

INSTALLATION, OPERATION & MAINTENANCE MANUAL

(English Version)

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Notes :

- This is a generic manual; it has not been customized for your custom equipment. In some sections, information's might or might not be applicable to your project.
- It is understood that the personnel performing the checks, installation or maintenance have the qualifications and training required to perform the work.
- The electrical diagram of the equipment supplied by **Bousquet Technologies** can be found inside the control box of the equipment.
- Manuals more specific to some components, for example: gas burners, heat exchangers, etc., will have additional operation and maintenance details on their respective manuals.
- It is recommended to always keep this manual in the unit and be accessible.

DANGER :

- Improper installation, adjustment or modification could cause property damage, injury or even death. Read the manual carefully before installing, operating, and maintaining the equipment. Any modifications to the delivered equipment might void the unit certification, please be aware before making any changes.
- This unit functions under high voltage. The electrical installation must be performed by a certified electrician.

Warnings :

- If the original wiring must be modified, the replacement wiring must meet the same specifications and certification as the original device. This does not guarantee that the unit will always be certified following modifications made by a contractor/electrician.
- Minimum clearances are required around appliances for safety, operation, service and maintenance. The building code also requires 1m (39 in.) in front of control panels and power disconnect.
- The air inlets of outdoor units must be located in such a way as to prevent snow, rain, flammable and/or toxic gases from entering the air handling unit.
- Outdoor units must be installed on a roof curb or structure to raise the bottom of the unit to prevent snow accumulation/infiltration. Per building code, it is also the responsibility of the contractor to mechanically fasten the unit to the base of the roof/structure with screws or other suitable fastening means.

Installation Manual

Lifting and installation procedure

1. Summary of the Procedure

This document is a general procedure which outlined the steps used for rigging, manipulating, and assembling a *Bousquet Technologies* air handling unit consisting of 1 or more sections. It is the responsibility of the contractor to carefully follow this manual and to ensure a secure rigging and a leak-proof unit assembly.

Each air handling unit is a custom-made equipment. From approved shop drawing and/or constructed drawing, verify the number of lifting lugs, the weight of each section, and if applied, locate all metal pieces provided from the factory to cover all joints sections, sealing gasket and sealant tubes. Once verified, simply follow the procedure listed in this present document.

2. Tools

Typical tools will be needed on construction site for rigging and assembling the unit. The following include, but not limited for field or area with restrictive access, a list of tools required for rigging, lifting, and assembling the equipment.

- ✓ Adjustable spreader bars (for crane)
- ✓ Cables (cables, chains or straps)
- ✓ Basic tools: screwdriver, wrenches, ratchet, cutter...
- ✓ Level, square, hammer, drill...
- ✓ Measuring tape
- ✓ Ladder, portable light, extension cord
- ✓ Tools required to pull section together (chains, chain blocks, 'come-along' puller)
- ✓ Caulking gun

For lifting, it is the responsibility of the contractor to select the proper tools and equipment to manipulate the air handling unit. Lifting lugs are located at the unit structural base frame and **ALL** lifting lugs must be used for a secure and proper rigging operation. It is strictly not recommended to lift nor pivot unit on one side to avoid damages and on field accident. Warranty might

not be valid if air handling unit is damaged by the result improper operations during the rigging and lifting operation.

3. Installations standards

The installation of this air handler must comply with the relevant installation codes, namely the Electrical Building Code (ex.: CSA C22.1 – 2021) and the ANSI/NFPA 70 2020 standard. All internal and external electrical installations must comply with the electrical diagrams provided. For more information, refer to the start-up instructions, the sequence of operation and the adjustment instructions.

The grounding of the device must be done properly to avoid injuries and/or unit damage.

4. Lifting and Installation Instruction

- As mentioned previously, it is important to use all lifting lugs provided on the structural unit base of the unit. (**Figure 1**). If all lifting lugs are not used, damages on the unit, injury or death can occur.

