

# ELECTRIC AIR HEATER

## INSTALLATION AND SERVICE MANUAL

**BC(E) SERIES**  
*INDOOR / OUTDOOR*



MANUFACTURED BY

**BOUSQUET**  
Technologies

## GENERAL INFORMATION

PROJECT:

\_\_\_\_\_

ADDRESS:

\_\_\_\_\_

MODEL:

\_\_\_\_\_

SERIAL NUMBER:

\_\_\_\_\_

INSTALLER:

\_\_\_\_\_

ADDRESS:

\_\_\_\_\_

TELEPHONE:

\_\_\_\_\_

INSTALLATION DATE:

\_\_\_\_\_

MANUFACTURER:

BOUSQUET TECHNOLOGIES INC.

ADDRESS:

2121, NOBEL, SAINTE-JULIE (QUÉBEC) J3E 1Z9

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514 874-9050 / 1-800-363-9197

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THIS INSTRUCTION MANUAL MUST ALWAYS BE READABLE  
AND KEPT IN THE HEATER AT ALL TIMES.

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## **INSTALLATION STANDARDS**

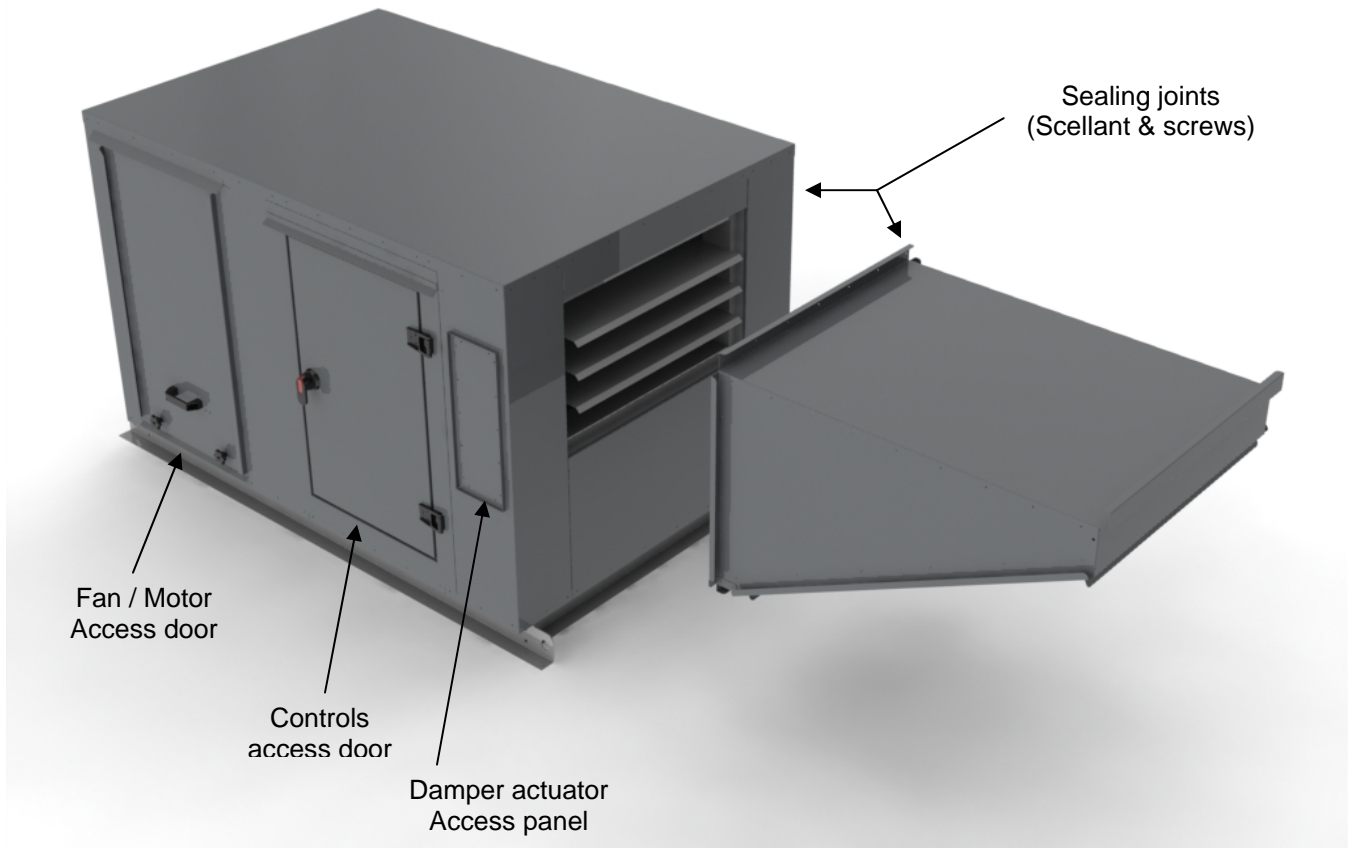
*The installation of this air heater must comply with the relevant installation codes such as the Canadian Electrical Code (**CSA C22.1**) and the standard **ANSI/NFPA 70**.*

