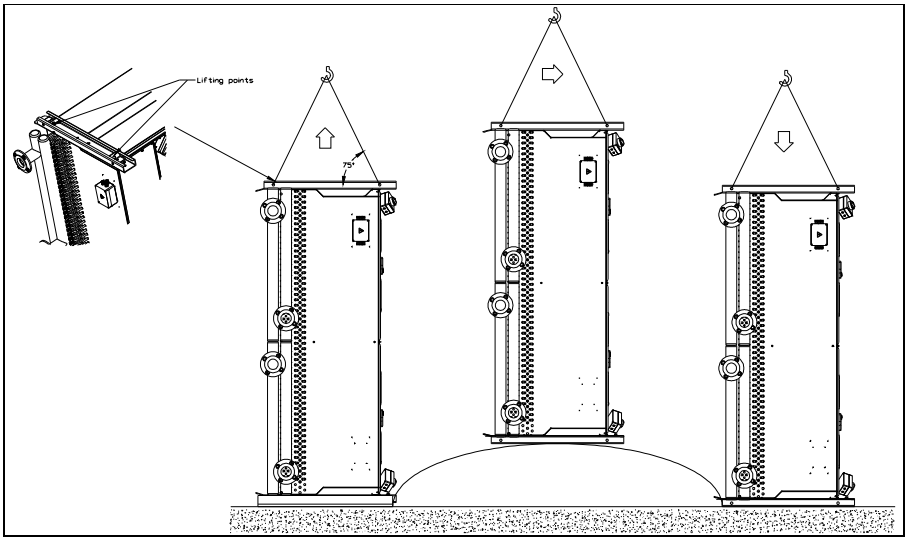
# INSTALLATION

All units are supplied with supports for vertical installation but, if requested kits with supports and screws for horizontal mounting can be provided.
For both cases the procedures are as follows:

***Note!*** *See first "Unpacking" in page 8*
*See first "Provisions for mounting" in pages 9 and 10.*

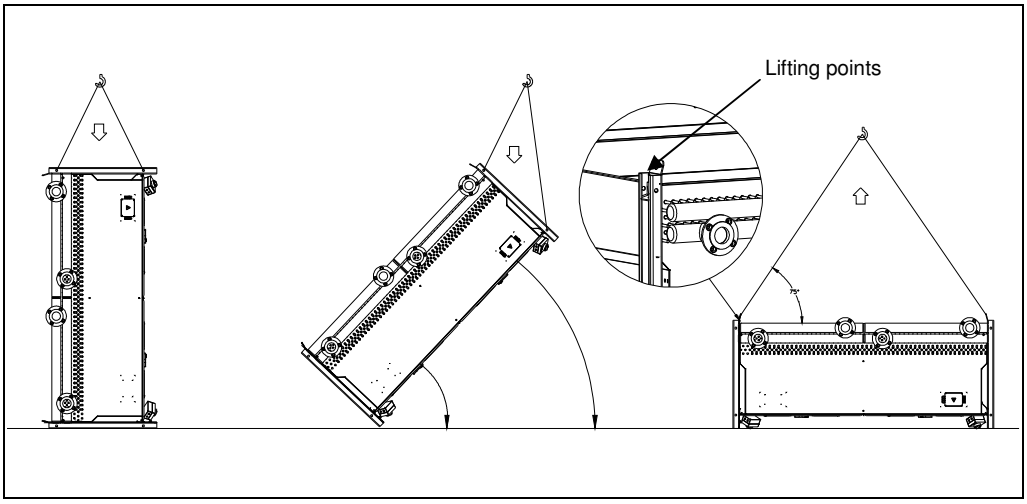
## Vertical installation

Lift the equipment removing the pallet.
Place it on top of the bases and fix it with anchor points (as shown in the figure below).