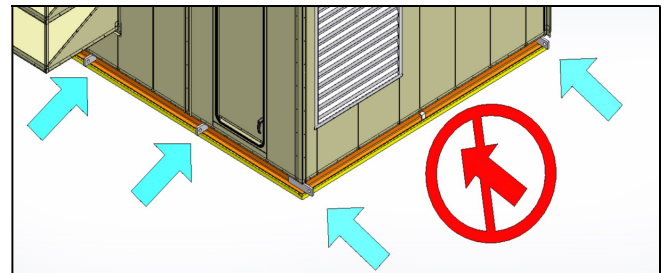


Figure 1: Possible Lifting Lugs

- Ensure that the unit is installed leveled. Non leveled units could potentially create issues and damage components. Some components also required to be installed leveled to deliver the performances they were selected for (ex.: heat pipes).
- It is important not to flip on its side any sections to be able to enter in a space. It would be preferable to unassembled pieces of the section rather than tilting it. Tilting the unit may cause damage to the equipment and serious injuries or death.
- Some unit design will require removable lifting lugs (**Figure 2**) which will need to be taken out before joining two sections together. In addition, the shape and the weight can influence the necessity of using removable lifting lugs.

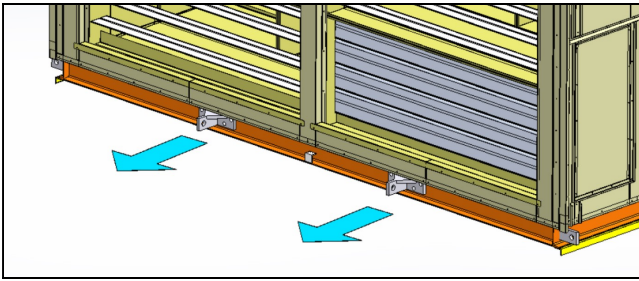


Figure 2: Removable Lifting Lugs: mostly installed between sections when unit is very large

- Remove the protective cover of the unit used for the transport (if provided).
- It is highly recommended to use spreader bars (**Figure 3**) to keep rigging away from the chains or/and sling from the unit cabinetry to avoid damages of the unit roof perimeters/gutters, and the paint. It is the responsibility of the contractor to select the proper equipment for rigging and lifting procedure. Improper technics for lifting can damage the equipment and/or cause injury or death.

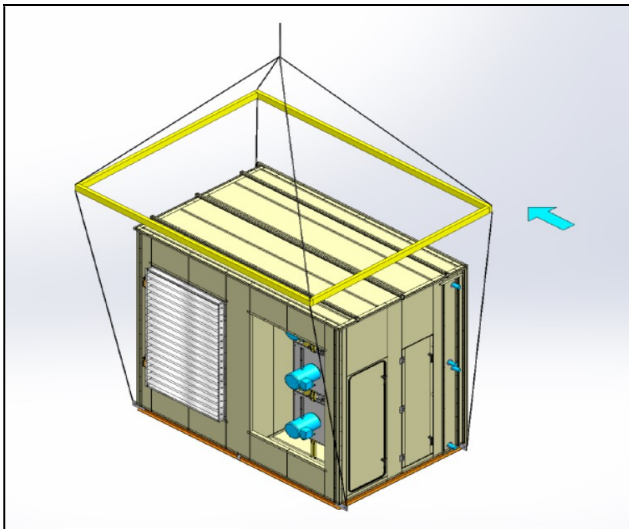


Figure 3: Utilization of the Spreader Bars

- Followed by the lifting procedure for 1 section, apply the sealing gasket provided with the unit **BEFORE** bringing the next module closer. If removable lifting lugs are in conflicts, please remove them (**Figure 2**). In some cases, reinforcing panels (**Figure 11**) are installed in between section for transport, and these will need to be removed.

Note : Please be careful to avoid empty gap between the extremities of the sealing gaskets when a new roll of gasket is starting (**Figure 4**).

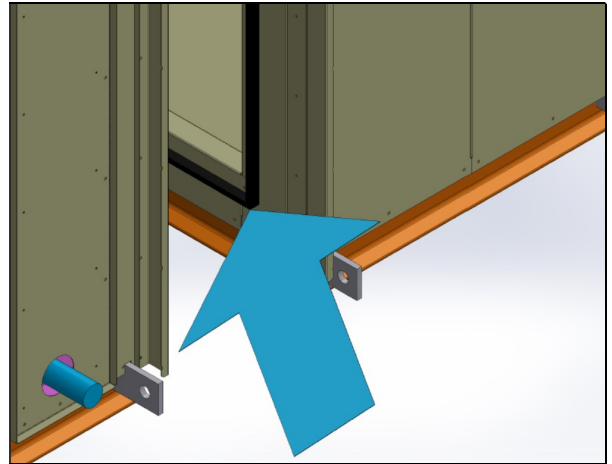


Figure 4: Installation of the Sealing Gasket

- When sealing gasket is in place, and the crane operator did move the adjacent section as close as possible to the preceding one, you might need a chain block to bring both sections closer. Shown in **Figure 5**, lifting lugs located at each corner of the section can be utilized with the use of the chain block.