*All internal and external electrical installations must comply with the electrical diagrams of the unit. (To find out more, please refer to the "Operating sequence" which can be found in the "Start up instructions" section.)*

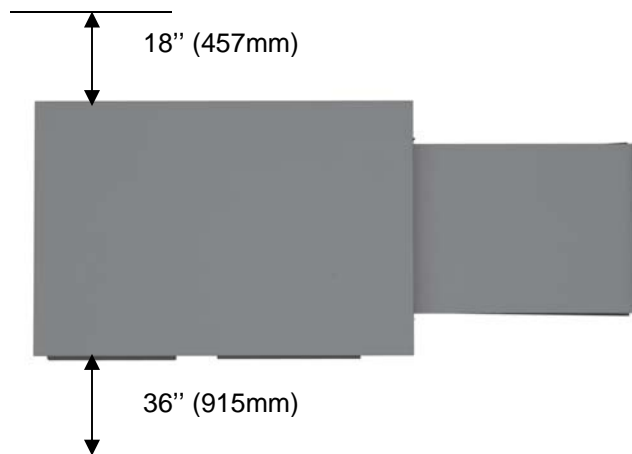
*The tightening of the connections must be verified before start up as well as after a short period of operation (typically, after 2 weeks).*

*The grounding of the unit must be done properly.*

## INSTALLATION INSTRUCTIONS



### MINIMUM CLEARANCE FOR SERVICE AND MAINTENANCE



The air intake must be located and oriented in order to prevent the infiltration of snow, rain and flammable toxic gas, as well as any other harmful material into the make-up air heater. When the heater is hung over a working area, it must be installed at an adequate height and sitting on an independent structure. For indoor installation, please refer to current local installation code.

When firewall dampers are used in the ducts they must be equipped with an electric switch wired to the safety control circuit of the unit in order to shut down the air heater when fire is detected. These electric switches must be wired to re-activate the safety circuit only when the firewall dampers are completely open.

In order to prevent any risk of freezing, the installer must install a low temperature sensor if not supplied with the unit. If the unit requires outdoor air, it is recommended to install a low limit sensor to prevent freezing.

## ELECTRICAL WIRING



### **WARNING**

*If the original wiring needs to be changed or modified, the replacement wiring must be of the same size and must be certified CSA, UL, TEW or AWM 105 °C.*

*The conductors installed in the air flow of this unit must be an integral part of a metallic cable or be enclosed in a duct, in an electrical metallic tube or in metallic pipes.*



### **DANGER**

*For safety reasons, all modifications or alterations to the electrical internal connections or to the electrical coil's components are strictly forbidden. All unauthorised modifications will void the warranty.*

*This unit runs on high voltage. Electrical installation of this unit must be performed by a qualified electrician.*

*RISK OF ELECTRIC SHOCK. Make sure that the electrical supply is disconnected before working on the unit.*

## Compliance of electrical installation

CAUTION: A disconnect with or without protective fuses must be installed if they are not present on the control panel of the electric coil.

CAUTION: The supply wires must be of an appropriate diameter, according to the current intensity. It is indicated on the nameplate of the manufacturer (MCA).

## Normal operating conditions

### AIR FLOW:

- The air flow must never be lower than the minimum indicated on the descriptive plate.
- No combustible particle, vapour of flammable gas must ever be present in the air flowing in the electric coil.
- The air flowing in the electric coil must be dust free. Filters of a minimum 3.0% efficiency are required.

## Maintenance

The electric coil does not require any particular maintenance; however, we recommend an annual inspection:

### 1) VISUAL INSPECTION



#### **CAUTION**

*DISCONNECT THE COIL'S ELECTRICAL  
SUPPLY BEFORE ANY VISUAL INSPECTION.*

- Check the condition of the heating elements. Pay special attention to the presence of dust accumulations which can cause damages to the electric coil.
- Check for corrosion or overheating signs on the frame.

## 2) ELECTRICAL INSPECTION



### **CAUTION**

*DISCONNECT THE COIL'S ELECTRICAL SUPPLY BEFORE ANY ELECTRICAL INSPECTION.*

- Check the condition and tightening of all electrical connections.
- Make sure the protective fuses are in good working order.
- Verify the resistance of each circuit against ground.