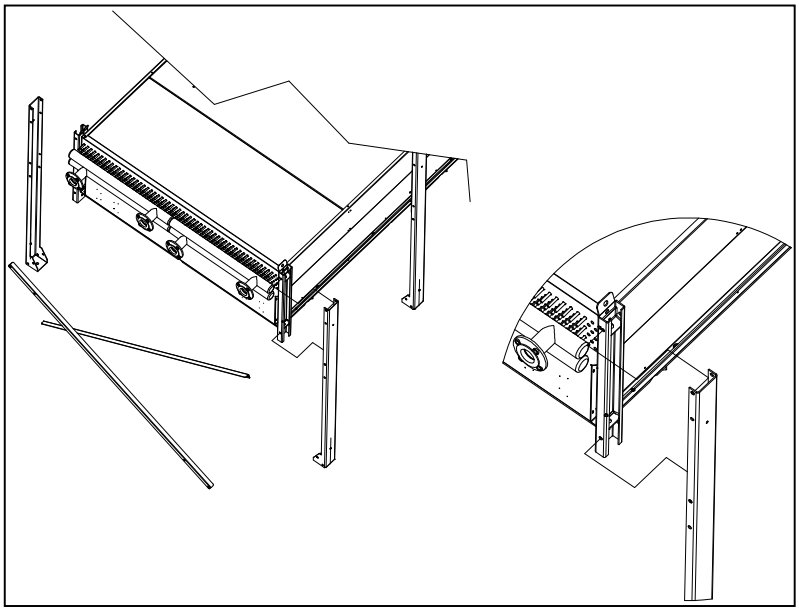

## Horizontal installation

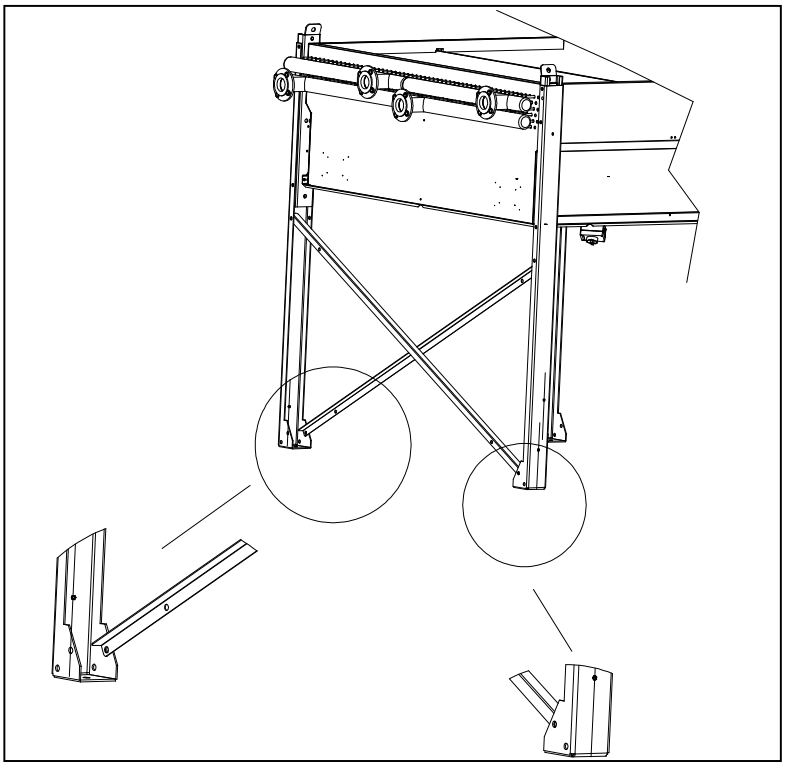
Lift the equipment as is done for vertical installation removing the pallet.
Incline the equipment up to lay it on the ground (as shown in the figure below).



# FEET INSTALLATION

Fix the feet for horizontal installation to the equipment with screws and bolts provided in the kit (as shown in the figures below).





# LIFTING

## Tools and accessories for lifting

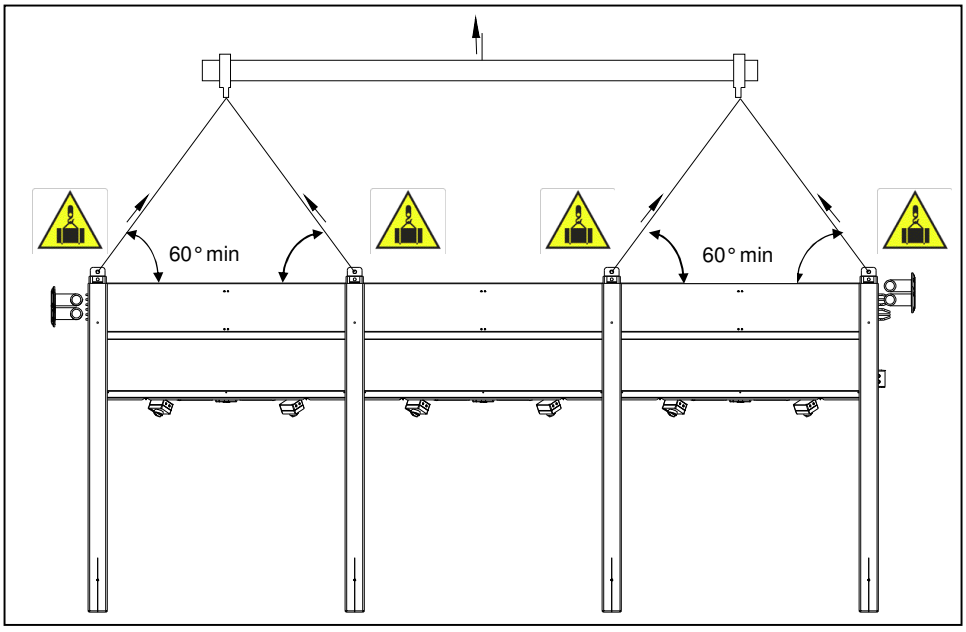
- Open end or combination wrenches kit (sizes from 10 to 20 mm).
- Steel chains or slings sufficient to withstand the weight of the unit.
- Lifting devices:
  - UPN 10 Steel section, length 2 to 4 meters (2, 3 and 4 Fans per row).
  - UPN 12 Steel section, length 4 to 8 meters (5, 6 and 7 Fans per row).