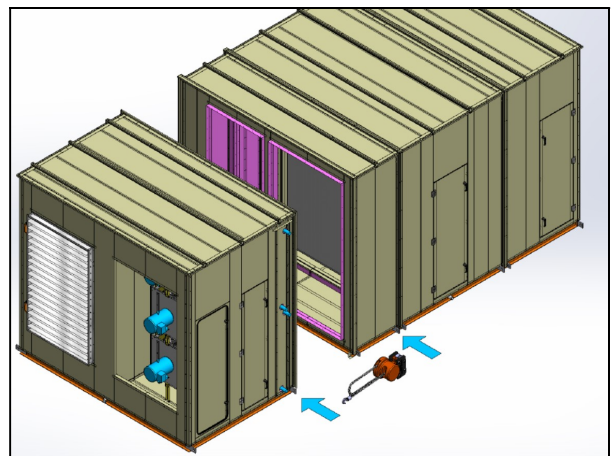


Figure 5: Approaching 2 sections with a chain block

- When both sections are aligned, use the supplied bolts and nuts to fasten them together to the corner lifting lugs of both sections. Once fastened, it will bring and secure both sections together while the installed sealing gasket, shown in **Figure 4**, will be well compressed. Two bolts grade 5 and 2 nuts are supplied at each unit joint (**Figure 6**).

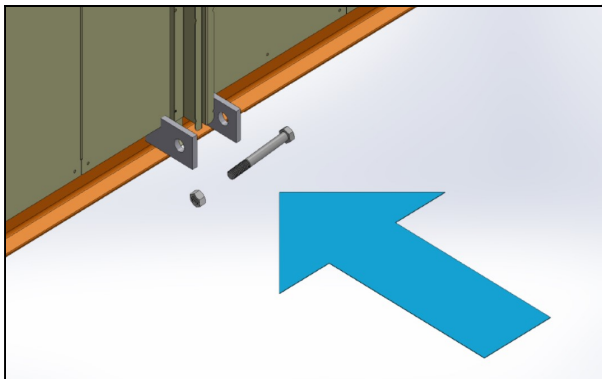


Figure 6: Supplied Bolt and nut

- Two metals pieces are supplied, for each side of the section, to hide the joint at the structural base level. Before **fixing** the metal plate on the structure, apply a generous bead of sealant behind the plate. Repeat the same step for each side of the unit (**Figure 7**).

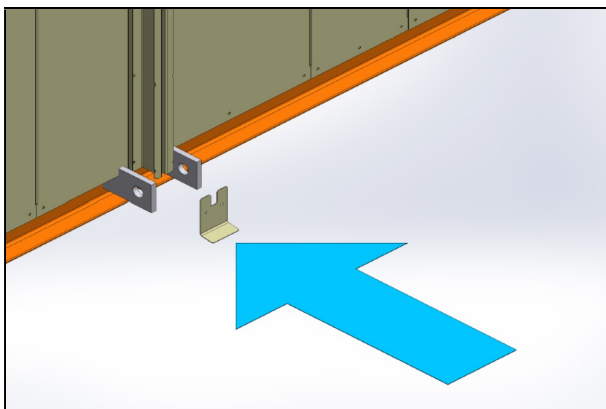


Figure 7: Metal plate for structure base frame

- This following step is to blank all pieces of the joint section with a cover flange (**Figure 8A**). Before installing these flanges, you will need to apply generously a bead of sealant (provided by Bousquet) between each fixation flange (**Figure 8B**). Ideally, caulk the joint seams of the unit by filling the cavity (**Figure 8C**) where the sealing gasket was installed in figure 4. If the sealing gasket is too distant from the border, please apply the caulking at the surface of the panel level (**Figure 8D**) where the fixation flanges are located. Please note, sealant is not shown in **Figure 8**.
- Before fixing the cover flange A (**Figure 8A**), use metal screws (**not provided** by Bousquet Technologies) to tighten the fixation flanges (**Figure 8B**) at every 12in.