***Any electrical component replacement must be made with original components.***

## WIRING SEQUENCE

- a) The nameplate of the unit gives the total voltage and amperage required. The main electrical supply cable must be well sized to accommodate these criteria.
- b) The main cable must be connected to the disconnect or the main power terminal strip. Make sure the tightening screws of the disconnect are well tightened.
- c) Connect the remote control panel (optional) to the strips provided in the main control box of the unit.
- d) Connect the remote temperature sensors (optional). Make sure the connection wires used are shielded (with metal sheathing).



## START UP INSTRUCTIONS

### BLOWER ADJUSTMENT

- Check the voltage at the main electrical disconnect.
- Check the fan's rotation direction and modify the electrical connection if required.
- Ensure that the contactor's overload relays are set according to the full load amperage (FLA) as indicated on the motor's nameplate.
- Check the belts' alignment and tension.
- Measure the amperage on each phase of the motor. This information must be specified on the service report.
- Balance the air flow in the unit and adjust pulleys consequently.

## ELECTRIC HEATING COIL'S FEATURES

The standard open elements coils are made of a NiCr 60 (grade C) alloy: 60% Nickel, 16% chrome and the rest is iron. With this type of alloy, the maximum operation temperature is of 1,850°F (1000°C).

### Operation:

An electric signal coming from a modulating thermostat is transmitted to the HEC controller. The HEC controller activates the first modulating stages of the electric coil. The superior stages are generally of the "Open / Close" type and are activated successively by the HEC controller.

The HEC controller accepts many types of entry signals used in the industry and converts them into a modulating signal or by stages to transfer them to the SSR and to the contactors.

This controller ensures a superior precision by precisely measuring the air speed and by updating continuously the signal transmitted to the electric coil.

### Types of entry signals accepted by the controller:

- 0-10VDC
- 4-20 mA

## **OPERATING SEQUENCE**

Operating sequence of a SINGLE VOLUME unit (for reference only)

### ***BLOWER'S START-UP***

- 1 - *Place the selector (OFF/BLOWER/HEATING) on the BLOWER position.*
- 2 - *Fresh air damper opens.*
- 3 - *The damper's opening proof contact shuts off.*
- 4 - *The contactor of the blower's motor is powered.*
- 5 - *The blower is in operation.*

### ***ELECTRIC HEATING COIL'S START-UP***

- 1- *Place the selector (OFF/BLOWER/HEATING) on the HEATING position.*
- 2- *Fresh air damper opens.*
- 3- *The damper's opening proof contact shuts off.*
- 4- *The contactor of the blower's motor is powered.*
- 5- *The blower is in operation.*
- 6- *The air flow switch's contact shuts off.*
- 7- *If the manual and automatic high limit temperature sensors are closed, the Modulating controller (SCR) is powered.*
- 8- *The modulating controller fluctuates proportionally according to the temperature sensor's reading to reach the desired temperature.*

## AIR HEATER MAINTENANCE

CHECK LIST	PERIODICITY			
	WEEKLY	MONTHLY	SEMESTRAL	ANNUALLY
Check filters; change if necessary	•			
Ensure that no combustible materials are stored near the unit	•			
Ensure that nothing blocks the air inlet and outlet of the unit	•			
Check the belts and adjust or change them if necessary		•		
Lubricate the blower and motor's bearings as needed		•		
Check the full opening of fresh air dampers			•	
Ensure that all security controls are in good working order			•	
Check maximum temperature thermostat				•
Check all electrical connections				•
Ensure that the blower and motor are firmly attached				•

### ***IMPORTANT***

**BEFORE START-UP AND AFTER 8 HOURS OF OPERATION**

- 1) *Check the alignment and lubrication of the bearings*
- 2) *Check the bearing's tightening rings*
- 3) *Check the alignment and tension of the belts*

**AFTER 24 HOURS OF OPERATION**

*Check the tension of the belts*

## **AIR HEATER SHUT OFF**

### **PROLONGED SHUTDOWN**

When the unit is not being used for a long period of time, it is recommended to cut the electrical supply.

Before starting up the unit after a long shutdown, it is recommended to fully inspect it in order to ensure that everything is in working order.

### **EMERGENCY SHUT DOWN OF THE AIR HEATER**

When it becomes necessary to shut down the unit in an emergency situation, you must place the main disconnect switch on "OFF".