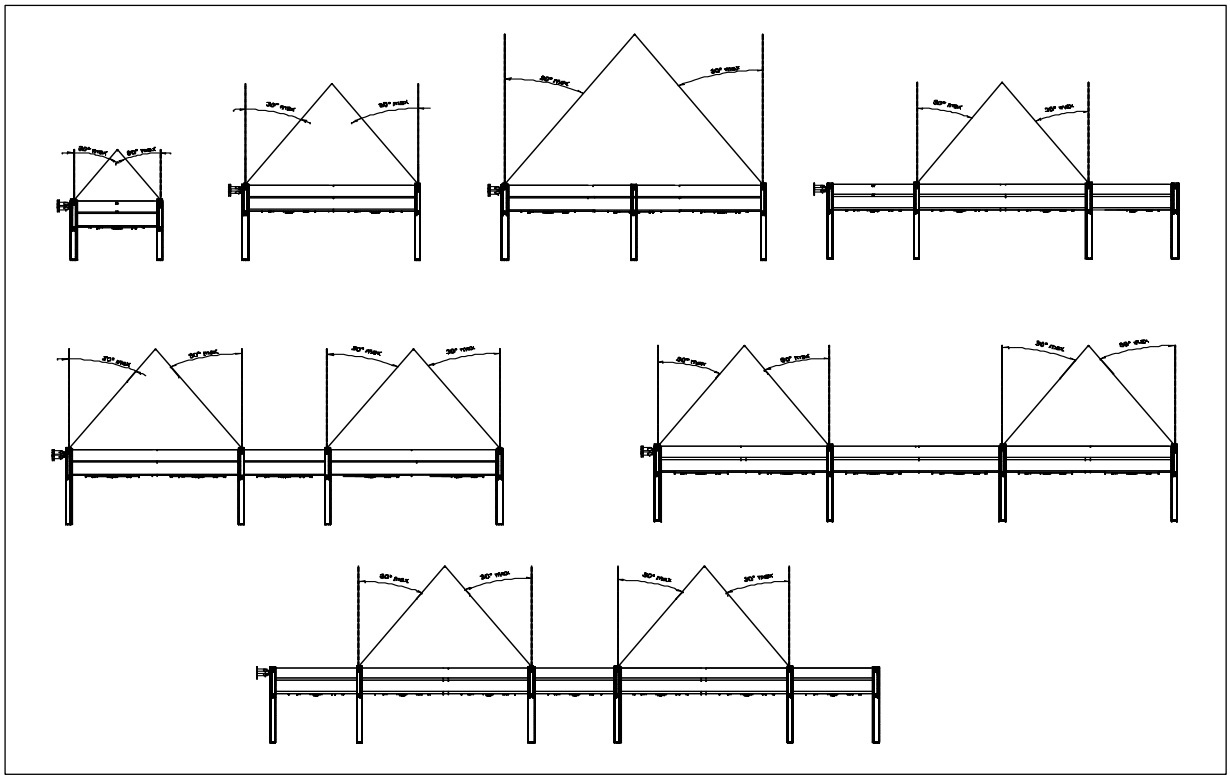
**Notes:**

- For detailed dimensions and weights of equipment consult the data of Cas (Alfaselect).
- Use all lifting points on the unit (as shown in the figures below).

***Attention!***
*You are strongly advised not to lift the equipment in case of wind!*

***Attention!***
*Pay attention that the ropes are uniformly loaded during every stage of handling equipment. An excessive loading on some ropes might result in failure!*





# PIPING CONNECTIONS

Units are delivered with the following connections:

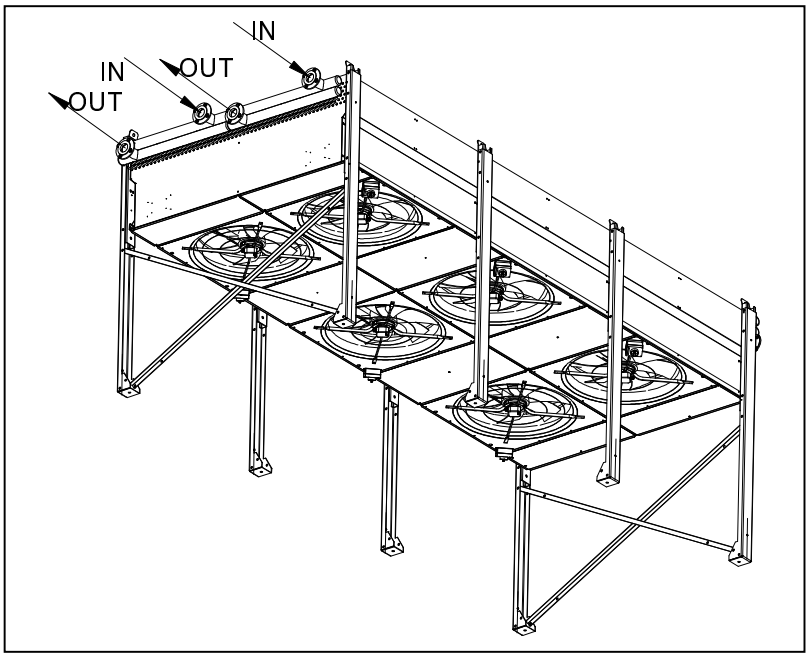
- PN16 DIN flanged

**Important!**
- To avoid the **water hammer** effect, regulating valves (preferably) should be installed at the input and output of the external circuit of the equipment. It should be mounted as close as possible to the equipment, so the normal maintenance could be carried out without draining the hydraulic installation.
- To verify the operation, thermometers at the input and output of the equipment should also be installed.

*The water hammer is a pick of pressure of short duration that can appear during the starting or the shutdown of a system, making the liquids to move through a pipe like a wave at the speed of the sound. This effect can produce considerable damages to the equipment.*

**Important!**
- Size the pipes to minimize the pressure drop and to obtain the coolant speed values to assure the oil drifting.
- In the delivery line, between the pumps and the dry cooler, install an anti vibration device to reduce the noise and vibration transmission along the line.
- Be sure that the line for liquid should have a minimum gradient of 1%, between the liquid discharge and the receiver.

***Piping connections.*** *The piping size should be in accordance with the IN and OUT connection's flanges of the unit. Connect the flanges by suitable bolts interposing a proper gasket.*