- Install the cover flange A (**Figure 8**) with the use of metal screws (**not provided** by Bousquet Technologies) on the fixation flanges.

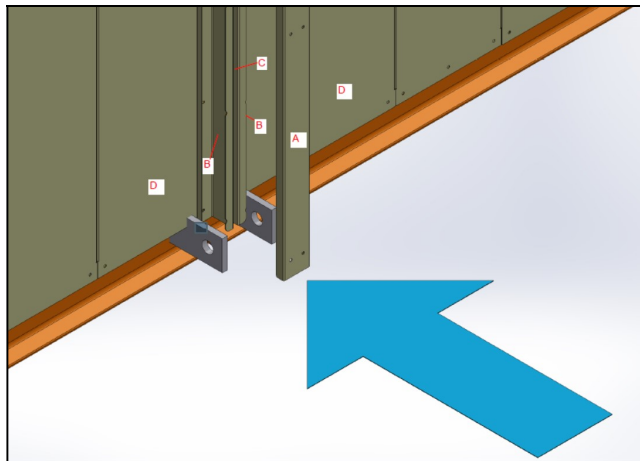


Figure 8: Installation of the cover flange on joint section

- For the joint roof, same type of cover flange will be supplied. And again, apply generously some sealant between the 2 pieces resulting a « T » at the unit roof before fixing the cover flange (**Figure 9**).

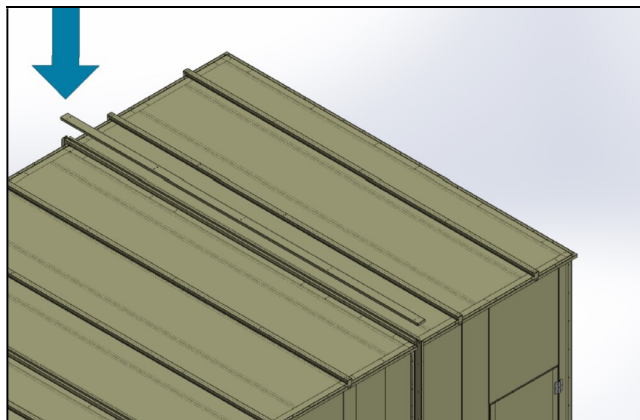


Figure 9: Cover flange for the roof

- Internal joint cover pieces are also provided. These pieces (*shown in pink on Figure 10*) must be fixed by the interior of the air handling unit section. It is the installer decision to apply another sealant joint before fixing the internal joint cover **or** depending on the client preference and/or the project application (**Figure 10**).

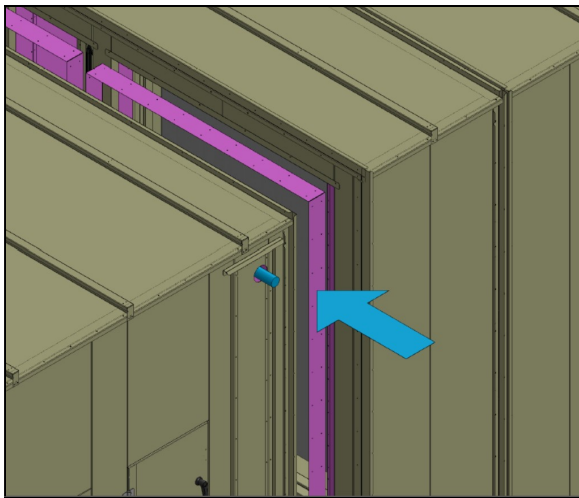


Figure 10: Internal joint cover pieces

- When installation is completed, it is important to remove the cover panels or reinforcing panels for shipping before installing the ducts and/or operating the air handling unit. (Figure 11) Also, as mentioned before, cover/reinforcing panels must be removed when joining 2 sections together. In some cases, some panels cannot be removed once the sections are joint together.