### **RESTARTING THE UNIT AFTER A SHUT DOWN**

Following a shut down of the unit, perform the following verifications:

- 1) Place the disconnect switch on "OFF".
- 2) Verify, replace or adjust, if necessary, the fan's belts.
- 3) Verify the condition of the filters and replace them if necessary.
- 4) Ensure that nothing blocks the air inlets and outlets of the unit.
- 5) Ensure that nothing keeps the air inlet and outlet dampers of the unit from functioning properly.
- 6) Place the disconnect switch on "ON".
- 7) Ensure that the blower's motor is functioning.
- 8) Ensure that the electric coil is functioning.

## TEMPERATURE CONTROL TOOLS



### Duct temperature sensor

Installed at the blower's discharge or in the returned air, it ensures an accurate reading of the supplied air temperature.



### Room temperature sensor

Installed in the room, it ensures an accurate reading of the room temperature and allows to adjust the supplied air temperature according to the request.



### Room or duct temperature selector

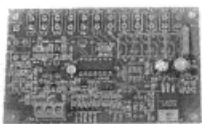
The temperature selector can be installed either in the unit's control box or in the remote control panel ("M" series). It offers a large range of temperature's set points.



### Air low limit thermostat and sensor

The air low limit thermostat stops the unit if the supplied air temperature is below 40°F for more than 300 seconds. (Optional)

## ELECTRICAL COMPONENTS



### HEC Electronic controller

The HEC changes a modulating signal into a proportional signal and sends it to the SSR to modify the heating capacity of the electric coil. The control signals are: 0-10 VDC and 4-20 mA provided by the room or duct thermostat and the air flow thermostat of the unit.



### Electronic relay (SSR) with a thyristor (SCR)

Controls proportionally the amount of power transferred to the electric coil according to the HEC controller's signal.



### Transformers

Two transformers are provided for controls and power.



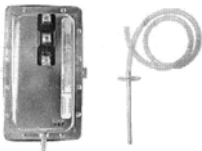
**High limit air temperature sensor with automatic reset**

Used to prevent the electric coil from overheating (installed near the electric coil and set at 160°F).



**High limit air temperature with manual reset**

Used to prevent from getting a supplied air temperature too warm (installed near the blower and set at 160°F).



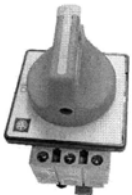
**Air pressure controller**

Automatically turns off the electric coil when the air pressure goes below the set points.



**Fuses**

Fuses assure the controls security. Additional fuses assure the electric coil's security when required by the local code (USA).



**Main electrical disconnect switch**

The disconnect switch is installed in the control box with a proof of operation to prevent the electric coil to be in heating mode when the door is open.



**Programmable timer clock (7 days / 24 hours; mode: « Day / Night »)**

The timer clock allows to program ventilation and heating sequence to accommodate the needs of the building.



**ELECTRIC AIR HEATER "BC(E)" SERIES  
START UP REPORT**

2121, Nobel  
Ste-Julie, Quebec J3E 1Z9  
Tel: (514) 874-9050 - Toll free: 1 (800) 363-9197  
Fax: (450) 649-8756

Company: _____	Project: _____
Technician: _____	Project's representative: _____
Installer: _____	Address: _____

**MANUFACTURING INFORMATION**

Model Number: _____	Overload: _____ Amps
Serial Number: _____	Belts: _____
Blower: _____ / _____	Pulley's C-C: _____ (+ - )
Motor's pulley: _____	
Blower's pulley: _____	

**INSPECTION**

Air conduits installed: <input type="checkbox"/>	Air intake hood installed (screws and sealant): <input type="checkbox"/>
Main electrical connection completed: <input type="checkbox"/>	Blower's rotation checked: <input type="checkbox"/>
Remote control panel installed: <input type="checkbox"/>	Interlock checked: <input type="checkbox"/>
Belts tension verified: <input type="checkbox"/>	Interlock type : _____
Note: _____	

**START UP**

Amps supply: _____	Measured voltage: _____
Ph 1      Ph 2      Ph 3	Ph 1      Ph 2      Ph 3

**ADJUSTMENTS**

Blower rotation speed _____ RPM	Electric coil modulation verified <input type="checkbox"/>
Supply temperature _____ °F	Complete unit sequence verified <input type="checkbox"/>
Low limit thermostat _____ °F	Low limit delay: _____ sec.
High limit thermostat _____ °F	Damper actuator _____ VDC
Inlet thermostat _____ °F	O/A end limit switch _____ %
Start up completed: <input type="checkbox"/> If not, for what reasons (or other comments):	
_____	
_____	
_____	

Signature : \_\_\_\_\_ Date : \_\_\_\_\_

**\*\*\* RETURN TO MANUFACTURER BY FAX AT 450 649-8756 \*\*\***