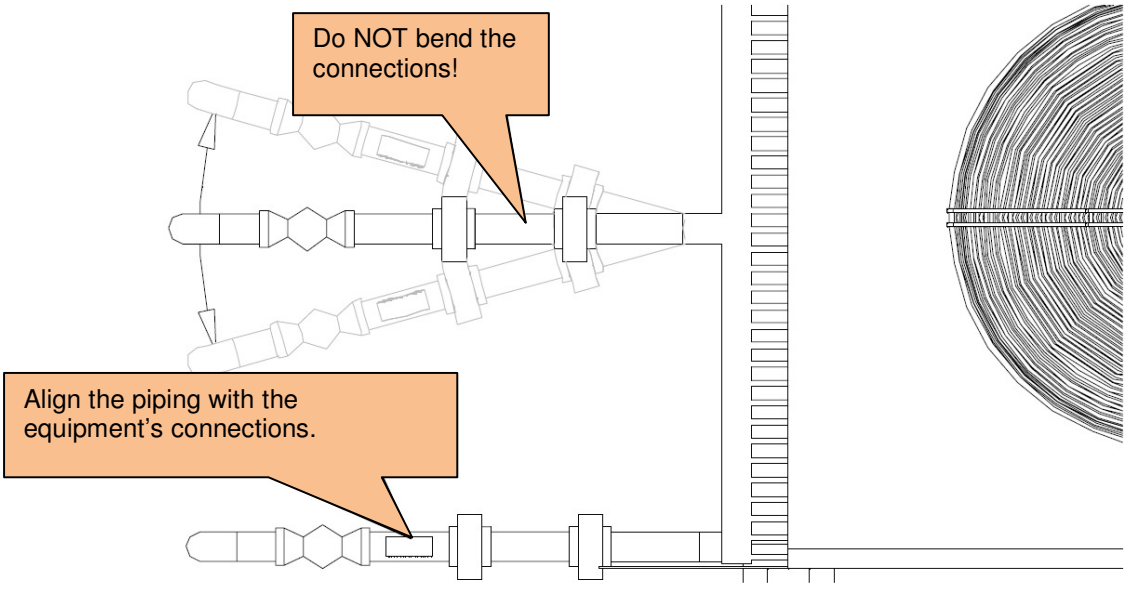


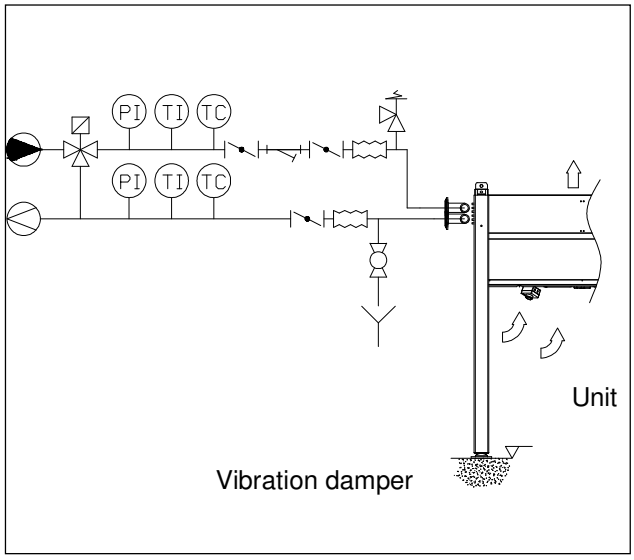
- Suggested Tightening:

| DN | PN | Tightening (Nm) |
|---|---|---|
| 25 | 10/16 | 40 |
| 40 | 10/16 | 50 |
| 50 | 10/16 | 55 |
| 65 | 10/16 | 60 |
| 80 | 10/16 | 60 |
| 100 | 10/16 | 80 |
| 125 | 10/16 | 80 |
| 150 | 10/16 | 80 |
| 200 | 10 | 80 |

## Steps to follow:

- The external piping to the equipment should be made by the customer.
- Once the piping has been installed, and before connecting to the equipment, the cleaning of the pipes should be carried out before with a compressed air sweeping and after with water, in order to avoid dirt and welding residuals.
- Check the alignment of the piping with the input and output ends of the equipment.






| KEY | |
|---|---|
| TC | Temperature probe |
| | Ball valve |
| | Spring safety valve |
| | Expansion joint |
| | Butterfly valve |
| | Basket filter |
| TI | Temperature meter |
| PI | Pressure gauge |
| | 3-way valve with modulating electric or magnetic servo control |

# ELECTRIC INSTALLATION

The customer should provide the following electrical connections:

## Power supply

Power supply is according to the purchase order-data sheet.

***Warning!*** *The verification of the conditions for protection by automatic disconnection of supply, in accordance with the requirements of point 18.2 of EN 60204-1:2006, must be carried out by the end user, in particular at his expense is the test 2 of point 18.2.2 of EN 60204-1:2006 for TN power systems.*
***Warning!*** *The insulation fault protection must be part of power supply of the machine and is not provided by the manufacturer of the machine.*

***Attention!*** *To carry out safe maintenance operations, an ON / OFF Switch should be installed close to the equipment.*

## Electric fans

The fan motors (std.) have the following specifications:

- Type: Induction squirrel cage
- Protection type: IP 54
- Insulation type: F class
- S1: Continuous duty
- Sealed ball bearings for thermal range from –40 to 100°C
- Connection: 3 phase – 400 V ± 10% 50 Hz

*For correct installation and operation of the systems for controlling the speed of the fans, follow the instructions (cable type, cable length, filters, etc.) given in the converter manual.*

In addition to overload protection, provide protection against overheating of the electric motor (use the thermal contacts when present).

# STARTING THE EQUIPMENT

- Before starting, check that all the equipment fastening screws are perfectly tightened.
- Check that the system inlet valve is closed and the outlet valve is fully open.
- First, open the unit vent valve and then start the liquid feeding pump.
- Open the system inlet valve slowly, until reaching the appropriate starting flow.
- When the whole air in the equipment has been discharged, close the unit vent valve.
- Make sure that the whole circuit, including the external piping, is now free of air.
- Once the equipment is full with liquid, start the fan(s) and check the proper fan rotation as shown in the label.
- Verify that there are no leaks in the equipment neither in the circuit.

# OPERATING THE EQUIPMENT

- Check the liquid inlet and outlet temperatures.
- Control that the current load indicated on a current clamp tester is equal or slightly lower than the rated, when the fan(s) are running at rated rpm.

*It is important to follow the starting procedure every time you want to start the equipment.*

# SHUTDOWN

If the unit requires emptying for maintenance or system shutdown, proceed as follows:

- Stop the system and then open the vent located on the highest part of the circuit.
- Open the drain valve (that has to be fitted by the installer) and wait until the system is empty.
- When drainage is completed, ice formation is prevented by adding to the unit the amount of anti freezing mix shown in TAB. 3.