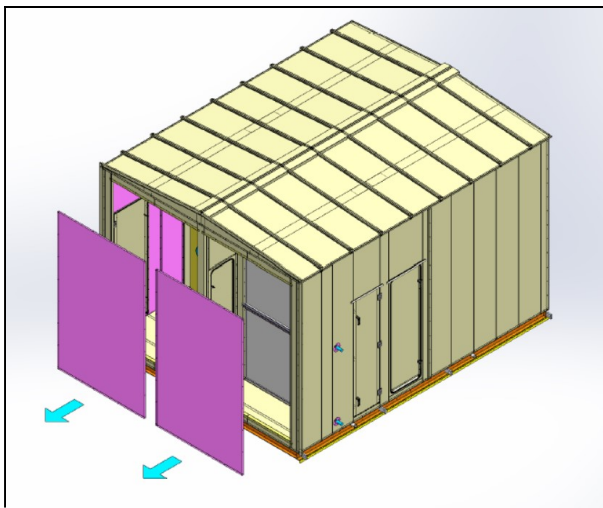


Figure 11: Removal of the cover panels for transport

Air handling unit with only 1 section, please follow **Figures 1, 2, 3 and 11** (if applicable).

Since it is not allowed to ship paint, if touch-ups are required, *Bousquet Technologies* standard paint code is RAL 7030.

NOTICE - For unit that must be set onto the curb:
 Note that *Bousquet Technologies* is not manufacturing curbs but will provide which perimeter size it should be built to for a nice fit. For recessed curb installation, First, a gap of ½" [13 mm] is left between the curb and the unit base frame on all outer sides. Use ½" [13 mm] wood shims to set the gap. This is important, as it will prevent the first section from sliding on the curb towards the next sections, when pulling the multi-section (modular) unit together and align the duct connection of the unit with the curb. The roof curb shall sits inside the unit perimeter base and the unit base overhangs the curb to prevent water entry. Note that a gasket, provided by the curb manufacturer shall be installed on top of the curb before installing the unit.

For structural steel or pad mounting, if the dimension of the support is larger than the curb, then the end section base must be positioned so the duct connection lines up properly and then fastened to the structural steel or pad to prevent the end section from moving when pulling sections together.

For both installation type, fastening method to the curb or structure must be determined by the Installing Contractor based on the local codes.

5. Equipment Shut-Down

- **Extended shutdown**
 When the unit is not used for a long period of time, it is recommended to turn off the power supply. It is also recommended to inspect the equipment before restarting the device after a prolonged shutdown.
- **Shutdown in an emergency**
 For any emergency, or maintenance, it is necessary to stop the unit using the main disconnect (OFF position).
- **Restarting after stopping the unit, follow the following minimum procedure:**
 - i. Put the main disconnect in the OFF position
 - ii. Check the condition of the filters, replace if necessary
 - iii. Make sure that nothing partially obstructs the air inlets and outlets of the unit
 - iv. Make sure that nothing obstructs the components of the unit in their movement (dampers, motors, fans, and others)
 - v. Make sure no one is inside the unit.

- vi. Place the main disconnect switch in the *ON* position and the sequence of operation will begin.
- vii. If nothing starts, consult customer service and/or the control firm.

6. Wiring sequence

- The unit nameplate gives the voltage and the total amperage required.
- The main power supply cable must be connected to the main disconnect switch (or terminal block) as shown on the electrical drawings provided.
- Make sure the power supply clamping screws are properly tightened.
- Connect the service circuit (optional) via the 120/1 junction box or the service disconnect provided.
- Connect any remote sensors that may be required (optional). Check if your device needs these probes in the shop drawings.

7. Fans check up

Check the direction of rotation of the fans. As *Bousquet Technologies* mainly uses direct drive fans, it is very common that variable frequency drives will have to be operated above 60 Hz. Consult the shop drawings for the expected operating frequency of the motors.

8. Additional verifications

Before starting the equipment and after 8 hours of operation, it is strongly recommended to check the alignment and lubrication of the bearings (when present). Also check their connecting collars.

In rare cases, please check the alignment and tension of the drive belts.

escaping into the drain caused by positive pressure. Condensate piping can be steel, copper or PVC. Slope the drain lines downward in direction of flow not less than 1/8" per foot toward the building drainage system; otherwise use a condensate pump. Refer to local codes for proper drainage requirements. Installing a plug for cleaning of the trap is recommended. Fill the P-traps with water before starting the unit. Winterize the drain line before freezing on outdoor units.

Under some conditions, heat tracing may be required on the drain pipe. Check and clear drains annually at start of cooling season. Drainage problems can occur should drains be inactive and dry out, or due to reduced water flow caused by buildup of algae. Regular maintenance will prevent these from occurring.

NOTICE:

Each drain connection requires a separate drain trap supplied and installed on site by the contractor.

For a trap to work properly, it must be primed.

During freezing periods, primed traps may need to be heat traced or drain and plug the trap when not in use.

If a drain connection has a smaller pipe inside, connect to the outer pipe only.

Ensure that the trap is of adequate depth to operate against a static that includes the extra pressure drop for dirty filters.

Cooling coil drain pans may have multiple drain connections extending outside the unit casing.

Multiple drains may be connected to a common drain providing that each drain is individually trapped and vented to avoid problems from drains in different pressure zones.

The drain must be properly sized and sloped.

Drain traps

Cooling coils, humidifiers, sensible heat exchangers or other options that can produce condensation are provided with a drain pan with a MPT (Male Pipe Thread) drain connection. A drain trap and condensate line of equal size must be field provided by the Installing Contractor on the drain connections and coupled to the building drainage system to prevent air or sewer gases from being pulled into the unit caused by the negative (suction) pressure and forcing water out of the pan into the unit or from air

Size drain trap with the following minimum requirements :

a) Units with draw through drain pans :

$$H1 = \text{Negative Static}^* \times 1.5 + 3.5'' \text{ (89mm)}$$

$$H2 = \text{Negative Static}^* \times 0.75 + 2.5'' \text{ (64mm)}$$

b) Units with blow through drain pans:

$$H2 = \text{Maximum Positive Static}^* \times 1.5$$

$$H1 = H2 + 0.5'' \text{ (13mm)}$$

*Static Water gauge (w.g.) in inches including fully loaded filters.

Ensure adequate clearance for properly sized drain traps.

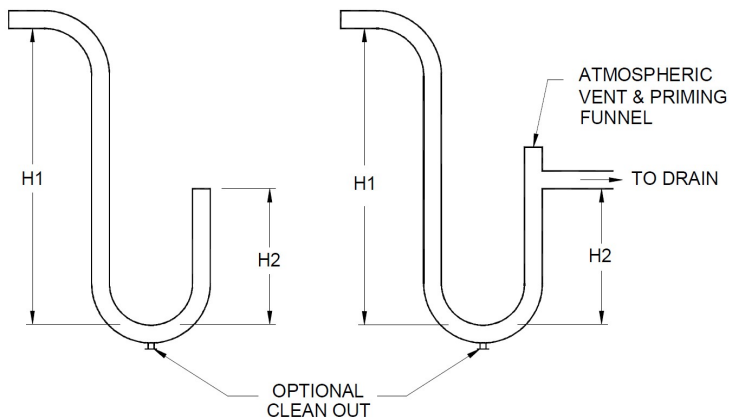


Figure 1: Drain traps

WARNING! Failure to properly trap each connection can result in drain pan flooding, standing water inside the equipment, building damage, injury or death, cause poor air quality or other problems.

START-UP FORM

General Information

Contractor : _____ Project Name: _____
 Technician : _____ Unit tag # : _____
 Date : _____
 Email : _____ Phone : _____

Pre-Start checklist

BEFORE starting the unit, the following form must be completed:

| CHECK | VALIDATION |
|---|------------|
| Is the electrical connection (disconnect) is in the "OFF" position? | |
| Is the unit data documentation included, clear and complete? | |
| Are joints between sub-sections properly installed? - For units only in section | |
| In order to avoid air and/or water intrusion, are all holes well sealed? | |
| Is all debris and packaging outside the unit? | |
| Are fans properly installed? (The turbine rotates freely? the belts are well aligned and tightened?) | |
| Are air filters clean and properly installed? | |
| The coils were not damaged during transport or installation? | |
| Is the piping completed, rinsed, ventilated, and tested? (Check for leaks) | |
| Are refrigeration components properly connected and in good condition? (Check that the required clearance around each component is respected) | |
| Are the dampers and actuators properly installed? | |
| The heat wheel media is not damaged, and the wheel rotates freely (by hand)? | |
| The heat wheel is well centered (does not tilt during rotation) and its seals are well positioned? | |
| Are the heat wheel components properly adjusted? (The wheel motor mounting clips and the alignment and tension of the belt pulley) | |
| Plate heat exchanger, heat wheel, heat-pipe or Superblock was not damaged during transport / installation? | |
| Have the drains been installed and connected to the outside properly? | |
| The high and low voltages in the sections initially connected in the factory have been reconnected? (for unit in sections only) | |
| Ship loose components have been installed and connected? | |
| Has the electrical diagram been checked and left inside the unit? | |
| Have power supplies and wiring been checked and validated by local authorities? | |
| Electrical connections made at the plant and site have been checked and tightened as required? | |
| Have ventilation, heating and air conditioning systems been checked and tested? | |