***TAB.3***

| T. Air (°C) | Glycol % (kg/kg) |
|---|---|
| 0 | 10 |
| -5 | 20 |
| -10 | 30 |
| -15 | 35 |
| -20 | 40 |
| <-20 | 50 |

***Attention!** Before attempting any maintenance operation, make sure that the power supply is properly disconnected.*

# PERIODIC PREVENTIVE CONTROLS

Every three months the following controls should be performed:

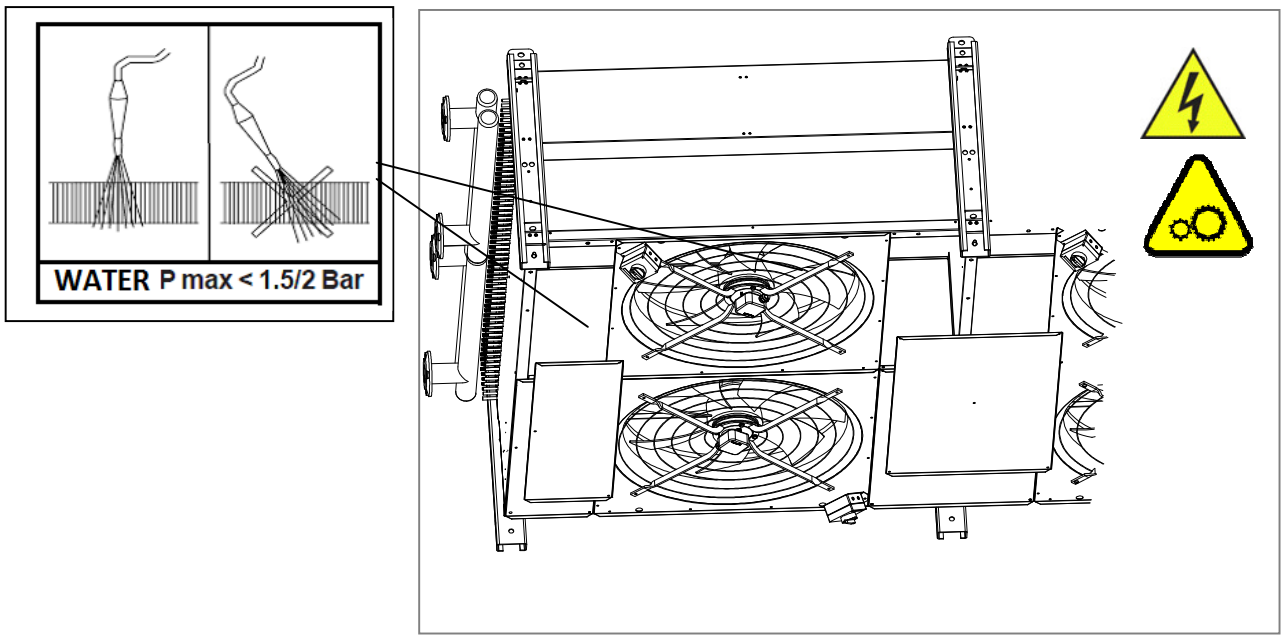
- Check the equipment fastening.
- Verify that the electric connection terminal studs are properly tight, to avoid losses and wear due to sparks.
- Verify the good condition of the wiring (it should not have cuttings or deterioration signs).
- Use an ammeter to check that the current absorbed is equal to or slightly lower than the rated value when the fan(s) work(s) at rated speed.
- Check the fan vibration level.

*If the equipment should remain without operation for long periods (three or more months), it is advisable to operate the fan(s), at least once per month, during 3 to 4 hours each time.*

# CLEANING THE EQUIPMENT

To guarantee the thermal efficiency of the equipment, it is necessary to eliminate the dirt deposited in the coils, on the suction side. Cleaning is recommended every three months, but this frequency should be defined according with the environment where the equipment is installed. The fin pack can be cleaned in different ways, according to the dirty amount:

- Compressed air (air intake side) perpendicular to the battery to prevent bending or damaging of the fins.
- Vacuum cleaner (air intake side).
- Jet of water perpendicular to the battery to prevent bending or damaging of the fins.
- If the fins of the coil are bent, they can be straighten using the repairing tool (comb)



# TROUBLESHOOTING

| PROBLEM | POSSIBLE CAUSE | SOLUTION |
|---|---|---|
| Outlet fluid temperature too high | Air flow to unit blocked by dirt on the coil with fins | Clean the coil |
| | Defective fan | Replace |
| | Wrong air flow direction through the coil | Invert the rotating direction of the fan, switching two of the three phases |
| | Air temperature too high | Contact Alfa Laval |
| Fans not running | Faulty motor | Replace |
| | Line voltage lower than tolerance limits | Check the voltage value between phases with a voltmeter |
| | Lack of a phase | Measure the voltage between phases, check the power supply line |
| | Overloaded motor | Check with an Ammeter |
| Fan(s) break | Blockage or shocked | Replace |