| CHECK | VALIDATION |
|--|------------|
| Power up the unit at least 24 hours before starting to ensure that the liquid coolant has evaporated from the compressors? (if applicable) | |

Start-up Checklist

DURING unit start-up, it is important to follow the steps below:

| STEPS | COMPLETED (Y/N) |
|--|--------------------|
| Close all doors and access panels. | |
| Turn off heating and air conditioning applications and test fans (check direction of rotation) and energy recovery component. -See appropriate manual for recovery type | |
| Check the dampers for proper operation. | |
| Adjust the VFD to the appropriate frequency. | |
| For recirculation mode, adjust the fresh/return/mixing/exhaust air dampers to obtain the required air volumes. | |
| Check the amperages of each motor over several phases and compare them with the amperages of the nameplate. | |
| Check the voltage of the disconnect and compare it to the voltage on the nameplate. | |
| Turn on the refrigeration system and check that the compressors do not produce excessive vibration/sounds. | |
| Check that the condenser fans are turning in the correct direction and do not produce whistling. | |
| Check refrigeration and/or water piping and make sure there are no leaks. | |
| For heating systems, ensure adequate air supply and set the minimum flow rate on the burner rating plate. | |
| Turn on the heating system and make sure to follow the start-up steps for burners and electrical coils -See the installation, operation and maintenance manual for each | |
| Check pre-programmed instruction points and adjust as required. | |
| Check the air balance for the different operation sequences (occupied and unoccupied) | |
| Upon completion of the checks, return the unit to default operation mode and send a copy of the checklist to <i>Bousquet Technologies</i> (support@bousquet.ca) to validate the warranty. | |



Maintenance

Maintenance Schedule

| COMPONENTS | DESCRIPTION | MAINTENANCE FREQUENCY | | |
|---|---|-----------------------|-------------|--------|
| | | Month | Semi-annual | Annual |
| General | General inspection of the unit | • | | |
| | Cleaning of debris & dirt | • | | |
| | Noise & abnormal vibration check | • | | |
| Filters | Replace filters | • | | |
| | Inspect the filter holding | | | • |
| Fans | Cleaning the fans | | • | |
| | Align, adjust or replace belt (centrifugal fans) | | • | |
| | Check motor voltage and current | | • | |
| | Lubrication (motor, shaft bearings, motor base screws, etc.) | | • | |
| Dampers | Inspect for dirt and leaks | | | • |
| | Check assembly (actuators and connecting parts) | | • | |
| | Lubrication of parts | | • | |
| Coils | Cleaning of coils | | | • |
| | Cleaning of condensation drain pans | | • | |
| | Wintering Water Coils | | • | |
| | Clean the p-trap of the drain line and check its liquid level | • | | |
| Burners | Refer to the Burner Type Manual (section "Maintenance of the Appliance"). In this manual, there will be different checks to be performed. | | | • |
| Heat Wheel | Check that the wheel rotates freely | • | | |
| | Check all wheel components -See wheel manual for details | | • | |
| Plate Heat-Exchanger | Inspect the general condition of the plate -See Heat Exchanger Manual for details | | • | |
| | Measure the pressure difference through the heat exchanger | • | | |
| Regenerative Energy recovery-Superblock | Inspect Superblock general condition -See Manual for details | | • | |
| Electrical | Check electrical connections, tighten if necessary | | | • |
| | Check all motor overload settings | | | • |
| | Check system operation in all control modes | | | • |
| Refrigeration | Check for oil on refrigeration components (coils, compressors, etc.) to indicate coolant leakage | | • | |
| | Inspect condition of condenser fans | | • | |