# MAINTENANCE

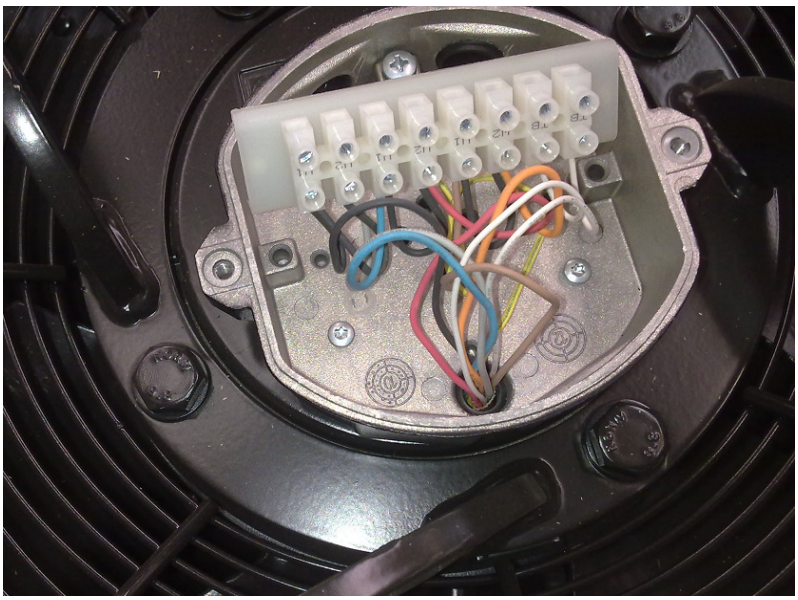
## Replacement of the fan

***Attention!*** *Before attempting to make any maintenance, the power supply should be turned off from the sectional board. For further security, the operator can also turn the switch ON / OFF to the OFF position to avoid accidents.*

Control the correct operation of the electric fans periodically.
In the event of electric or mechanical failures, the motor should be replaced as follows:

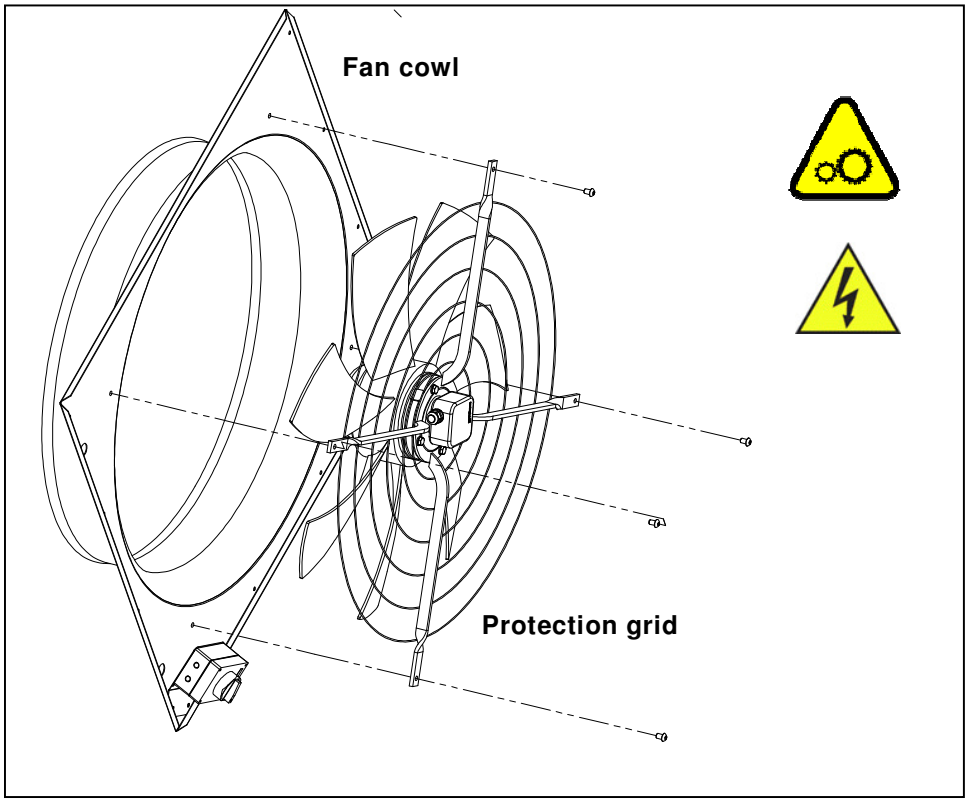
- Make sure that the power supply has been switched off, by placing the security switch in the OFF position.


- Then, open the electric motor derivation box, disconnect and remove the electric wires.



- Unscrew the 4 fastened screws (M10) in the grid and remove the impeller group- motor supporting the fan with an appropriate support.

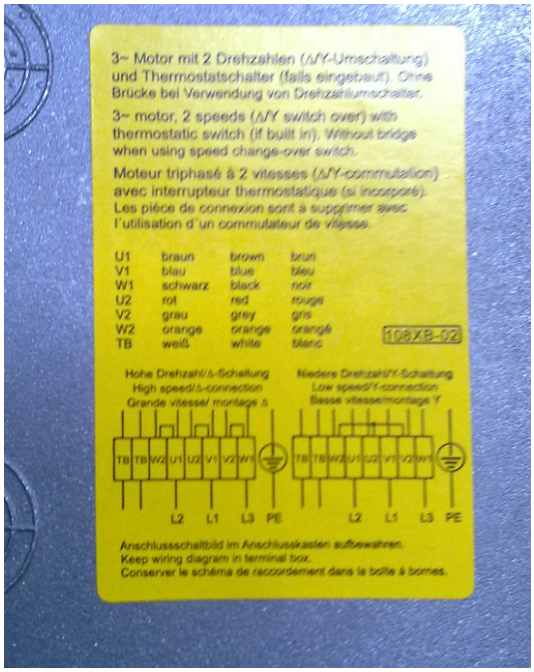
**Attention:** ***Fan standard weight max 55 kg.***




- Place the new fan group and fix the grid to the fan cowl fastening two opposite screws for centering reasons.

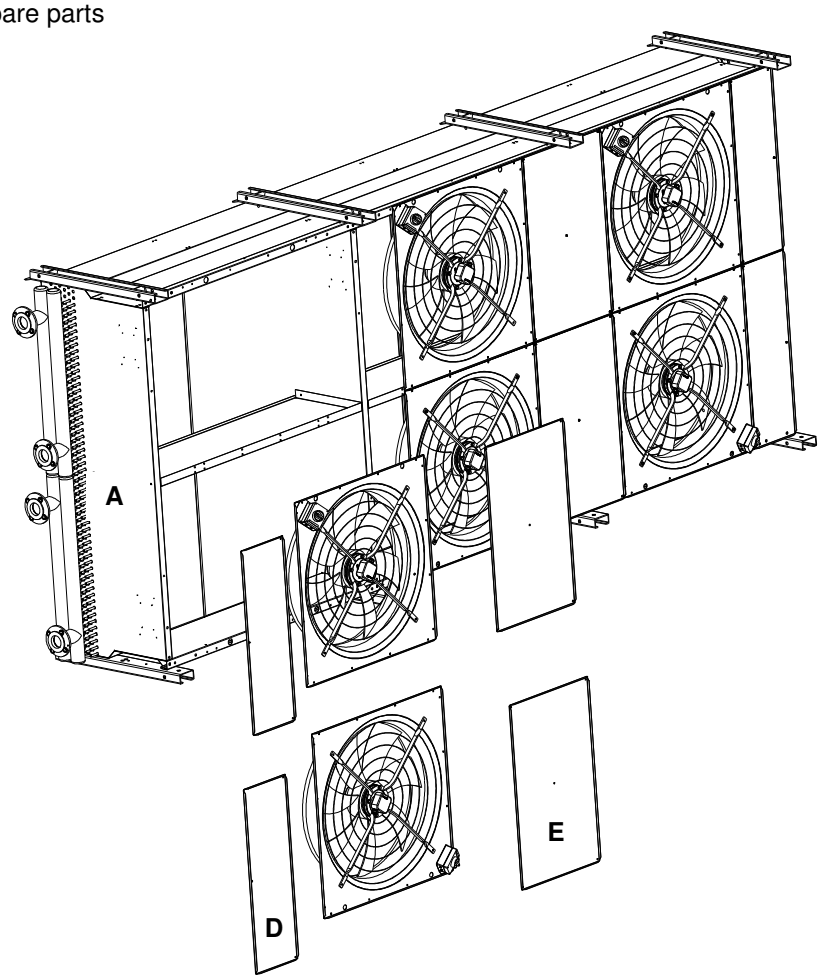
***Attention to:***
**a) not damage the blades during fan handling**
**b) avoid the direct contact between the fan support and the grid (using the pallet or wooden sticks) in order to prevent accidental damages to the paint that could lead to corrosion problems**

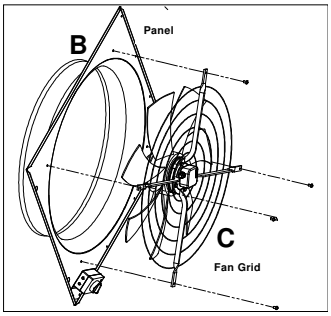
- Make the electric connection according to the wiring diagram reported on the yellow label within the junction box of the fan **(Note: the picture below is only indicative!)**




- Turn the security switch to the ON position.
- Check the correct rotating direction.

Spare parts




***See spare parts section on RCPL***

| CODE | DESCRIPTION |
|---|---|
| **A** | COIL |
| **B** | FAN COWL |
| **C** | FAN |
| **D** | REMOVABLE SIDE PANEL |
| **E** | REMOVABLE MODULE PANEL |