Troubleshooting

TROUBLESHOOTING GUIDE

|  GENERAL  | | |
|--|---|---|
| PROBLEM | PROBABLE CAUSE | SOLUTIONS |
| The unit does not start | Open Occupancy Contact | Check external wiring |
| | Open unoccupied Recirculation Contact | Check wiring in control panel |
| The unit does not turn off | Closed occupancy contact | Check external wiring |
| | Closed unoccupied recirculation contact | Check wiring in control panel |
| The unit is noisy | The ducts vibrate | Install flexible connections |
| | Fan wheel misaligned and/or hooks other components | Adjust the fan wheel or replace the defective part. If necessary, remove the fan-motor assembly from the unit |
| | Belt tension (too loose or too tight) | Adjust the belt tension |
| | Unit is too close to occupants | Install a silencer |
| | Thermal wheel contact seal not properly installed | See Heat Wheel Manual for proper installation |
| Supply air is too cold | Unbalance between supply air and exhaust air | Check filters and heat exchanger for obstruction |
| | | Check air flow balance |
| | | Install a heating module |
| The damper does not open | The power supply is interrupted | Check actuator wiring |
| The damper opens when it should be closed | The wires are inverted | Reverse the actuator wires |
| Low air flow | The filters are dirty | Replace filters |
| | Air Leakage | Seal leaks in ducts and on the walls of the unit |
| | The exchanger does not perform as expected | Check the pressure difference of each flow and compare with the document |
| | Fan wheel rotates in the wrong direction | Reverse rotation |
| | Fan rotation speed is too slow | Increase speed by increasing the diameter of the motor pulley or decreasing the diameter of the fan pulley |
| | The fan belt slides | Adjust the belt tension |
| Filters are no longer in their holding frame | The filters are too dirty and are out of rack | Clean or change filters |
| | The filter holder is damaged and/or missing fasteners | Repair the filter holding and reinstall the filters. Order new fasteners. |
| Fan Motor Overload | Static pressure too low | Check for filters and other components |
| | Motor electrical voltage is too high/low | Check electrical voltage and adjust as required |
| | Fan speed is too high | Reduce speed |
| | Motor power is too low | Install a more powerful motor |
| Energy recovery wheel not working | The unit is in "Free Cooling" mode | Check connecting wire for proper operation |
| | Wheel Motor Failure | Check your operation |
| | Wheel Belt Failure | Check for derailment or failure |
| | Wheel Pulley Failure | Check its connection with the motor shaft |



WATER RELATED ISSUES



| Problème | Cause probable | Solutions |
|---|--|--|
| Presence of water inside the unit | Unit not properly sealed at installation. Check electrical ducts and piping | Seal all joints (pay special attention to sections under negative pressure). Inspect and seal all holes drilled by electrical wires and piping |
| The water carryover from the cooling coil on the components (fan, motor, etc.) | The flow is too high | Reduce flow rate by adjusting the frequency controller |
| | The absence of an intermediate condensation drain pan | Install an intermediate condensation drain pan |
| Condensation drain pan does not drain appropriately | P-Trap drain not properly installed | Revise drain installation and dimensions |
| | Unit is not level | Level the unit |
| Pre-filters are wet | Air intake hood (shipped separately from unit) not properly installed and sealed | Reinstall the air intake properly |
| | Flow exceeds design conditions and draws water into the unit | Redo air intake design or reduce airflow |



PROBLEMS RELATED TO REFRIGERATION



| Problème | Cause probable | Solutions |
|--|--|---|
| Solenoid valve does not open | There is no power to the coil | Check circuit connections |
| | Solenoid coil is defective | Replace the solenoid coil |
| Condenser Fans Short Cycle | Improperly adjusted control sequences | Adjust with VFD |
| Overheating too low due to excess refrigerant transmitted to evaporator | Expansion valve is defective | Disassemble the valve, remove dirt and recheck the overheating. If the problem persists, replace the valve. |
| Compressors Lock-out | Condenser fan failure | Check fan rotation. Check speed, overload, controls, motors burned. |
| | High pressure control malfunction | Check the controls settings |
| | Insufficient fluid flow through condenser coil | Clean the dirt on the coil. Repair damaged fins. |
| | Excessive coolant filling | Check condenser sub-cooling and adjust charge as required. |

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